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Math Placement Acceleration Initiative at the City College of San Francisco Developed with San Francisco Unified School District

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Background

This issue brief both presents an analysis predicting students' success in their first community college math course and explains how a new placement policy created through San Francisco's Bridge to Success (BtS) initiative acts on these results. BtS brings together the City and County of San Francisco, the San Francisco Unified School District (SFUSD), the City College of San Francisco (CCSF), and key community organizations to promote postsecondary success for underrepresented students. BtS leadership identified CCSF's math placement policies as one issue where greater study could improve policy: because some of the students requiring remediation entered CCSF straight from a SFUSD high school, a joint policy between SFUSD and CCSF could improve policy and student outcomes for incoming CCSF students. The BtS math placement team recommended a policy to advance by one level certain students placed into remedial math; this analysis predicted which students could succeed under this policy, based on high school math grades, attendance, and California Standardized Test math scores.

By the new policy created by the BtS math placement team, SFUSD graduates entering in fall 2012 will have the following opportunity:

- Entering high school graduates who place below college-level math may choose to enroll in a course one level higher than their tested placement level if they meet two of the following three criteria:
    - Cumulative math GPA at SFUSD of 2.7 or higher;
    - Cumulative attendance rate at SFUSD of 90% or higher;
    - California Standards Test (CST) math proficiency level of Basic or above in 11th grade.
- Existing CCSF math placement testing policies, including a testing waiver related to Advanced Placement tests, will continue to apply to entering SFUSD graduates.

Background on Placement and Persistence

During their senior year of high school or in conjunction with college registration, students who enroll in CCSF take the ACCUPLACER® exam to determine their math placement.   Their test scores indicate which level of the math sequence they may take:

CCSF has two levels of introductory classes that count for college credit and three remedial or developmental levels that lead up to that college level. SFUSD graduates who entered CCSF in 2009-10 placed directly into college-level math 25% of the time (201 students out of 818[1]). The other 75% began in the remedial sequence, working their way up to college-level math.

At California community colleges, remedial programs do not count toward four-year college credit, though some do count toward associate's degree credit. Yet, remedial courses are necessary prerequisites for taking many of the courses that fulfill degree requirements for associate's degrees, many certification programs, or transfer to a four-year postsecondary institution. Taking these remedial classes can discourage student persistence; across 57 community colleges, more students did not make it through their remedial sequences because they did not enroll in the next course than because they failed or withdrew from a course (Bailey, Jeong, and Cho, 2010). However, the same study found that students assigned to remediation who opted to skip it were almost as likely to pass the first college-level course as students who made it through remediation. Research by CCSF found that the farther below college-level math a student placed, the less likely he or she was to advance through the sequence of remedial courses and to complete necessary transfer-level courses to enter a four-year institution (City College of San Francisco, 2010). In short, prior research shows that some students might do better in the long term by accelerating beyond some remedial work.

Previous Findings on Math Placement in CCSF

The JGC previously analyzed the factors that predicted math placement results, and this encouraged the Bridge to Success team to think about appropriate placement policies. That work showed that test scores and certain coursework could predict the students most likely to place into college-level math. In particular, a student scoring in the top two categories on either of the two highest CST math tests, assessed as "college-ready" or "conditionally college-ready" on the Early Assessment Program (EAP), or passing an AP Calculus or AP Statistics course was most likely to place into college-level math. Other positive indicators were earning higher grades in the math courses taken, taking higher levels of high school math, and taking math through senior year (Gurantz, 2011).

These data are useful on their own because it is helpful to know how aligned placement results are with the indicators students and teachers have in high school. For instance, some students might be motivated when they learn that working harder to bring up their math grades now could have an effect on how their college math career starts. However, when high school data and the placement test lead to different predictions for a student, are the placement results necessarily more accurate? Performing well in a math class can be the product of a broad variety of traits, while even well-created placement tests must measure a much narrower construct of math performance. Although the data showed general correlation between factors like high school math grades and ACCUPLACER® scores, there were enough outliers to raise questions. This indicated that placement test scores might not fully reflect students' potential math performance, and high school indicators such as math grades might provide additional useful information.

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[1] The count includes students who graduated from an SFUSD high school in four years, took the math placement test, attended CCSF in fall, spring, or summer of 2009-2010 and who either did not previously take classes at CCSF or graduated from SFUSD in 2009.

To test this, we followed up by asking how SFUSD students who entered CCSF performed when they took their first math courses. The level of this first course was determined by the placement test. We found that high school records could help predict which students were likely to pass or fail the class. Regression analysis showed that some of the characteristics that best predicted passing the first CCSF math course were test scores, attendance, and high school math GPA.

Predicting Success in the First CCSF Math Course: Data and Analysis

Our analysis used high school and community college records for the last six years of classes of students entering CCSF from SFUSD. These 3,978 students were enrolled as first-time SFUSD 9th graders from 2000-01 through 2005-6, graduated from SFUSD in four years, enrolled at CCSF, have a math placement record on file, and took a math course by fall 2010.

Exhibit 1 shows how passing rates for the first math course varied with course level and high school math GPA. Although it may seem counterintuitive, the few students who placed into the most basic level of math and had the highest high school GPAs were less likely to pass the class than were students who had lower GPAs; math GPA may have been a poor indicator for these particular students, or the students may have been placed in too low of a remedial class by the placement test and gotten bored in class.

Exhibit 1. SFUSD Graduates' CCSF Math Passing by Math Placement and High School Math GPA.
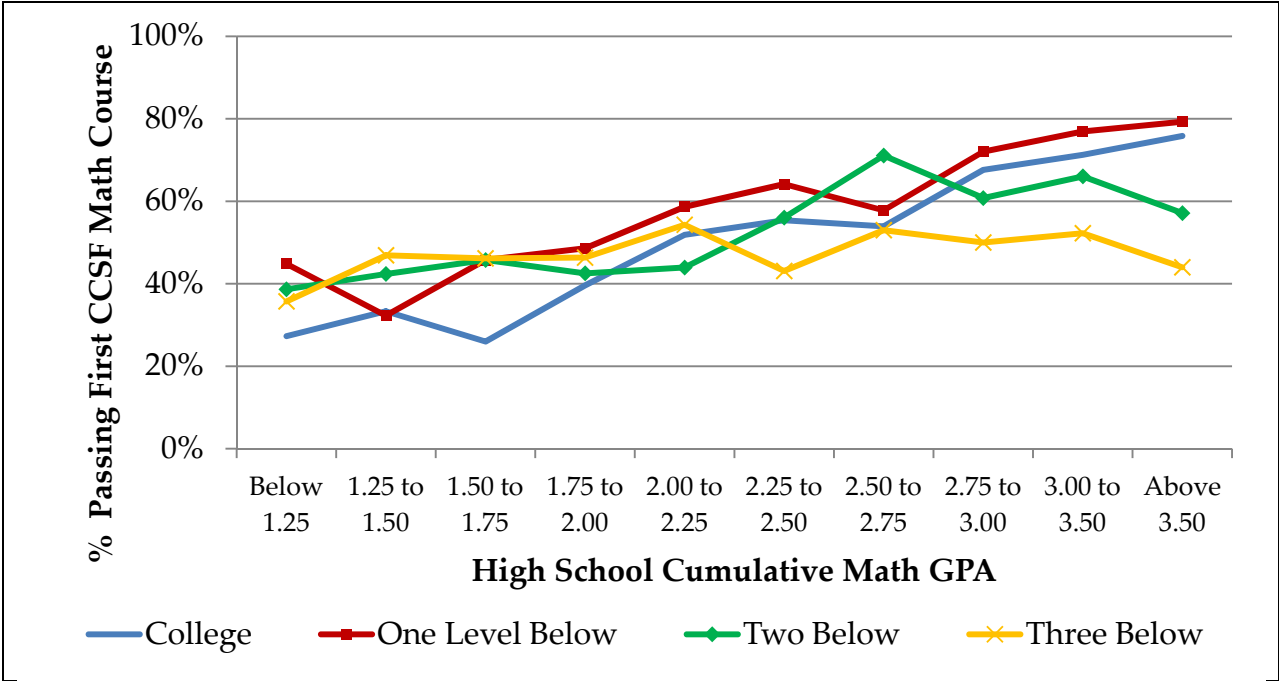
We then analyzed which student traits correlated with passing a first math class at CCSF. Some of the strongest predictors we found were high school math GPA, scores on the math California Standards Test (CST) students took in 11th grade, and attendance. Appendix Exhibit 1 shows that:

- Students had a harder time passing higher levels of math classes;

- Scoring higher on the Math CST helped, though the level of CST did not matter;
- Retaking the CAHSEE math exam or failing core classes in high school predicted that a student was more likely to fail; and
- Better high school attendance and high school math GPA predicted better performance.

Creating a Policy

Through a series of discussions, the Bridge to Success math team drafted a proposal based on the current math placement procedure, data on current course-taking success, and the goals of the CCSF and SFUSD math faculties.

Analyses conducted by the JGC showed which student characteristics were important in math course success. As mentioned above, some of the strongest predictors we found were high school math GPA, scores on the 11th grade math CST, and attendance. Upon discussion, the team chose these three measures as crucial because they believed the measures indicated actual causes of better math performance, they were in line with goals that SFUSD was already encouraging for students, and they were feasible for data systems on both sides to incorporate into their data exchange.

In order to incorporate these measures into policy, the team could require that students perform exceptionally well on at least one measure, or that they perform well on multiple measures. They decided that students meeting cutoffs on two of the three criteria would likely be capable of succeeding in a higher math class when promoted, while not making the criteria so narrow that the program reached few students.

The team examined student data to set cutoffs based on the success rates of those above and below the mark. They set cutoffs so that students above the cutoff had high rates of passing their first CCSF math course and students below the cutoff had much lower passing rates. The students selected by these measures appeared most likely to easily pass their current classes, and thus most likely to be able to handle a math class higher than their initial placement. Exhibit 2 shows that these criteria together differentiate students who passed their course less than half the time from students who passed their course two-thirds of the time. In an average year from 2004-05 through 2010-11, this rule would have promoted 106 students, about half of whom would move from the highest level of remedial work into college-level math.

Exhibit 2. Historical Performance in First CCSF Math Class of Students Meeting the Standard of At Least Two of the Three Criteria for Acceleration.

	% Passing First CCSF Math	Total # Placing Below College-level (Typical Year)	# Placing 3 Levels Below College-level (Typical Year)	# Placing 2 Levels Below College-level (Typical Year)	# Placing 1 Level Below College-level (Typical Year)
Meet Standard	66%	106	27	23	56
Do Not Meet	47%	248	137	66	45

Note: Criteria are earning at least 2.7 high school math GPA, at least 90% attendance, and at least a performance level of "Basic" (coded as 3 on a 1 to 5 scale) on the math CST taken during junior year. College math performance is measured for years 2004-05 through 2010-11, and results are averaged to suggest numbers for a typical year.

Faculty from SFUSD identified another issue important to the implementation of this policy. Some of the students they had taught who would have most benefitted from being accelerated by a level appeared to feel insecure about their skills and might be hesitant to enroll at an accelerated level. Thus, they discussed how students should receive letters that are carefully drafted to congratulate them on their potential and identify the traits that helped them get a higher placement; the letter as sent also directs students how to meet with counselors, a necessary step for both taking advantage of this opportunity and for using the Early Registration Program for first priority in fall classes . The Math Department Chair has contacted all of these counselors with a further explanation of the policy and encouragement to discuss the advantages and disadvantages of acceleration.

The acceleration policy has potentially negative unintended side effects. In particular, this policy would change the student composition of each remedial math course and the first level of college-level math. The CCSF math faculty identified that the remedial courses were often pulled ahead by a few active students who brought the rest of the class along, and if these students were bumped into the next level of courses, their former classmates might suffer. However, we did not know whether these were the students who would be promoted by the policy, nor could we evaluate whether these students themselves would benefit more by being exposed to more prepared peers or by helping the peers in their original courses. In addition, the policy is primarily advertised to new graduates of SFUSD, who currently constitute about a sixth of CCSF math students[2]. Thus the class composition would not change dramatically because CCSF students hail from a broad array of schools and educational backgrounds, and many are not recent graduates of SFUSD.

Another potential side effect might be greater numbers of students enrolling in math courses upon entering CCSF. Receiving a letter saying that they have been given an accelerated placement may encourage students to pursue math in their first semester, and it may incentivize them to enroll early in case the policy is temporary. The additional students induced to take math might be systematically different than the ones who had chosen to enroll in earlier years, and so the consequences of greater enrollment are unclear. Perhaps the additional students would have hung back because they were not confident in their math ability, and the letter gives them more confidence and helps them fully succeed. Or perhaps the additional students would have hesitated because they knew math was very difficult for them, and they actually lacked math skills compared to previous students. Although increases in enrollment would add more uncertainty to the outcomes of this policy, faculty from both systems involved favored higher math enrollment straight from high school and hoped it might maintain students' academic momentum in math.

Measuring the Results of an Acceleration Policy

As the policy is implemented, we hope to learn whether it is successful in getting students to pass a college-level math course sooner. A primary analysis—to be conducted after the fall 2012 semester and again with more students after fall 2013—will compare the grades of accelerated students to non-SFUSD coursemates, SFUSD coursemates who did not quite qualify to accelerate, and previous years' students.

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[2] Of 15,052 students taking their first math course at SFUSD in fall 2007 or later, 2,506 were SFSUD graduates.

Due to the conditions of the policy, the comparisons with previous years will not be perfect. However, we hope that the results will be strong enough to see whether it makes a difference for these students.

In addition, we hope to learn about the experience of students, faculty, and administrators during this transition using qualitative research methods. Not only can we learn about how the policy was implemented, but we can also investigate how well the policy was understood and learn about how the classroom experience felt for all involved.

Implications

This accelerated placement policy could not have happened without the active, intentional collaboration of SFUSD and CCSF through Bridge to Success. We hope that this continuing partnership will allow them to evaluate the results of this policy, refine the policy, and pursue other avenues of change.

SFUSD and CCSF have already made efforts to prepare students for placement tests. Officials from both districts identified lack of preparation for the placement test as a potential problem. As has been found in other systems, students are often unaware of the importance or even existence of placement tests; when students review beforehand they may achieve higher scores that more truly represent their abilities. SFUSD had already begun making students aware of the importance of these placement tests. Their push to keep students in math classes through senior year would likely have a similar impact, keeping students from getting too "rusty" before their placement tests. Other efforts have included a Summer Bridge pilot to ease the transition from high school to community college and FRISCO Day, a day for seniors in SFUSD high schools to tour CCSF and other local colleges to learn about placement tests, enrollment procedures, financial aid, and other information to help them succeed in college.

This acceleration policy requires CCSF and SFUSD to exchange data about eligible students. Because FERPA limits the sharing of student data between systems, this policy can only be automated for those seeking admission to CCSF who identify as SFUSD students. As implemented in this first year, CCSF identified who had taken steps toward enrollment and requested additional data from SFUSD on these applicants and enrollees. From this list, SFUSD identified for CCSF the graduates who meet two of the three criteria on attendance, math GPA, and CST math scores. SFUSD sent letters to these students, while CCSF incorporated the accelerated placements into their enrollment system, and prepared staff and faculty to be able to correctly advise students about their math enrollment. Clearly, close communication and timely action are important to making this program work on a large scale.[3]

These findings from San Francisco depend on many context-specific factors such as the curriculum and instruction at SFUSD and CCSF. However, analyses of other systems might also find that high school records help predict community college math performance, beyond what existing placement tests measure. We encourage other systems to conduct relevant quantitative research and to bring together secondary and

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[3] The policy applies regardless of where and when the matriculating student graduated from high school, but securing the appropriate documentation may be more of a challenge for other students.

postsecondary faculty to explore how they can improve student success, whether by advancing students' placement as in this policy or by identifying and addressing other needs.

References

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For more information about the study on "Proposed Math Placement Acceleration Initiative at the City College of San Francisco for San Francisco Unified School District Graduates," please contact Betsy Williams at betsyw@stanford.edu.

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Appendix

City College of San Francisco Math Placement Test Results and Corresponding Courses:

Appendix Exhibit 1. Regression Predicting Whether Student Passes First Math Course at CCSF.

	Variable	Estimate and Standard Error	
High School Variables	HS Attendance	0.005	***
		0.001	
	Core Classes Failed in HS	-0.015	***
		0.002	
	Math GPA	0.049	***
		0.018	
CST Math Variables	CST Level (if not missing CST)	0.011	
		0.013	
	Took Integrated Math CST (if not missing CST)	-0.036	
		0.026	
	CST Math Score (if not missing CST)	0.070	***
		0.011	
CAHSEE Variables	# of Times CAHSEE Math Retaken (if not missing CAHSEE)	-0.020	***
		0.004	
1st CCSF Math Class Level	Level of First CCSF Math Class (Increasing Difficulty)	-0.010	***
		0.001	
	Number of Observations	3042	

Note: This regression is a linear probability model. The significance of the results is robust to using a probit specification; however, the linear model is presented for ease of interpreting the results. Asterisks indicate two-tailed significance levels: *** = .01, **=.05, *=.10. Model also includes intercept, missing CST indicator, missing CAHSEE indicator, and controls for student's demographic attributes (gender, language status, ethnicity, special education status, and parent education level).

CST score is measured on a scale from 1 to 5 (from "Far Below Basic" to "Advanced"). High school attendance is measured in percentage points. Math GPA is measured on a 4.0 scale. CST Level is measured from 1 to 4 (from Algebra or Integrated Algebra and Geometry I to Summative High School Mathematics). Level of First CCSF Math Class is measured on a scale from 1 to 4 (from three levels below college math to college math).