john w. gardner center for youth and their communities

snapshot

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EXAMINING STUDENTS' MATH COURSE-TAKING AND EDUCATIONAL OUTCOMES IN THE GARDEN GROVE UNIFIED SCHOOL DISTRICT (YEAR 1)

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Background

Prior research demonstrates that students' success in rigorous middle and high school math courses is positively associated with their admission to college, earnings in later life, and career prospects. The sequential nature of math course-taking, however, can create an opportunity structure that disadvantages certain students, specifically those from lower-income, ethnically, and linguistically diverse backgrounds.

In 2012, the John W. Gardner Center for Youth and Their Communities (Gardner Center) at Stanford University's Graduate School of Education partnered with the Garden Grove Unified School District (GGUSD) for a multi-year study to examine the relationship between students' math course-taking and their educational outcomes. The objectives of the analysis were to generate knowledge about the differences in students' performance levels in specific math subject areas; potential disparities in students' access to college-level courses; and possible differences among high schools in how students are being placed in math.

Key findings

Using administrative records for four cohorts of students who graduated in the 2009-10 to 2012-13 academic years (n = 7,838), we traced students' math enrollment histories from the 12th grade back to the 8th grade. Employing descriptive statistics and estimating a series of predictive statistical models that accounted for the influence of student and school characteristics, our analysis yielded several findings:

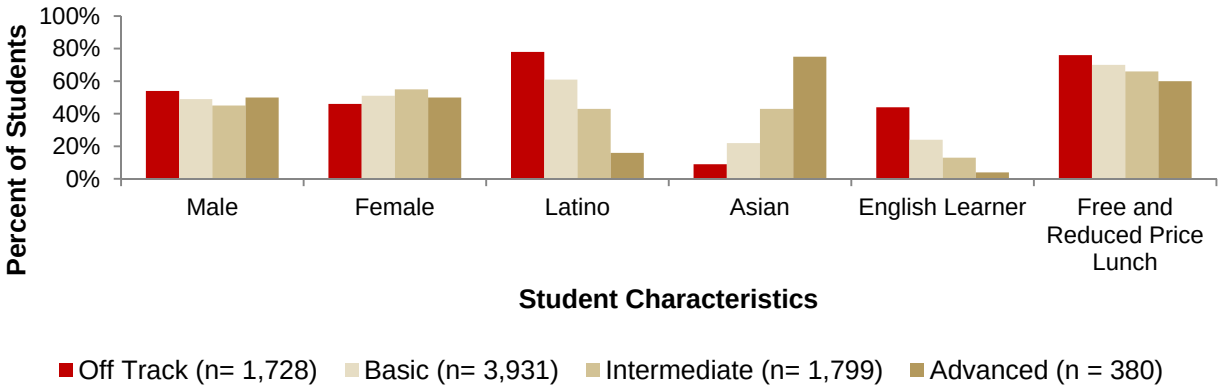
- Eighty-eight percent of students were enrolled in Algebra I in the 8th grade (Exhibit 1).[1]
- Nearly two-thirds of students in the study sample had to repeat the Algebra I course at least once.
- Among all racial/ethnic groups, Asian students were more likely to have completed an Advanced math course-taking sequence (i.e., Calculus) by the time they graduated.

[1] Students must complete a pattern of 15 college-preparatory courses drawn from history/social science, English, math, lab science, a language other than English, the visual and performing arts, and a college-preparatory elective. A-G requirements specify at least three years of mathematics with a grade of *C* or better in courses such as Algebra I, Geometry, Algebra II, or some other higher-level course (e.g., Trigonometry).

Based on students' final course-taking sequence in grade 12, we observed that Asian students made up 75% of those on an Advanced track, while 16% were Latino, 8% were Caucasian, and 1% were students of other races/ethnicities.

- Students who deviated from their initial course-taking were likely to do so during the transition between grades 9 and 10, or grades 10 and 11. For example, we observed that it was possible for students on an Intermediate course-taking sequence in 9th grade to transition to either an Advanced or Basic track.
- Relative to Caucasian students, Latino students were more likely to diverge from their initial course pathway and on to a general or less rigorous track. Asian students performed similarly to their Caucasian counterparts.

Exhibit 1. Student Characteristics by Course-Taking Sequence, as Observed in Grade 12 (n = 7,838)



**Note: Off Track* = student never enrolled in Algebra II; *Basic* = student completed Algebra II; *Intermediate* = student completed Trigonometry or Precalculus; *Advanced* = student completed Calculus. Students in *Basic, Intermediate,* and *Advanced* course taking trajectories are considered *On Track* for meeting the A-G requirements.

Implications

The present analysis raises potential practice and policy implications:

- **Balance early access to advanced-level mathematics with incoming students' preparation, particularly students from minority and disadvantaged backgrounds**. Present findings show that racial/ethnic disparities exist, where Latino students relative to their Caucasian peers, are more likely to diverge from the initial Basic pathway and move on to a lower course-taking sequence. Economically disadvantaged students and English Learners are also more apt to fall short of a rigorous math course-taking threshold that improves their college prospects. Educators in GGUSD may want to engage in further investigation on why these disparities exist (e.g., how is language playing a role in linguistic minority students' math performance?), and develop potential solutions to narrow such gaps.

- **Support students who repeat Algebra I multiple times.** Results show that about two-thirds of students in the sample repeated Algebra I at least once. While repeating the course one time did not have a significant effect on students' course-taking patterns, a majority of those who had to repeat Algebra I multiple times ended up in a less rigorous sequence. District and school leaders may want to examine how and when students are placed in Algebra I, the types and levels of support they receive when they are there, as well as the strategies for helping those who have to take the course multiple times because of failing grades.
- **Ease the transition into high school.** It is important to highlight that as students struggle to pass Algebra I, they are also navigating the socially and academically difficult shift from middle school to high school. As such, districts may want to consider implementing strategies that support students' transition into high school as one of their many approaches in improving students' performance in math (e.g., smaller learning communities, freshmen academies, extended supports).

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