The Multiplier Effect: Dual Enrollment x Math

Dual enrollment opportunities can help increase college access, completion, and transfer rates for groups of students that are historically underrepresented in college by letting them get a leg up on college work. Dual enrollment partnerships between colleges and high schools or school districts can focus on a variety of academic subjects to form well-sequenced pathways that meet certificate, degree and/or transfer requirements. Mathematics is a key area of academic preparation for partnerships to address, given the centrality of math to many programs of study as well as the barriers that math requirements can present to college access and readiness. Because reforms including corequisite approaches, new placement practices, and broadened math pathways have implications for program design, math courses are also a critical area for high school and college partners to consider together.

This information sheet highlights some of the key issues in mathematics that partnerships should consider when designing dual enrollment opportunities, with a special focus on dual enrollment partnerships in California. The ultimate goal is to support partnerships in understanding the implications of math courses that help students meet early gateway requirements and explore future majors and careers.

New math sequences

Colleges have expanded their math offerings beyond the traditional courses leading to calculus to include exciting new options, such as data science, statistics, and contemporary mathematics. These paths better reflect how math is used in many disciplines and fields. In K-12, the Common Core State math standards placed new emphasis on statistics, and numerous states—including California—have been integrating other innovative options into their K-12 curricula. Such courses can provide additional opportunities to engage students who may not have excelled in traditional math sequences or seen themselves as bound for math-intensive careers in fields including science and technology.

Studies have shown that access to an expanded range of college math courses contributes to improved gateway math course completion. In the same spirit as contextualized instruction, math courses aligned with students' academic interests can eliminate barriers traditionally associated with math courses. For example, a history major may find a statistics or liberal arts math course more compelling than college algebra or precalculus, and perform better as a result. At the same time, such paths needn't shut doors to STEM (science, technology, engineering, and mathematics) majors: In fact, research suggests that students who began their math preparation with statistics and subsequently pursue STEM-oriented courses can do as well as or better than students who took more traditional algebra-intensive sequences.

Track data, not students

Examining disaggregated data can reveal which groups are accessing and succeeding in different math offerings. Doing so can help practitioners focus their recruitment and support efforts where they are most needed. It can also help ensure that the availability of new options is not used to reinforce traditional biases about math ability, in which women and students of color are less likely to be seen as strong candidates for STEM.

Rather, intentional efforts by colleges can ensure that expanded options in dual enrollment allow more students to enter and succeed in their field of interest. For example, research has demonstrated that dual enrollment college algebra opportunities are associated with increased entry and completion in STEM fields for Black and Latinx students. At the same time, engaging dual enrollment statistics courses have also led some students to discover a newfound interest in STEM, while supporting others in pursuing their interest in social sciences or humanities, according to other research.

Professional learning

New course options may also provide opportunities for both high school and college math instructors to expand their skills. Incorporating regular time for cross-institutional collaboration allows high school math faculty to develop the expertise to teach math content that has not traditionally been offered in high school. At the same time, college instructors—who typically haven't had formal training in pedagogy—can also benefit from the expertise of high school math teachers. High school instructors often know the local students and families well and can share insights with their college counterparts.

Alignment issues

Among students transitioning from high school to community college and those transferring from community colleges to universities, math courses and sequences present unique alignment challenges that partnerships need to consider and address.

- ***Remedial courses***. Community colleges in California and elsewhere are limiting or eliminating remedial math courses, which cover high school content, because of research showing how they restrict college attainment. Such courses are not generally appropriate for dual enrollment partnerships, as they repeat high school content and do not confer college credit.

- ***Corequisite support***. In lieu of traditional remedial courses, many colleges offer concurrent—or corequisite—support for students who may need additional assistance to succeed in college-level math courses. Research studies have validated the effectiveness of this approach. There are not yet clear models for offering college corequisite courses at the high school level, given the constraints of master schedules. However, partnerships can use other strategies, such as co-teaching, to infuse support into the classroom for less-prepared students. The partnerships can also provide high school instructors opportunities to learn from their college counterparts about corequisite support strategies that have been effective with their students.

- ***Transferability***. In designing dual enrollment programs to include math courses, partnerships should be attentive to issues of transfer and articulation. Because of the emergence of new, modernized math options, it's important to stay up to date on changes in policy.

  Introductory statistics, for example, is recognized as an option in the traditional general education patterns for transfer to the California State University (CSU) or University of California (UC). It is also included in the model curricula that meet requirements for the Associate Degree for Transfer (for transfer to the CSU) or for the UC's Transfer Pathways in a number of fields. Statistics is a requirement in 12 transfer model curricula, including public health science, psychology, nutrition and dietetics, and child development. It also meets the math requirements for a host of other fields, such as administration of justice, sociology, political science, and many humanities majors.

  Newer offerings, however, may not yet be recognized under the transfer mechanisms. For example, introductory data science is a relatively new offering for freshmen at a growing number of CSU and UC campuses. It has not yet been added to the general education patterns or included in transfer model curricula. However, its status will likely change in coming years, given the expansion of data science in higher education and new interest among community colleges in offering such courses.