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Commentary

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Make Math a Gateway, Not a Gatekeeper

By Anthony S. Bryk and Uri Treisman

The story is a familiar one: A high-school dropout and single mother works the supermarket late shift. Motivated to earn a four-year degree so she can have a better life for herself and her 4-year-old daughter, she enrolls in a community college after earning a GED. Three years later, she still hasn't completed the sequence of three remedial math courses required before she can take college-level math. Defeated, she says, "I just couldn't do it anymore." For this student and too many others, the dream stops here.

Remedial math has become an insurmountable barrier for many students, ending their aspirations for higher education. To earn a degree, certificate, or license, community-college students usually must complete a college-level math course. However, the relationship between this particular course requirement and the specific quantitative competencies necessary for future success at work is often unclear to students. In addition, some students must take as many as four remedial courses before they are considered "college ready." Recent studies report that between 60 and 70 percent of students placed into remedial math either do not successfully complete the sequence of required courses or avoid taking math altogether and therefore never graduate.

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The relevance question—"Why do I really need this to succeed?"—is often hard to answer. It's time to ask fundamental questions about why people who care about student learning, despite Herculean efforts, are still not able to help these students realize success. It's time to decide what these students really need to know to succeed. For these reasons, we think that it's time to revisit both the structure and goals of remedial math. We want to create a challenging, alternative math pathway that emboldens students to realize their goals and prepares them well for life beyond the math classroom.

Math should be a gateway, not a gatekeeper, to a successful college education. Students must come to see math as an essential aspect of their everyday lives, no matter what their field of study. They need to think, "I can understand this, I can do this, this is important to know." The math pathway for students pursuing majors in the math-oriented disciplines is well established: Students work their way through algebra to calculus. Certainly, students entering science, technology, engineering, and mathematics fields need to be proficient in pre-calculus and the algebra on which it depends.

However, many students in the social sciences, arts, and humanities, and those seeking careers in business, applied technologies, health sciences, and other fields, could be served just as well by another pathway. The skills in those professions can require rigorous preparation in statistics. Statistical reasoning supports decision making under conditions of uncertainty, an inescapable condition of modern life. This is math that will help these students understand the world around them, and it's the math they can use right now.

The current lengthy sequence does little to support student success. The Carnegie Foundation for the Advancement of Teaching is organizing a network of faculty members, researchers, community colleges, and professional groups to develop a statistics pathway that will provide a challenging alternative to the current developmental-mathematics sequence. This sequence will bring students to and through a course in statistics in one year that would count toward both college credit and transfer. This would replace the current sequence that takes multiple years, if—and that's a big if—students persist through the process.

We know that redesigning the mathematical content isn't enough to help these students through. With the dismal pass rates of students in math, it is clear that we must change not only the curriculum itself, but also the academic-support system that should be integrated within it. Students need college knowledge as well as content knowledge. Many community-college students are the first in their extended families to pursue postsecondary degrees; they need to learn how to "do" college in order to be successful in college. And, yes, colleges need to review their policies and practices to make sure they are doing everything possible to help their students realize their hopes. We need to strengthen the connections of students to successful peers, to their institutions,

and to pathways to occupations and education.

The development of a statistics pathway is Carnegie's best bet for what might help solve the remedial-math problem for a significant number of community-college students. We have consulted community-college leaders and members of national education and mathematics groups. We are also coordinating closely with such programs as Achieving the Dream and the California community-college system's Basic Skills Initiative. These programs have redesigned mathematics courses and created courses that help students succeed in college, as well as mentoring and tutoring programs. While successful intervention strategies exist at many community colleges, they tend to be costly add-ons and extra courses and therefore can have an impact on only a small number of students. Carnegie will instead weave into developmental courses units and activities that provide students with strategies that support persistence while building skills in mathematics. If we integrate such concepts as goal setting, resilience, time management, and study skills into the classroom, they could gain the serious attention they deserve.

The groundwork begins this summer, when Carnegie will bring community-college teams together to collaborate with other practitioners, designers, and researchers to begin the development of materials and assessments for this pathway. During the next year, Carnegie, through face-to-face and online collaborations, will support a networked community using newly developed materials and ideas, continuously improving them and documenting practices that will guide expansion. If we are initially successful, we aim to expand the network to more than 100 colleges over the following three years. Our ultimate goal is to double the proportion of students who, within one year of continuous community-college enrollment, are mathematically prepared to succeed in further academic study or occupational pursuits.

If we truly want to make math the gateway rather than the gatekeeper to a college education, then remedial math is an obvious place to help students develop the knowledge, skills, and social connections for success beyond the math classroom. We need to create a sense of opportunity, of possibilities for those who otherwise might see a lengthy road ahead. This pathway would make it possible for students to fulfill the mathematics requirement needed for many occupations and learn what it takes to be academically successful.

We want to help community colleges build new pathways worthy of mathematics, worthy of their students, and worthy of their institutional missions.

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Some recent writers on mathematics education have been talking about mathematics as a field enjoying â€™unearned privilegeâ€™ as a â€˜gatekeeperâ€™ in our society. The more I think about it, the less sense this makes.
https://blogs.ams.org/matheducation/2019/02/14/mathematics-gatekeeper-or-gateway written by Mark Saul.Â If you tune in on a random tv quiz show and wait for a "mathematical" question, usually some very basic algebra, chances are that it will be accompanied by a comment "how bad someone was in 'math' at school" or a similar fishy statement. People seem to be proud of their ignorance when it comes to mathematics. Why is it so? Or is my observation a local one? Make math a gateway, Not a gatekeeper. [Commentary]. The Chronicle of Higher Education. Retrieved July 29, 2010 from http://chronicle.com/article/Make-Math-a-Gateway-Not-a/65056/. Committee on Prospering in the Global Economy of the 21st Century: An Agenda for American Science and Technology. (2005). Rising above the gathering storm: Energizing and employing America for a brighter economic future.Â Gateway to engineering. Clifton Park, NY: Delmar CENGAGE Learning. Sallee, T., & Hoey, B. (2002). Math should be a gateway, not a gatekeeper, to a successful college education. Students must come to see math as an essential aspect of their everyday lives, no matter what their field of study. They need to think, â€œI can understand this, I can do this, this is important to know.â€ The math pathway for students pursuing majors in the math-oriented disciplines is well established: Students work their way through algebra to calculus.Â If we truly want to make math the gateway rather than the gatekeeper to a college education, then remedial math is an obvious place to help students develop the knowledge, skills, and social connections for success beyond the math classroom. We need to create a sense of opportunity, of possibilities for those who otherwise might see a lengthy road ahead. Make maths a Gateway not a Gatekeeper. How? Acceleration: Rather not have 3 developmental courses (pre-algebra, algebra1, 2) before taking the required course. Problem-centered curriculum. Student-focused, collaborative pedagogy.Â Productive Persistence is about studentsâ€™ tenacity. How can we shift mindsets of mathematics and of students as doers of mathematics? Do people need a functional understanding of math to function in this world? I say no. Maybe this is not a popular answer, but this is my first answer. Let me give my reasons. What percent of people in this world have a functional understanding of math? (let me just say functional understanding means they can do basic word problems and understand what is going on) If I estimate this percent of people at 50%, you might argue that this is too high, but that is my estimate. What percent of people are able to get along in this world? Is 98% a good guess? Most people seem to be mostly fine.Â I agree that if everyone understood statistics, politics would make more sense and people would make better decisions (like not playing the lottery). Should you study math? Absolutely yes.