

To Increase Participation in STEM, Don't Focus on STEM: Re-Imagining Undergraduate Education to Increase Racial Diversity and Student Success in STEM

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In order to increase undergraduate participation in STEM majors, we need to embrace a counter-intuitive proposal: put less emphasis on STEM and more emphasis on supporting students as individuals. In recent work studying a comprehensive college transition program, we found that students of color were more likely to declare a STEM major when they receive holistic support from program staff. Staff members worked to understand students' unique interests, goals, strengths, and challenges, and helped students make decisions about their majors based on what was the right fit for them. It is not enough to increase the number of college undergraduates entering STEM fields without increasing equity in the representation of people of color in STEM fields. By validating all students' potential and allowing students time to explore different potential majors during their first two years, institutions can take meaningful steps towards both goals.

We not only found that students of color were more likely to declare a STEM major when provided with holistic, validating advising experiences, we also found that students who had declared a STEM major earned higher grades overall and specifically in STEM courses than students who did not receive this type of support. Thus, this structure of support not only has the potential to increase the racial diversity of undergraduates participating in STEM, but it can also help all students, regardless of race, achieve at higher levels, leaving them better prepared to enter the workforce.

Our work focused on students from low-income backgrounds enrolled in public four-year institutions who were receiving a competitive, five-year scholarship. Half of the students were randomly assigned to participate in a comprehensive college transition program, which provided one-on-one advising from staff as well as access to tutors, courses taught by program-affiliated faculty, shared living and study spaces, success workshops, and events during their first two years on campus. Our data allow us to examine the impact of these comprehensive supports on students' outcomes for their first three years. Through hundreds of interviews with program participants, we identified the importance of the support and advising students received from staff members for fostering inclusion and academic success in STEM.

What would it look like if this approach were scaled up across an entire campus? First, every student should be assigned a single advisor with whom they would consistently meet for their first two to three years on campus. Students should meet with their advisor not just to register for classes, but to check in around midterms to discuss how things are going. Advisors should discuss not just students' grades, but how they, as individuals, are faring—in terms of academic performance, academic interests, mental health, financial aid, relationships with friends and family, goals for the future, and the campus environment. Advisors won't be able to provide all the answers, but they can act as a sounding board for students and connect them with the appropriate resources on campus to address their needs. A student who is struggling in chemistry may need additional tutoring—or they may need to meet with a licensed therapist to cope with ongoing personal struggles. A student may be excelling in their calculus class but on the verge of dropping out of college because of inadequate financial aid. A student who is not attending their computer science class may be struggling with time management or feel unwelcomed in

the classroom because of racist comments made by a classmate or instructor. Students bring their whole selves into the classroom, and having a consistent, stable relationship with an advisor can engender trust and allow students to have all of their needs met.

Too often, university advisors are faced with high caseloads, attempting to connect with hundreds of students for 15 minutes each in the last few weeks of each semester. Students may make decisions about courses or majors based on conversations with peers, or visit a new advisor each semester simply based on scheduling. Because of these constraints, advisors may make recommendations based on surface-level metrics, such as a single grade or first impression, rather than on a deep, nuanced understanding of a student's goals, strengths, interests, and challenges. Changing this system will require institutional investment to ensure manageable caseloads and to facilitate communication between advisors and other units on campus. However, doing so represents a real opportunity to increase the diversity of students majoring in STEM and the achievement of students majoring in STEM, which in turn will create more students ready to step into high-demand occupations after graduation.

The use of data systems and communication tools across departments can ensure that all advisors are equipped to assist students in their first two or three years, regardless of major. In our work, we found that many students switch majors during their first few years on campus, including students who first enrolled with a stated major and career goal. By providing students a safe space in which to question and explore, advisors can help students find the major that is the best fit for them.

The United States faces numerous and mounting calls to increase the number of undergraduates leaving college with a STEM degree, and it is imperative that undergraduate STEM programs, as well as the STEM workforce as a whole, become more racially diverse. When faced with a challenge this pressing, the urge is to draw a straight line between the start and end, focusing exclusively on changes to STEM or on recruitment efforts. A broader approach is needed. In order to increase representation and success in STEM, we need to step back and ensure that every undergraduate is provided with validating, holistic advising that empowers them to find the major that is the best fit for them and to access all the supports necessary for their success.