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The Science of Diversity:
Data-driven Solutions for Higher Education & Careers in STEM
Zoom Summits – June 29 and 30, 3-5pm

National concern for equity in higher education and in the workplace has grown rapidly as the country reckons with the consequences of racial disparities in the distribution of opportunity and trajectories of upward mobility, both of which are tied to education and to pathways through the labor market. Calls for increased attention to and investment in diversity, equity and inclusion are growing. But what do we know about the reforms that actually move the needle? How do we improve on outcomes that matter the most, especially in the domain of Science, Technology, Engineering and Mathematics, fields that are gateways to rewarding employment and well paid occupations?

The **UMass Amherst** **Institute for Diversity Science** and the **University of Massachusetts** **Office of the President**, in collaboration with the **Massachusetts Life Science Center** and the **Massachusetts Business Roundtable**, is sponsoring two zoom summits – one focused on the college experience (June 29, 3-5 pm) and one on the workplace (June 30, 3-5pm) – that explore interventions that have proven to increase the persistence and retention of under-represented minorities and women. In higher education, the key metrics involve completion of STEM majors and graduation rates. In industry, the focus is on attraction, retention over time, and promotion of under-represented groups.

The Science of Diversity – Higher Education, June 29, 3-5pm

> Overall, a higher percentage of bachelor's degrees were awarded to females than to males in 2015–16 (58 vs. 42 percent). However, in STEM fields, a lower percentage of bachelor's degrees were awarded to females than to males (36 vs. 64 percent). This pattern—in which females received higher percentages of bachelor's degrees overall but lower percentages of bachelor's degrees in STEM fields—was observed across all racial/ethnic groups.[1]

[1] https://nces.ed.gov/programs/raceindicators/indicator_reg.asp

> While Black and Latino/a undergraduates were just as likely as their White counterparts to begin college as STEM majors, they were significantly less likely to complete a STEM degree: 58 percent of White STEM majors persisted to earn a STEM degree as compared with only 43 percent of Latino/a students and 34 percent of Black students.
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> …These racial disparities in STEM persistence are not simply a result of differences in students' academic preparation. Even after accounting for differences in students' socioeconomic and academic backgrounds, Black students were 14 percentage points more likely than White students to switch out of STEM majors, and both Black and Latino/a STEM majors were about 15 percentage points more likely than Whites to leave college entirely.[2]

Higher education has been the locus of attention in improving diversity outcomes because STEM careers require exceptionally high levels of skill. Although there are exceptions (e.g. coding camps), the acquisition of those skills runs through college and university degree programs, particularly to qualify for professional and managerial jobs. As a result, improving the track record of colleges and universities in attracting under-represented undergraduates into STEM fields, ensuring that they prosper in introductory courses in Chemistry, Physics, Math, and Computer Science where losses are significant, and encouraging persistence through to graduation are all critical steps in creating a diverse talent pool.

This zoom summit will present evidence from random assignment experiments in "framing" the value of science, classroom structure and pedagogy, internships and experiential education. Under the leadership of the founding director of the Institute of Diversity Science at UMass Amherst, Nilanjana Dasgupta (Professor of Psychology), these interventions were introduced to "treatment groups" and control groups of freshman students in Engineering and Computer Science who were tracked over the succeeding four years. Dasgupta and her colleagues will explore the interventions and the psychological mechanisms behind their efficacy in significantly increasing the attractiveness of STEM disciplines, persistence through often very challenging "gateway" courses where losses often occur, and through to the completion of majors in these fields. The results make it clear that relatively inexpensive changes in pedagogical approaches significantly increase the number of minority and women students who elect scientific and engineering majors and stick with them through to graduation. The importance of the "handshake with industry" of encouraging these students to compete for positions in scientific companies forms an important bridge to the second summit.

The Science of Diversity – Industry, June 30, 3-5pm

STEM careers are among the most fulfilling occupations, especially in a knowledge economy like the Commonwealth. Indeed, in the pandemic moment, we are all aware of the critical importance of science in pulling us through a period of peril. But STEM careers are also critical drivers of economic inequality. These occupations boast relatively high earnings compared with many non-STEM jobs, and the earnings gap persists even after controlling for educational attainment. That is, among workers with similar education, STEM workers earn significantly more, on average,

[2] https://www.higheredtoday.org/2019/03/04/study-examines-stem-programs-distinctive-racial-persistence-gaps/

than non-STEM workers. Accordingly, access to and long-term success in STEM industries is both an economic imperative for the health of our economy and a social aspiration for closing wage gaps by gender and race.

As the Pew Foundation reported recently, women have seen progress since the 1990s in the life and physical sciences. The news is not as healthy in other fields:

> The share of women…has actually gone down 7 percentage points in the area with the largest job growth over this period: computer occupations, a job cluster that includes computer scientists, systems analysts, software developers, information systems managers and programmers.

Racial gaps in STEM industries have been stubbornly persistent:

> Blacks make up 11% of the U.S. workforce overall but represent 9% of STEM workers, while Hispanics comprise 16% of the U.S. workforce but only 7% of all STEM workers. And among employed adults with a bachelor's degree or higher, blacks are just 7% and Hispanics are 6% of the STEM workforce.

This zoom summit will focus on programs for improving the intake of minorities and women in STEM fields, for encouraging their persistence in the early career period when the greatest risk for leaking pipelines emerges, and for promoting women and minorities into STEM management. The program will draw on the experience of the REBLS[3] (Researchers, Educators, Business Leaders and Students) Network, with participants from IBM, Dell, Oracle, Google, General Dynamics, and Synagex, among others, was created with support from the National Science Foundation, to develop programs for industry that increase diversity in the ranks of the STEM workforce.

As in the first zoom summit, the focus is on what interventions are proving successful, on what is moving the needle in the firms that have been most successful at increasing the presence, visibility and influence minority and women workers. Difference in firm structure, patterns of access to work assignments that are consequential, the composition of teams, performance evaluation practices, and other workplace practices will be explored.

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[3] REBLS is a Network created by the Institute for Diversity Science at UMass Amherst to directly engage industry with the K-12 and higher education pipeline to STEM careers.