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Recommended Strategies to Increase the Participation of Underrepresented Groups in STEM

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Many institutions understand the benefits of diversity and would like to enhance diversity among its students, faculty and staff, including postdocs. This has been easier to accomplish in certain fields, yet the science, technology, engineering, and math (STEM) fields lag behind. There have been some positive changes at the level of diversifying the students in the STEM fields, but this is not translating into diversification at the faculty level. The long-term goal is to increase the diversity of STEM faculty. In order to do that, steps need to be taken to ensure that a pipeline of individuals can progress through undergraduate programs into graduate programs through a postdoctoral position and into a tenured faculty position. In order to move qualified individuals through the pipeline these primary components are essential **1) recruitment 2) retention and 3) preparation for the next phase**. Below are some suggestions of ways institutions can increase the number of underrepresented minority (URM) participation in STEM fields:

RECRUITMENT

Outreach and Generating a Pipeline

- Create nationwide “sustainable partnerships” with predominantly minority serving institutions nationwide (<http://www2.ed.gov/about/offices/list/ocr/edlite-minorityinst.html>) involving outreach and faculty exchanges and graduate student visits.
 - There are NIH grant mechanisms that support these endeavors (U54, U56) (<http://grants.nih.gov/grants/guide/rfa-files/RFA-RM-06-008.html>).
- Partner with Native American-focused initiatives such as Tribal Learning Community and Educational Exchange (TLCEE) (<http://www.law.ucla.edu/centers-programs/native-nations-law-policy/tribal-learning-community-educational-exchange/Pages/default.aspx>) and Retention of American Indians Now (RAIN) (<http://uclacommunityprograms.org/RetentionofAmericanIndiansNow.php>).
- Sponsor Graduate Student/Postdoc Recruitment Days to bring undergraduates/graduate students from underrepresented groups on to campuses and introduce them to STEM research programs; include panel discussions, workshops, and lab tours.
- Offer summer research experiences for undergraduates where students participate in a seminar series, attend workshops and panels, tour facilities, and meet individually with underrepresented graduate students.
- Send University representatives to attend meetings focused on underrepresented groups such as the Society for the Advancement of Chicanos and Native Americans



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- in Science (SACNAS) (<http://sacnas.org/>) and the Annual Biomedical Research Conference for Minority Students (ABRCMS) (<http://www.abrcms.org/index.html>) where there will be undergraduate, graduate and postdoctoral scholars in attendance.
- Generate a pipeline of underrepresented minority students to progress through the educational process ultimately becoming STEM faculty.
 - There are a number of programs that are engaged in this effort, such as:
 - MESA (Mathematics, Engineering, Science Achievement Program) (<http://mesa.ucop.edu/about/mesausa.html>) works with thousands of educationally disadvantaged students from the K-12, community college and university-level to help them excel in math and science and graduate with math-based degrees.
 - HEADS UP (Health Education and Discovering Science while Unlocking Potential) (<http://www.sph.uth.tmc.edu/headsup/>) at the University of Texas targets middle school children.
 - Upward Bound (<http://www2.ed.gov/programs/trioupbound/index.html>) targets high school students and prepares them for college.
 - CAMP (California Alliance for Minority Participation) (<http://www.camp.uci.edu/>) is supported by the National Science Foundation and through peer mentoring, tutoring and faculty mentored research opportunities, encourages student development and completion of the B.S. degree in science, engineering, and mathematics.
 - Minority Postdoc (<http://www.minoritypostdoc.org>) works to connect postdocs with job opportunities and provides professional development resources.

Fellowships/Funding Opportunities

- Inform graduate students, postdoctoral fellows and their mentors of NIH's minority supplement to R01 grants (this program allows a faculty member with an R01 to apply jointly with an underrepresented minority student for additional funding to cover stipend/salary/cost of research above and beyond the grants allotted budget).
 - (PA-08-190) (<http://grants.nih.gov/grants/guide/pa-files/pa-08-190.html>)
- Share the University of California system's President's Postdoctoral Fellowship Program (<http://www.ucop.edu/acadpersonnel/ppfp/>).
 - This program offers postdoctoral fellowships, faculty mentoring, and eligibility for a hiring incentive to outstanding scholars in all fields whose research, teaching, and service will contribute to diversity and equal opportunity at the University of California.
 - Of the President's Postdoctoral Fellows appointed since 2001, ***approximately 75% are currently in tenure track faculty appointments***



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and over 40% have received faculty appointments at University of California campuses.

- Offer competitive research fellowships (recipients selected via application process).
- Provide travel grants
 - Have funds available that students can apply for to use to attend a discipline-specific or professional development conference. Presenting a poster or oral presentation should be a prerequisite for the award. This will give the trainee more opportunities to be immersed in their field of study and if it is a competitive application process receiving such a travel award enhances one's CV.

RETENTION

Fostering a sense of Community

- Have an Office of Diversity/Minority/Multicultural Affairs that serves and advocates on behalf of the undergraduate, graduate and postdoctoral communities (these can be separate offices or compiled into one office). Ideally Institutions would have a Postdoctoral Office that works closely with this office at the institution similar to the one at Yale University (<http://www.yale.edu/graduateschool/diversity/>) or the University of Washington Graduate School's Graduate Opportunities & Minority Achievement Program (GO-MAP) (<http://www.grad.washington.edu/gomap/>).
- Trainees should attend regular meetings with program managers in order to monitor student progress and foster a community feeling among group members.
- A group of faculty, staff, and students, which represent a broad cross-section of departments throughout the campus from diverse backgrounds, all receive special training in how to encourage dialogue at diversity-themed events on campus.
- Student organizations can be utilized to ensure that incoming graduate students and postdocs have an instant peer network; a network of professors who are committed to mentoring underrepresented minority Ph.D. students and postdoctoral fellows can be developed; summer transition experiences and organized group study models can also be developed.
- Social networking via listservs and Facebook affinity pages can be encouraged and supported.
- *Science Careers* (<http://community.sciencecareers.org/myscinet/>) provides an online community for persons from diverse backgrounds.
- The National Organization of Gay and Lesbian Scientists and Technical Professionals (NOGLSTP) (<http://www.noglstp.org/>) fosters professional networking and peer support.

Mentoring

- Peer and faculty mentoring - New students can be assigned another Ph.D. student or postdoctoral fellow as a peer mentor in addition to the faculty mentor that they are assigned to. This relationship persists through the student's time in the program



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and, as they become a senior Ph.D. student or postdoctoral fellow, they are assigned as a peer mentor to another new student.

- Mentor training for faculty - training faculty how to be effective mentors for mentees at all stages including undergraduates, graduate students, and postdoctoral fellows.

Workshops/Seminars

- Sponsor a seminar series where the speakers are researchers from underrepresented backgrounds that have excelled in research in part due to membership in and familiarity with the diversity groups.
- Sponsor workshops to help underrepresented minorities succeed in graduate school and beyond, such as “Dissertation Writing in the Life Sciences”, “Excelling in Graduate School and Beyond”, “Enhancing Communication skills”, and “Discovering funding opportunities”.
- Sponsor workshops/seminars discussing diversity issues and other sensitive issues in a secure, accepting environment. The University of Missouri provides a sample of topics that these types of session may cover (<http://cdi.missouri.edu/>)
 - University of Missouri organizes a bi-annually meeting - Mizzou Diversity Summit (<http://diversity.missouri.edu/summit/>), which brings the campus community together to dialogue and plan strategies which help strengthen the university identity as an environment or culture that values diversity in its many ways and forms.
 - **Diversity in Action**: Bridging research and practice seminar series (<http://cdi.missouri.edu/programs-services/diversityinaction/index.php>). This series of research-based seminars is designed to inform and engage scholars, students, and practitioners of diversity-related research at MU. Among these seminars we can find:
 - Discriminatory Housing Advertisements Online
 - Welfare Reform and Poverty in the U.S.
 - Multiculturalism in a U.S. University classroom
 - Human Sex Differences and Social Competition
 - **You in Mizzou**: A program designed to give MU students, faculty and staff the opportunity to learn about a variety of hot topic issues as well as challenges participants to respectfully discuss their differences and discover their similarities in a safe environment (<http://cdi.missouri.edu/programs-services/youinmizzou/index.php>). Example of discussion topics:
 - Immigration today: Time to Break the Myth



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- 48 years of the Civil Rights Act: Equal Rights or Equal Opportunities?
- Passing and Covering: The Price of Being Gay

PREPARING FOR THE NEXT PHASE

- Provide teaching opportunities and expand teacher training workshops
- Offer skills building workshops (i.e. giving a seminar, writing a teaching statement, grant writing, interviewing skills, conflict resolution, resume/CV building)
- Sponsor programming to enhance awareness of varied funding mechanisms at each level of the training process (i.e. graduate student, postdoctoral fellow, new faculty, tenured faculty)
- Create networking opportunities
 - California State University hosts a reception, which brings together new graduate students with returning graduate students, alumni, and faculty.
- Generate an online newsletter with postings on recruitment fairs, professional workshops, and grants similar to the minority scientist network newsletter.