Promotion of Underrepresented Minorities in Academic STEM (PUMA-STEM)
College Readiness Workshop Summary Report

The first PUMA-STEM workshop on College Readiness was held at Concordia University Chicago on February 22, 2017. The major goals of the workshop were to (i) increase awareness of college readiness barriers faced by underrepresented minority (URM) students, (ii) identify the most significant barriers for URMs related to success in STEM, (iii) discuss and develop strategies to overcome these barriers. Participants identified and discussed steps needed to reduce the need for remedial training among college freshmen in STEM and to promote the success of URMs in STEM.

Including PUMA-STEM collaborators, nineteen faculty from five Chicago area colleges or universities and two high schools attended the workshop. A short presentation on topics related to the fundamental issue of underrepresentation of URMs in STEM and the issue of college readiness and the transition to collegiate STEM was given, followed by small group discussions prompted with questions about current practices, perceived barriers, and recommendations. Afterwards, all participants reconvened to report on the group discussions. The major findings from these discussions are summarized below.

The small groups first discussed how "college readiness" should be defined in terms of a student being able to graduate from college-level STEM programs. Participants agreed that it was important to differential between academic issues and issues relating to external life or personal issues. General characteristics of college readiness identified by participants included: the ability to persist, confidence, math skills, writing and linguistic skills, test-taking skills (without a study guide), and not having a need for remedial course work. Participants also suggested that college readiness would involve critical thinking skills, curiosity, an "attitude for education", metacognition, life skills, study skills, decision making skills, time management skills, and being proactive.

When asked to identify the most significant barriers to "college readiness" that relate to secondary STEM programming or other pre-college training, participants identified the following: inability to communicate effectively, inability to seek help, not knowing how much work is required, lack of realistic view of what is needed to succeed, lack of needed skills (e.g., studying, note-taking), lack of resources, or lack of support at home. Various fears and social aspects were also discussed as barriers for some URMs including: fear of success, fear of failure, fear of STEM, excessive distractions or extracurricular responsibilities (including work), and social stigma. Other barriers proposed included students' reliance on reward, mentality of compliance, and a lack of continuity across educational stages (K-12 through college). Institutional barriers were also identified, which may negatively impact URM success in STEM, e.g., preconceptions of teachers about URM students, "oversupport" in K-12 schooling, and teachers judged by pass rates.

Participants were asked, "Are barriers to college readiness in STEM experienced differently by underrepresented minorities (URMs) in STEM compared to non-URMs (e.g., white students)?

If so, what are these barriers and how do you think student experiences differ?" Generally, the answer was "Yes" to the first question, with comments on the second including the following:

-Lack of familiar role models
-Lack of parental understanding of the value of STEM
-Financial barriers disproportionately affecting URM students
-Lack of family support of loans for higher education
-Responsibilities as a parent
-Responsibilities as a non-parental caretaker
-Responsibilities to family
-Lack of "fitting in"
-Lack of a sense of belonging
-Lack of access to resources
-Teachers' expectations that URMs may underperform

Several participants noted that it may be important or necessary to break out additional characteristics of URM and non-URM students:
-Gender
-First-generation students
-Urban versus rural
-Commuter versus non-commuter
-Four year student versus transfer student
-Athlete versus non-athlete

Participants were asked, "Are there certain challenges/barriers (e.g., social stigma, inadequate K-12 academics, etc.) that are experienced to a greater extent within some demographics of URM students compared to others?" Responses put forth included the following:

-Undocumented students experiencing greater financial barriers
-Students from some backgrounds/cultures may stay closer to home (spend less time on campus)
-Some URMs may have more non-academic family obligations than non-URMs
-Differences in accessibility of technology (e.g., internet access at home, resources to complete online homework, possession of a graphing calculator, etc.)
-Possession of textbook on the first day of class
-Stigma around changing academic path (proposed barrier in Latino/a families)
-Lack of acceptance from peers

Participants were asked, "What are the most important aspects of secondary (i.e., high school) STEM education, in terms of facilitating improved enrollment and completion rates for URMs in college STEM programs?" Responses included:

-Improving pedagogies
-Improving academic advising
-Teaching students how to get help when they need it
-Teaching what it means to be in STEM
-Communicating to students about what is needed for success in STEM
-Increasing the number of "near peers" (student mentorship)
-Improving continuity of math education (e.g., not skipping math during senior year of high school)
-Increasing exposure to rigor
-Improving student recognition of the need for diligence in STEM
-Improving aspects of advanced placement and dual credit in STEM
-Building interest in STEM
-Building curiosity about STEM
-Emphasizing applied STEM (e.g., engineering) to grow interest and engagement
-Increasing mentorship
-Promoting students seeing themselves as STEM practitioners
-Better teaching of basic skills (reading, writing, note-taking, etc.)

Finally, participants were asked to propose solutions or improvements to the problems being addressed in the workshop. Several ideas were put forth, such as use of a cohort model, increasing peer mentoring programs, and building "communities of practice." It was proposed that increased participation in extracurricular activities may help to promote belonging and success; however, the clear caveat related to potential time burden experienced by students was also discussed. It was suggested that familiarization of more URM students early on (in grade school) to college campuses would be beneficial, exposing them to STEM early and often, if possible. The need for more familiar role models was also emphasized. Several participants indicated that institutional efforts should be geared towards building an open and embracing environment where URM students feel like they belong in STEM.