

Barriers to Students Success in the Diverse STEM Classroom

1. Racial discrimination: a high percentage of racial minority college students perceive racial discrimination and isolation from nonminority peers (Mooney & Rivas-Drake, 2008).
2. Stigmatization: Stigmatized students often perceive barriers to education and certain career paths due to their minority status (Luzzo & McWhirter, 2001; McWhirter, 1997; Mooney & Rivas-Drake, 2008).
3. Negative perceptions towards People of the Global Majority (PGM*): Faculty, advisors, counselors, and other role models often have negative perceptions or make negative comments about PGM student abilities. (Gatta & Trigg, 2001; Leaper & Brown, 2008). The Scalia Syndrome.
4. Negative self-perceptions: Negative perceptions from others may translate to negative perceptions of oneself. (Andreescu, Gallian, Kane, & Mertz, 2008).
5. Inclusion: Despite the increase in diversity, PGM do not always feel included in the classroom, in the department, in the profession.
6. Stereotype Threat: Negative perceptions about the abilities of PGM students [often] translate into PGM students believing that they have lower abilities in science than do comparable white students. (DeBacker & Nelson, 2000).
7. Some [people] believe that science and engineering are less suitable for PGM. (Jones, Howe, Rua, 2000; Malcolm, 2008). The Summers Syndrome.
8. Female and racial minority students may perceive barriers to engineering because of the image of engineers, which remains one stereotypically and predominately White and male. (Malcolm, 2008).
9. Differential treatment in the classroom leads to negative perceptions by PGM students.
 - a. Teachers interact and engage more often with male students than they do with female students in the classroom. (Barbaria, Bernheim, & Nunez-Smith, 2011; Jones & Dindia, 2004; Trautman & Stewart, 2007).
 - b. Teachers use more positive interaction techniques (e.g., praise, affirmation) when engaging White as opposed to Black or Hispanic students (Tenenbaum & Ruck, 2007).
 - c. When girls are called on, they are more likely to be asked easy questions as opposed to difficult ones (Barbaria et al, 2011; Brickhouse, Lowery, & Schultz. 2000). Thus, boys may be challenged to use critical thinking skills in the classroom to a greater extent than are girls.

* PGM (People of the Global Majority): Used here to refer to people from traditionally under-represented groups.

10. Black students are less likely than White students to have been counseled to take or enroll into college preparatory courses (Southworth & Mickelson, 2007).
11. Communication barriers may present a challenge between teachers and bilingual or bicultural students. Many school districts focus on tracking ESL students into “basic” skills courses (e.g., reading, writing, and mathematics) for English learning and choose to sacrifice high-level learning in other areas, such as science (Amaral, Garrison, & Klentchsy, 2002).
12. Classroom materials may create barriers. For example, many textbooks depict fewer images of women and PGM in STEM fields (Brotman & Moore, 2008; King & Domin, 2007).
13. Lower pre-college enrollment in STEM related courses:
 - Fewer Black and Hispanic (compared to White) students enroll in higher-level math and science courses in high school or in advanced placement (AP) courses, which are designed to prepare students for and give them an edge in college. (College Board, 2011; Moore & Slate, 2008; Riegle-Crumb & King, 2011).
 - Students from low socioeconomic families, Black and Latino students often attend schools in lower-achieving school districts that provide fewer resources for students (fewer honors and AP classes; fewer advanced level math and science classes, fewer labs, etc.) (National Science Board, 2010).
14. First Generation College Students – Working Class-
 - Family involvement plays a role in the perception of barriers to education.
 - Parental support positively influences minority students’ future aspirations, expectations concerning education and academic achievement, and self-efficacy concerning career decisions (Gushue & Whitson, 2006; Hill & Tyson, 2009; Jeynes, 2007).
 - Parents and other family members of minority students influence educational attainment to success (Spera, Wentzel, & Matto, 2009)
 - Latino students who have high-quality relationships with and receive academic support from their siblings report higher levels of academic motivation than do those who do not (Alfaro & Umaña-Taylor, 2010).
 - While family support has been shown to benefit PGM students, families may not be able to provide much support. This may be particularly true for students whose families have a low socioeconomic status or who are first-generation college students.
 - A higher percentage of Hispanic and Black students come from families with fewer resources (i.e., lower incomes and lower parental education) than do White and Asian students, which can contribute to lower rates of college persistence (Perna & Titus, 2005).