Information Sheet: Diversity, Inclusion, and Cultural Awareness for Classroom and Outreach Education

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Jennifer, a junior in high school, did well in her science courses and was one of 35 students selected to attend a summer program focusing on civil engineering. On the first day, Jennifer found that she was one of only five female students in the program and one of only two Hispanic students. Throughout the summer, engineers came to speak about their experiences in the field; however, none of the speakers were Hispanic or women. During most of the hands-on activities, Jennifer was paired with male students and found that she was expected to passively assist her partner by handing him tools needed to complete experiments rather than handle instruments or take a leadership role. When the instructor asked Jennifer's group about experiments, the instructor tended to direct simple knowledge questions to Jennifer and more critical thinking questions to her partner. Jennifer felt isolated in the program. At the end of the summer, she decided she would not be very good in engineering, and she changed her career aspirations.

Effects of Exclusion

The previous example illustrates how a lack of diversity, inclusion, and cultural awareness can prevent minority students from attaining success in certain fields of study and professions. Diversity in the classroom includes the representation of students from different gender, racial, ethnic, social, socioeconomic, and ability levels. Although girls and boys perform at a similar level in primary and secondary science education classes (Amelink, 2009; Freeman, 2004; National Science Board, 2010), girls perceive more barriers than boys do, which ultimately may preclude girls from pursuing certain fields (DeBacker & Nelson, 2000). The example of Jennifer is not unique in that it is too often female or minority students or both who are underrepresented in science, technology, engineering, and mathematical (STEM) fields (Freeman, 2004).

One explanation for this underrepresentation involves a lack of diversity and inclusiveness at early stages in STEM-related fields. For instance, White students often have access to better-qualified elementary school math and science teachers than do Black and Hispanic students (National Science Board, 2010), and teachers at all levels typically engage male students more often than female students (Jones & Dindia, 2004; Trautman & Stewart, 2007). Thus minorities and girls face multiple social and economic hurdles in access to STEM fields. Another explanation involves the negative stereotypes attached to individuals' "in-group" (i.e., group of individuals that have characteristics similar to oneself, such as same gender or age) performance in STEM fields (e.g., "girls are not as good in math as boys"). Both of these characteristics likely lead to negative outcomes, such as a loss of interest in the field, lowered self-efficacy (i.e., a belief that one can succeed [Rittmayer & Beier, 2008]), academic disidentification or disengagement (i.e., judging

an academic domain to no longer be important [Strambler & Weinstein, 2010]), or a combination of these outcomes.

Increasing Diversity, Inclusion, and Cultural Awareness
Many of the negative effects that occur with the underrepresentation of minority groups can be reduced through greater diversity and inclusion strategies in outreach education as well as the classroom.

Some strategies focus on training educators:

1. Provide diverse examples and role models.
2. Explain the benefits of diversity to educators.
3. Provide professional development in diversity and cultural awareness for educators.

Educators with such training are better able to provide diverse students with information and demonstrations that are relevant (Adams, 1992). Providing diverse role models also helps improve academic achievement, self-esteem, and confidence in minority and female students' ability to achieve (Blanton, Crocker, & Miller, 2000; Dee, 2007; Marx, Stapel, & Muller, 2005; Rittmayer & Beier, 2008). Thus, having Hispanic or female role models or speakers to whom Jennifer could directly relate could have boosted her confidence in her ability to succeed in engineering. When inviting female or minority speakers is not possible, diverse role models might be illustrated through literature that highlights diverse individuals in the field. Such literature can be found online by searching for past and present minorities who have made significant contributions to a particular field.

Other strategies focus on specific teaching practices and methods educators can use to engage and encourage diverse students:

1. Recruit diverse students.
2. Involve all students in active learning.
3. Frame educational topic and careers in ways that are interesting to all students.
4. Engage students in groups activities in which groups comprised diverse students who are interdependent on each other.
5. Create safe spaces in which stereotype threats are not present and students are able to discuss experiences and perceptions of isolation and exclusion and learn coping strategies to deal with negative experiences.

Teachers and school counselors can encourage female and minority students to take STEM-related and advanced placement classes and enroll in outreach-education programs. Increasing the attendance of diverse students at such programs can help prevent feelings of isolation (Davis-Lowe, 2006), such as those that Jennifer had. Outreach-education programs also might provide an opportunity to fill knowledge gaps resulting from a lack of college preparatory classes in high school. Also helpful is having minorities and women work on interdependent tasks and hands-on activities in which the group must rely on everyone to do well (Aronson, 2002). Finally, girls like Jennifer should be active participants in hands-on learning experiments, which can help increase girls' knowledge and interest in engineering (Hebl & King, 2004; Knight, Hebl, & Mendoza, 2004).

Effects of Inclusion and Diversity

Although exclusion can lead to negative effects, inclusion and diversity can have positive effects on students' success. In fact, increasing diversity, inclusion, and cultural awareness in educational settings can lead to positive learning, citizenship, and societal outcomes. For Jennifer, having the opportunity to be exposed to diverse individuals and information and feel included in activities may have increased her critical thinking and problem-solving skills (Terenzini, Cabrera, Colbeck, Bjorklund, & Parente, 2001) and helped her become more engaged with other students in her program. Additionally, greater diversity and inclusion in this outreach program may have helped pique Jennifer's interest in engineering and encouraged her to pursue it or another STEM-related field in college and beyond.

In short, there are a number of ways to increase diversity, inclusion, and cultural awareness in education. These strategies are critical to increasing learning, fostering positive interactions, and encouraging students from diverse backgrounds to pursue education and careers in majors and fields in which women and minorities have traditionally been underrepresented.

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