Chapter 13
All Hands on Deck:
Using Case Studies to Support Institutional Change

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EXECUTIVE SUMMARY

The nationwide National Science Foundation (NSF) Innovation through Institutional Integration (I^3) program challenges faculty, administrators, and project partners to think strategically about the creative integration of NSF-funded awards and to provide students with an interdisciplinary, cross-curriculum, technologically current approach to Science, Technology, Engineering, and Mathematics (STEM) curriculum. The NSF I^3 program places particular emphasis on underrepresented minorities seeking two- and four-year degrees in STEM disciplines. The focus of this chapter is on how survey data collected across STEM departments in the School of Arts and Sciences and the School of Technology and Design have been used to guide the City Tech I^3 Project to implement case study teaching methodologies as a means for creating institutional change in STEM laboratories. The City Tech I^3 Project addresses three of the national NSF I^3 goals: broadening participation, integrating research and education, and developing a global workforce.

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SETTING THE STAGE

In 2009, just one year after the beginning of the greatest economic collapse since the great depression, New York City College of Technology received one of thirty-two National Science Foundation (NSF) Innovation through Institutional Integration (I^3) awards. At the same time, President Obama set a national goal to increase the total percentage of individuals completing college degrees by improving the quality of Science, Technology, Engineering, and Mathematics (STEM) education (OTPS, 2012). The national response has since been to propose investing billions of dollars in funding for programs focusing on STEM education with particular emphasis on supporting individuals pursuing degrees in STEM from traditionally underrepresented groups (OTPS, 2012). The direct targeting of these populations of students is the result not only of shifting nationwide demographics, but is a response to the 6% increase in post-secondary freshman classes from fall 2007 to fall 2008, the first year of economic decline, of which 75% was comprised of minority students (Fry, 2010). According to the National Research Council (2011):

…Underrepresented minority groups comprised 28.5 percent of our national population in 2006, yet just 9.1 percent of college-educated Americans in science and engineering occupations (academic and nonacademic), suggesting the proportion of underrepresented minorities in S&E would need to triple to match their share of the overall U.S. population (NRC, 2011, p. 3).

New York City College of Technology serves a population of students that mirrors the diversity of the New York City: Black non-Hispanic (34.0%), Hispanic (31.7%), Asian/Pacific Islander (18.5%), White non-Hispanic (11.0%), Native American (0.5%), and other (4.3%). City Tech is unique not only because of the diversity of its students and its access to a high percentage of underrepresented minority students in comparison to other CUNY schools, but also for the types of STEM degrees it offers. This is particularly important as Blacks, Hispanics, and American Indians constitute smaller percentages in science and engineering than they do of the national population (NSF, 2011).

The National Science Foundation (2011) ranked New York City College of Technology third in the nation in the number of science and engineering associate degrees awarded to Black students in 2011. Though City Tech is a leader in producing Black associate degree holders, representation by traditionally underrepresented groups in STEM fields continues to lag nationally. Broadening and strengthening the participation of students and in particular, underrepresented minority students in STEM is of critical importance not only to increase the pool of well qualified workers in STEM, but to prevent the overall loss of human capital (National Academy