

# BROADENING PARTICIPATION IN STEM

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DIVERSITY IN HIGHER EDUCATION VOLUME 22

# **BROADENING PARTICIPATION IN STEM: EFFECTIVE METHODS, PRACTICES, AND PROGRAMS**

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# PREFACE

US students exit undergraduate science, technology, engineering, and mathematics programs at alarming rates (Committee on Prospering in the Global Economy of the 21st Century (U.S.) & Committee on Science Engineering and Public Policy (U.S.), 2007; Committee on Prospering in the Global Economy of the 21st Century (U.S.) & Committee on Science Engineering and Public Policy (U.S.). 2010; National Academy of Sciences, National Academy of Engineering, & Institute of Medicine, 2011). In fact, less than 50 percent of US undergraduates who enter STEM degree programs as aspiring freshmen complete degrees in these areas. This is especially true for minorities, whose departure from STEM degree programs is often twice the rate of Caucasian and Asian students (National Academy of Sciences et al., 2011). As the US population becomes increasingly diverse, the underutilization of US human resources endangers the long-term economic health of the nation.

In 2012, the President's Council of Advisors on Science and Technology (PCAST) issued a clarion call to increase the number and quality of STEM graduates by 1,000,000 (President's Council of Advisors on Science and Technology, 2012). This body of education, industry, and government leaders also advocated for the broad-based adoption of innovative pedagogies to increase student success in STEM degree programs, with an emphasis on increasing the participation of women, minorities, and other UR groups, who they posited would benefit the most from these innovations.

Higher education administrators and educators grapple with how best to transform educational practices in STEM. Noting that diversity is a lever for innovation, this book shares best practices that embody the principles of *inclusive excellence* within STEM. Herein, the dissemination of best practices, adaptation of national models (such as POGIL, peer-led team learning, SCALE-UP, Emporium learning, etc.) for minority populations, and other approaches will contribute to national dialogue on what works. Accordingly, this book provides roadmaps for universities and programing seeking to expand their capacity for advancing student success among groups historically underrepresented in STEM disciplines.

The collective works featured in this book illustrates the development and implementation of high-impact educational practices and programs that have been demonstrated to be effective at broadening the participation of underrepresented groups in the STEM disciplines. For each initiative, the authors describe the origins and structure of the practice or program, the philosophical and theoretical underpinnings, and the institutional context wherein the program has been developed. The authors also summarize evidence of effectiveness and

describe implications for local practice. In each chapter, the goal is to provide the reader with an understanding of the innovation and effort sufficient to lead to informed implementation at the local level. Accordingly, the book seeks to provide campus-based faculty, administrators, and diversity professionals with a guide that can be used to develop programs designed to address specific student success and inclusion goals.

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