Chapter 1
Urban STEM Education:
A Vehicle for Broadening Participation in STEM

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ABSTRACT

Students in underserved urban communities often lack access to educational opportunities in STEM (science, technology, engineering, and math). Evidence reveals a lack of STEM access in urban environments, displaying a clear pattern impacting predominantly impoverished neighborhoods the hardest. The issue of STEM education in urban schools reflects an increased interest in expanding and diversifying the future workforce to compete in a STEM-centered future. STEM has been positioned as a critical part of urban education reform efforts and a potential vehicle to broadening participation in STEM. In various US cities, schools labeled as failing are being repurposed as selective STEM-intensive academies to build a STEM education infrastructure. In this chapter, the authors discuss the barriers associated with urban STEM education and how this underserved population is a vital vehicle to increase diversity in STEM.

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INTRODUCTION

The ability of this nation to support a growing economy, maintain health and human services, and ensure national security depends upon a vibrant, creative, and diverse science, technology, engineering, and mathematics (STEM) workforce. The end of World War I left much of non-Russian Europe financially disseminated, which set in motion a series of steps that would eventually lead to the United States (U.S.) becoming a global economic powerhouse (Focus Economics, 2018; Tooze, 2008). This position has been defined by a highly skilled and competent STEM workforce, leading in innovation and competition (Xie & Shauman, 2015; Focus Economics, 2018). However, in recent years developing trends have resulted in dramatic shifts in the U.S. STEM workforce resulting in the U.S. now ranking 29th in the developed world for producing STEM-related college degrees according to the 2015 Organisation for Economic Co-operation and Development (OECD) Science, Technology, and Industry Scoreboard (Organisation for Economic Co-operation and Development, 2018). Despite decreases in the number of STEM-related degrees conferred in the U.S., there remains a steady demand for skilled, American STEM workers in response to the ever-changing landscape of technology fueling innovations in how goods and services will be manufactured, engineered, and delivered (Carnevale, Smith, & Melton, 2011). Demand is projected to be greatest for engineers (mechanical and electrical), computer programmers and software developers, and end user support (Carnevale, Smith, & Melton, 2011; Education Week, 2018). Presently, there is growing concern about the nation's ability to sufficiently meet these workforce demands. It has been stated that in large metropolitan areas ~30% of all employment needs are STEM-based while only a fraction of the population have the needed STEM training or education (Rothwell, 2013). According to the National Science Board's 2016 Science & Engineering Indicators report, the U.S. is faced with the following workforce challenges in STEM (National Science Board, 2016):

- An underrepresentation of women, African Americans, and Hispanics in STEM jobs at rates lower than their U.S. population representation;
- An aging STEM workforce (median age of STEM workers has risen from 41 to 43 years old between 1993 and 2013);
- A STEM workforce disproportionately foreign-born compared to other occupations;
- And a demand for science and engineering workers

These identified challenges can be directly articulated to the dearth in effective implementation policies and best practices that are designed to ensure and improve equal access to STEM education. As a result, invested stakeholders struggle to