

Chapter 1

STEM Education in Rural Areas: From Research to Reality

ABSTRACT

Science, technology, engineering, and mathematics (STEM) education is challenged to produce enough graduates to maintain nationwide STEM workforce needs. This chapter discloses the importance of STEM education for developing a more scientifically literate citizenry prepared to face the challenges of an increasingly technological society and meet U.S. workforce demands. An examination of the state of STEM education reveals its current inability to produce enough qualified graduates to meet current and future needs. The researchers propose looking towards rural areas to supply the STEM pipeline running from college to STEM career. In order to capitalize on the rural school population, programs are needed to address the barriers between the rural student and college. This chapter outlines and expounds these barriers as well as introduces Project Engage as one such program determined to prepare rural students from the Alabama Black Belt region, particularly rural minority students, for STEM futures.

INTRODUCTION

STEM education has been at the forefront of research as investigators seek new ways to address shortages of STEM professionals and technical workers. Low performance of U. S. students in science and mathematics has only exacerbated the issue, highlighting the need for improved STEM education.

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This chapter introduces rural students as a source for supplying the STEM pipeline. Rural students may be the solution to increasing the number of students entering postsecondary education with a STEM major and ultimately adding to the STEM workforce; however, rural students face many barriers to college entrance and completion such as limited educational resources, STEM teacher shortages, poverty, lack of school funding, and low parental awareness and expectations. Thus, a secondary purpose of this chapter is to identify and describe the impediments rural students face. Finally, the researchers will introduce Project Engage, a Minority Science and Engineering Improvement Program (MSEIP) grant initiative, designed to support the needs of rural minority students, specifically those from the rural Black Belt area of Alabama in pursuit of a bachelor's degree in a STEM field.

STEM IMPORTANCE TO SOCIETY

There has long been a broad consensus that continued U. S. competitiveness in an increasingly global economic environment relies heavily on the adequacy of supply and the quality of the workforce in the STEM fields (National Research Council, 2011; President's Council of Advisors on Science and Technology, 2010; U.S. Department of Labor, 2007). The National Academies *Gathering Storm* committee (National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, 2011) concluded:

A primary driver of the future economy and concomitant creation of jobs will be innovation, largely derived from advances in science and engineering. While only 4 percent of the nation's workforce is composed of scientists and engineers, this group disproportionately creates jobs for the other 96 percent (National Science Board, 2014).

THE STATE OF STEM EDUCATION

Knowledge of STEM is not just required of professional scientists and engineers. It is now required for an increasing number of jobs at all levels. It is a national advantage to have a more diverse STEM pipeline and more STEM literate citizens. However, disconcerting statistics give us good reasons to be concerned about STEM education. The National Assessment of Educational Progress (Schmidt, 2011) reported about 75% of U. S. 8th graders are not

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