

Chapter 4

A Three–Pillar Approach to Preparing Tomorrow’s STEM Professionals: Developing Knowledge, Abilities, and Ways of Working

ABSTRACT

STEM professionals need specific knowledge, abilities, and general ways of working to be successful. In this chapter, the authors identify a three-pillar approach for preparing future STEM workers including 1) knowledge of STEM careers and professionals, 2) abilities to work in the STEM fields, and 3) ways of working as STEM professionals. Additionally, the individual components and activities of Project Engage that address each pillar are detailed. Finally, this chapter also presents the results and implications discovered through survey research designed to ascertain the participants’ opinions of the project activities and the impact of the activities on retention in STEM fields and on participants’ desires to continue into STEM careers. The survey results uncover a trend of more positive responses of minority students towards project activities designed to prepare future STEM professionals. This trend calls for future, more in-depth examinations on the project activities and similar ones as a means to increase the number of underrepresented minorities in STEM professions.

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INTRODUCTION

Unequal access to educational preparedness and opportunities in STEM continues to be perpetuated along racial, socioeconomic, gender, and geographic lines (U. S. Department of Education, Office of Innovation and Improvement, 2016). Rural students are not often exposed to STEM professionals and their work environments, hindering their professional aspirations. Project Engage intends to change that circumstance by promoting awareness of the ways STEM professionals work, increasing students' abilities to work in STEM fields, and exposing students to STEM careers. This three pillar approach adopted by Project Engage ultimately transitions students from college to the workforce by preparing them as tomorrow's STEM professionals. In this chapter, the three pillars of preparation are presented, the activities supporting the pillars described, and results from surveys of activities communicated.

PREPARING TOMORROW'S STEM PROFESSIONALS: A THREE PILLAR APPROACH

The three-pillar approach to preparing STEM professionals for working in tomorrow's STEM workforce incorporates: 1) knowledge of STEM careers and professionals; 2) abilities to work in the STEM fields; and 3) ways of working as STEM professionals (see Figure 1). Typically, in the rural landscape, young adults go directly into the workforce rather than seeking postsecondary education as illustrated by data from the nine county school systems within the Project Engage service area. On average 17% of high school graduates from this region attend college, with some county school systems having as low as 4% of their graduates attending college. Of those who attend college and earn an undergraduate STEM degree, only a small percentage return to their hometown areas due to lack of employment opportunities. According to Harmon and Wilborn (2016), "For the vast majority of students, pursuing academic subjects like mathematics as preparation for (STEM) occupations aligns with the need or desire to leave home for a more prosperous opportunity in an urban place" (p.26). Ultimately, this trend leaves few STEM role models for high school students to want to emulate. Together, the lack of STEM role models and exposure to STEM careers can partially explain rural students' lack of interest in STEM disciplines and motivation to pursue a STEM

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