Chapter 5
Collaborations between Elementary Schools and Higher Education:
Lessons Learned from Community–Engaged Science Education Efforts

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ABSTRACT

This chapter examines service learning efforts and community partnerships formed between elementary schools and higher education around science education. The types and characteristics of the efforts are considered using a newly developed framework for service learning and community engagement. The potential benefits of these collaborative efforts for higher education faculty, college students, elementary school students, teachers, and school communities are explored, highlighting what is known from the existing research literature. The match between these projects and the Next Generation Science Standards (NGSS) are considered, highlighting the ways which community engagement efforts can utilize standards in developing and implementing projects. Finally, recommendations are made regarding how to optimize community-based science education collaborations and expand our knowledge-base regarding these efforts.

INTRODUCTION

In the last twenty years there has been an increased emphasis on service learning projects and community engagement efforts which link elementary schools and institutions of higher education. These collaborative, interdisciplinary efforts between schools and academics allow each to work with and learn from one another to address real-world issues and problems (Boyer, 1996). At their best, community

engaged scholarship efforts are designed to be mutually beneficial for schools, teachers, communities, higher education institutions, and university faculty (Maton, 2008; Norris-Tirrell, Lambert-Pennington, & Hyland, 2010).

Collaborations between elementary schools and institutions of higher education have taken many forms. They have ranged from efforts to increase teacher and pre-service teachers' skills to bolstering content knowledge of teachers and students in key disciplines such as science where U.S. rankings worldwide are reason for concern (OECD, 2014). The recent adoption of the Next Generation Science Standards (NGSS) (Achieve, 2013), which include more in-depth emphasis on scientific core knowledge, interdisciplinary connections, and practice creates a natural place where higher education and schools can collaborate in their communities. Science education collaborations have taken the form of tutoring, mentoring (Moseley, Ramsey, & Ruff, 2004), afterschool programming (Cartwright, 2012; Cone, 2009, 2012; Cox-Petersen, Spencer, & Crawford, 2005), outreach education (Falter et al., 2011; Felzien & Salem, 2008; Kalivas, 2008; LaRiviere, Miller, & Millard, 2007; Thompson, Bickmore, Graham, & Yanchar, 2007; Woodard et al., 2011), science fairs/nights (Orleski, 2013; Theall & Bond, 2013), and traveling exhibits (Kamela & Gammon, 2011). They have also utilized applied projects in the community such as community gardens (Reeves & Emeagwali, 2010), restoring outdoor spaces (Schon, Eitel, Bingaman, Miller, & Rittenburg, 2014; Wilson, Bradbury, & McGlasson, 2015), and establishing a nature center (Werner, Voce, Openshaw, & Simons, 2002). These efforts differ in scope, intensity, duration, and context.

The goal of this chapter is to examine service learning efforts and community partnerships formed between elementary schools and institutions of higher education around science education. The types and characteristics of the efforts will be considered, examining the typology of these projects using a newly developed framework for service learning and community engagement based on work done by Sigmon (1997), Terry and Bohnenberger (2004), Daniels (2013), the International Association for Public Participation (IAP2 International Federation, 2014), and Delano-Oriaran (2015). The potential benefits of forming these partnerships for schools, higher education, and communities will be articulated. The impact of these efforts on different stakeholders including teachers, students, schools, and institutions of higher education, including faculty, pre-service teachers, and college students, will be considered. Innovative projects examining each of the dimensions of NGSS will be reviewed. Finally, the chapter will consider best practices in implementing, documenting, and evaluating these efforts to improve their utility and make positive contributions to science education in the United States.

BACKGROUND

Elementary schools and higher education institutions choose to work together around science education for a variety of reasons. Universities often develop partnerships with schools to further the skills of pre-service teachers enrolled in teacher education programs. They are designed to assist pre-service teachers in a number of ways including promoting academic development, self-efficacy, professional dispositions, and social understanding of educational contexts (see Root & Furco, 2001; Verducci & Pope, 2001). For some academic contents, such as science, service learning experiences may be crucial in helping pre-service teachers overcome anxiety about learning and teaching content which they perceive as challenging (Enochs & Riggs, 1990; Harlow, 2012; Palmer, 2001). Service experiences also provide pre-service teachers additional engagement in the practice of teaching science through focused efforts

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