Chapter 21
Partnerships for Science, Technology, Engineering, and Mathematics Education and Career Prosperity

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**ABSTRACT**

The purpose of this chapter is to report on partnerships between local school agents, business partners, institutes of higher education, and nonprofit organizations that promote science, technology, engineering, and mathematics (STEM) activities that enhance career opportunities for students. The authors share the importance of these partnerships as well as the benefits that result for all members. In addition to describing the benefits of the partnerships, the authors lay out techniques used to manage and develop partnerships. Most importantly, the authors share the outcomes of these partnerships, including professional development projects rooted in the work between the member partners. The chapter provides data about the impact of these partnerships on students’ academic achievement and concludes with recommendations and suggestions to develop and sustain partnerships.

**INTRODUCTION AND IMPORTANCE**

Building partnerships with local businesses and community groups is crucial to promote Science, Technology, Engineering, and Mathematics (STEM) education and deliver productive educational outcomes. The partnership stakeholders to whom the authors refer in this chapter include: Local school agents (LEA), STEM business partners, institutes of higher education (IHE), and nonprofit organizations who

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promote and support STEM activities at all levels of education. Partnerships not only require dedication at the institutional levels (e.g., LEA, IHE, and STEM businesses), but also connect professionals on interpersonal levels (e.g., faculty-faculty and faculty-school teachers-STEM professionals). A robust partnership network creates a professional ecosystem that helps groups within the partnership to envision possibilities for STEM education and to implement those visions to pursue the outcomes of college readiness and career prosperity.

Partnerships can be powerful tools for bringing about innovative changes and value-added growth. These partnerships take on added meaning and importance as they engage business and industry, as well as other entities, in building innovative capacities to support the Common Core State Standards in English Language Arts (CCSS-ELA) and in Mathematics (CCSS-Math), and Next Generation Science Standards (NGSS). The new standards present an unprecedented challenge by requiring school districts to build systems for helping teachers to attain a deeper conceptual understanding of disciplinary core content knowledge, develop a more informed perspective on subject pedagogy, and enhance their awareness of the ways in which students learn the practices of STEM and Literacy. This challenge requires districts to provide teachers with access to the expertise and materials which are necessary to actively engage all students in STEM and Literacy practices, while also emphasizing interdisciplinary connections to STEM and Literacy content areas.

Effective change, beginning with regional STEM education and business partnerships, can expand a community’s educational infrastructure to improve the quality of STEM and Literacy teaching and learning. Society’s reliance on an increasing demand for STEM workforce makes it more important than ever that education and industry work together to inform educational decisions and to address the need for human capital to meet the needs of the STEM workforce.

Partnerships between educational institutions and local businesses allow both organizations to communicate common needs, ideas, information, and resources to more fully invest educators in meeting the needs of local industry and vice versa. It was for these reasons that East Tennessee State University (ETSU), through its Center of Excellence in Mathematics and Science Education (CEMSE) and the ETSU Northeast Tennessee STEM Innovation Hub, has worked to create local and regional partnerships that serve school districts throughout Northeast Tennessee. These partnerships contribute support for research-based practices, K-12 educator professional development, business and industry workforce needs, informal STEM learning, learning communities, proposal writing and project management, and other accomplishments and opportunities that would not be available otherwise. By describing the components of these partnerships, the activities that they make possible, and the benefits that result, the authors hope to encourage other communities to develop their own education-business partnerships that enhance student learning experiences, increase academic achievement and capacities, and address career-related needs in their communities.

A Robust Partnership Network

The authors’ work has benefited from their location in a vibrant and collaborative STEM community in Northeast Tennessee, which includes not only K-12 school districts, colleges, and a university, but also large businesses, such as Ballad Health System, Domtar Paper Mill, and Eastman Chemical Company, small local businesses, such as Copper Standard, Nuclear Fuel Services, and TRW Automotive, informal science learning institutions, such as the Bays Mountain Park and Planetarium, General Shale Brick Natural History Museum, and Hands On! Science Museum, and foundations and organizations, such