

# Chapter 3

## Challenges to Implementing STEM Professional Development From an Ecological Systems Perspective

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### ABSTRACT

*This chapter provides insights to common barriers to conducting STEM professional development in an urban setting. The chapter will illustrate the complexity of integrating changes to STEM teaching practices from a systems perspective, from the lens of a researcher-practitioner conducting an 18-month study of professional development in a K-8 school in a metropolitan, public school setting. Specific challenges along themes related to the classroom level, the school level, and the district level will be discussed. Finally, the chapter concludes with implications and suggestions for future professional development providers, and schools and district leaders who are considering implementing instructional and curricular change related to STEM education.*

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## **INTRODUCTION**

Educators conducting STEM professional development in urban settings often face significant challenges because urban schools are typically in large, densely populated areas with diverse populations, characterized by large enrollments and complex bureaucratic systems. The complexity of integrating changes to STEM teaching practices, from the lens of a researcher-practitioner conducting an 18-month study of professional development in a K-8 school in a metropolitan, public school setting will be illustrated within this chapter from a systems perspective. Using an ecological systems framework (Petrides & Guiney, 2002; Zhao & Frank, 2003), this chapter will provide a personal narrative and analysis of systemic barriers to change, to examine the challenges to impacting instructional practices and professional learning communities from the author's perspective as a researcher-practitioner who provided the professional development program within the school. An ecological systems framework provides a way to study the interactions within a school system, looking at relationships between what occurs in classrooms, with the structures and systems in place at the school and district level, and how they impact curricular and instructional change in the classroom (Zhao & Frank, 2003).

Successful implementation of the professional development program in this study was measured by the effectiveness of sustained professional development on teacher learning and instructional practices through the development of a STEM curriculum and implementing inquiry-based unit planning and teaching in an urban school. Underlying the foundation of the professional development was the expansion of the skills and knowledge within the staff to build effective professional learning communities (PLC) as teacher leaders, capable of inquiring into their practice to sustain and continue this STEM-focused improvement in their school community. PLCs, defined as "a group of people sharing and critically interrogating their practice," allow for teachers to engage in ongoing professional learning within their schools, enhancing student learning and school-wide change in practice (Stoll, Bolam, McMahon, Wallace, & Thomas, 2006).

Within the classroom level, the author will discuss themes related to teacher agency; teacher skills, knowledge, abilities, and existing beliefs and practices; response of students; and the impact of classroom resources. At the school level, themes related to leadership, scheduling, and staff turnover will be discussed. Finally, at the district level, the author will discuss the complexities of working within a large urban school district, specifically, themes related to navigating the district processes, integrating STEM curricular resources from the district level, and managing the number of competing initiatives mandated by the district. This chapter will conclude

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