Everyone Wins:
Afterschool STEM Club as an Introductory Field Experience for Prospective STEM Teachers

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EXECUTIVE SUMMARY

A novel approach to an initial field experience for prospective secondary mathematics and science teachers is described. This field experience is based on a partnership between a university teacher preparation program and a local elementary after-school extended day enrichment program to found a STEM club, providing supplementary STEM instruction to the elementary students while also creating opportunities for prospective teachers to plan, teach, and reflect upon weekly lessons in a shared field experience. Across 10 weeks of STEM club meetings, prospective teachers implemented lessons and activities to small groups of elementary students, sorted by grade levels. Lessons were guided by state standards, the mathematical, science, and engineering practices, and based on the 5E lesson cycle format. This chapter describes the reasoning behind the design of the STEM club field experience, the cycle of planning, teaching, and reflection, and includes insights gained in the

implementation of this model across spring and fall semesters since 2016.

INTRODUCTION: INTEGRATING AN INITIAL STEM TEACHING EXPERIENCE WITH AN ELEMENTARY AFTER SCHOOL PROGRAM

While there is evidence that the nationwide supply and demand of teachers in the United States is approaching greater parity than was seen in the past two decades, we are now in a situation where the expectations placed upon teachers have created some unique challenges for teacher preparation. These include the need for teachers to possess greater pedagogical and content knowledge to meet the demands of national and state content standards, an increase in accountability through standardized testing of students, and a need to evaluate and adjust teaching practices to ensure that instruction is meeting the needs of more diverse student populations. A recent report from the National Academies of Science, Engineering, and Medicine (Scherer, et al., 2020), has acknowledged that

> *These increased expectations for learning, combined with the demand to create a responsive learning environment that supports the needs of diverse students, call for innovative approaches to instruction that may differ substantially from teachers' own experiences as students or their preservice education (p.3).*

In 2016, our university program faculty began to reevaluate the goals of the initial field placement for our secondary STEM teacher preparation program in an effort to better align with these changes. A top priority was to provide undergraduate STEM majors with a low risk, high reward experience that would allow them to explore teaching while also developing foundational pedagogical knowledge in STEM education. Because of the high-pressure atmosphere around state mandated testing, and general challenges of an initial teaching experience situated in a K-12 classroom, we decided that an informal STEM field experience would be our best option. We envisioned an afterschool elementary STEM Club where prospective teachers (PTs) engage with small groups of enthusiastic elementary students; designing and leading weekly activities as an ideal first teaching experience for undergraduates considering a career in teaching. To support a STEM club field experience, we revised all aspects of our program's introductory course to support the implementation of a weekly opportunity for PTs to work with elementary students in this flexible informal education school setting.

We approached our thinking about an initial STEM teaching experience through the lens of sociocultural theory; exploring the ways in which individuals develop their skills and knowledge through participation in cultural practices (Rogoff, 1998; Vygotsky & Cole 1978). Lave and Wenger (1991) introduced the idea that learning