Chapter 9

Using a STEM Camp for Rural Middle School Students to Launch Ambitious Teaching Practices With Pre–Service Teachers

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ABSTRACT

In this chapter, the authors describe an initiative they have been enacting within their secondary science and mathematics Master of Arts in Teaching (MAT) program over the last four years. As a first teaching experience during their first term in the program, MAT students prepare and enact engaging STEM lessons for middle school students who attend a free, three-day STEM Camp during their summer break. The authors describe the context of the students (both middle school and pre-service), the structure of the camp and teacher supports, and share excerpts of written reflections from the MAT students to highlight patterns in outcomes of this medial service learning experience.

INTRODUCTION

Kraft (1996) summarizes service-learning as reflecting a balance of benefits for learners and the community that receives the service as well as a balance between academic and contextualized learning. Arguably, the ideal of all teacher education programs is that they are models of service-learning in that the teaching practicum should be a mutually beneficial relationship between multiple partners, should support contextualization of content knowledge within an authentic setting (Giamellaro, 2017), and should support deep reflection within college coursework. However, without the intentionality of the

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service-learning lens, teacher preparation programs can focus too much on the needs of the pre-service
teacher (PST) at the expense of the K-12 students, can limit the growth of the PST in service of classroom
expediency, or can become disconnected from the pre-service program coursework. Sigmon (1997) de-
scribes this disproportionality amongst partners as common within many approaches to service-learning
and suggests the most balanced approaches are the most effective for all partners. Service-learning op-
opportunities built into pre-service education programs can avoid these pitfalls.

In this chapter, the authors describe and discuss a service-learning event that is situated early in a
Science and Mathematics Masters of Arts in Teaching (MAT) program at Oregon State University-
Cascades. The MAT students in the program prepare and enact engaging STEM (Science, Technology,
Engineering, Mathematics) lessons for a free middle school summer STEM camp in cooperation with a
rural school. This chapter is focused on the outcomes for the PSTs, as self-reported in written reflections
that followed the camp experience.

In considering the needs of MAT students, service-learning was specifically incorporated into the
MAT program to provide a primary contextualization experience (Giamellaro, 2014) through which
PSTs could test theory and practices, and gain both confidence and content knowledge (Cuttita Ferdenzi,
Shekoyan, & Ellerton, 2016). In a review of service-learning outcomes, Levesque-Bristol, Knapp, &
Fisher (2010) identified three themes that tend to render service-learning experiences successful in the
development of skills and knowledge, (1) structures that support participant autonomy and competence,
(2) direct student involvement with people receiving the service, and (3) significant opportunities for
in-class and written reflection on the experience (Levesque-Bristol et al., 2010). As the STEM Camp
model was developed, these factors drove decisions around the structures and principles of the experi-
ience. These three themes frame the discussion of the STEM Camp experience below.

BACKGROUND: STRUCTURE AND EVOLUTION
OF THE STEM CAMP PROGRAM

The STEM Camp experience is a partnership between a local middle school, a regional museum, a city
government, and the OSU-Cascades MAT program. The program’s interests are served by providing
students with an authentic opportunity to understand student needs, practice teaching moves and test
educational theory early in their development as teachers. The middle school students (campers) are
served by receiving a free STEM camp experience that is engaging and provides them with exposure to
ideas and practices they are not otherwise likely to experience. Similarly, the town has an opportunity to
provide young residents with a rare out-of-school learning experience that does not require travel to the
regional population hub. The museum has an opportunity to connect with participants who are outside
of their typical visitor demographic, an institutional goal.

The camp is structured as a three-day event with two days of STEM activities at the school and a third
day where students are bussed to the museum to participate in educational programming. The learning
events on Days One and Two are planned and carried out by PSTs, leveraging their interests and back-
grounds and supported by MAT faculty (authors). In some years the PSTs have landed on a cohesive
theme to guide the event while other years have become a series of more independent stations that the
campers rotate through. PSTs have included topics such as kinesiology, water balloon trajectories, coding
for simple robots, biomimetic design, measuring carbon sequestration, and modelling volcanic flows.
The camp atmosphere compels the PSTs to keep the lessons engaging and active. The campers would
A Self-Study of Factors Affecting the Collaboration Between University and School Professionals
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