

# Chapter 6

## Alternative Service–Learning Projects in Mathematics: Moving Away from Tutoring and Consulting

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### ABSTRACT

*A discussion of the development, implementation, and results of two service-learning projects from different mathematics courses is presented. In an Honors Mathematics and Social Justice seminar, where the focus was on fairness and access to quantitative and financial literacy, the students developed financial literacy brochures that would be relevant to students and the community at large. The pamphlets were used in two ways: they were distributed across campus and they were used in an adult ESL curriculum. In a History of Mathematics course, students developed a lecture series at a local senior day center on historical highlights from the world of mathematics. The students learned how to differentiate between learning and unpacking mathematics for other audiences. In this chapter, the use of reflection is discussed, as this is an essential component of any service-learning project. Encounters with resistance are discussed as well.*

### INTRODUCTION

First-year seminars, learning communities, service-learning courses, undergraduate research projects, and capstone experiences are among a list of high-impact educational practices (HIP) compiled by George Kuh (2008), which measurably influence students' success in areas such as student engagement and retention. It is recommended that all college students participate in at least two of these HIPs to deepen

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their approaches to learning, as well as to increase the transference of knowledge (Gonyea, Kinzie, Kuh, & Laird, 2008). However, the benefits of the service-learning practice have been known by practitioners long before Kuh's report was published in 2008. Moreover, evidence supports the idea that benefits to college students from participating in service-learning practices manifest not only while they are taking the course in which the service-learning experiences occur, but that these benefits are also extended in subsequent courses (Strage, 2004). Thus, there are short- and long-term gains. In addition, although there is not much research on the benefits of service learning to those community-based organizations that are served, one study suggests that these organizations at least perceive that partnering with higher education helped to further their mission and enabled them to gain new perspectives through interactions with those individuals participating in service learning, as well as with the faculty partner (Geller, Zuckerman, & Seidel, 2014). In this same study, community-based organizations indicated that grant opportunities were more readily available through these partnerships, and that contact with higher-education institutions led to new research and knowledge on campus; this partnership also resulted in a generally more expanded resource base (Geller et al., 2014).

The most conventional service-learning project in a mathematics class is tutoring, either in conjunction with a school or with an after-school program. Another typical service-learning project for mathematics students is consulting, which is usually statistical in nature, for non-profit organizations. In this chapter, the authors will discuss two service-learning projects that were developed for two distinct mathematics courses, neither of which involves these traditional tutoring or consulting opportunities. In the BACKGROUND section, a discussion of the development and implementation of these service-learning projects is provided, and some necessary context is offered for each course. The section on SOLUTIONS AND RECOMMENDATIONS includes insights into how some student and colleague resistance was handled, as well as what changes the first author would make the next time the courses are taught. Ideas for future service-learning projects are offered in the FUTURE RESEARCH DIRECTIONS section. Finally, some thoughts for those who may want to implement similar projects are provided in the CONCLUSION.

## **BACKGROUND**

A discussion of two service-learning projects in two courses, Mathematics and Social Justice which was taught in the spring of 2008, and History of Mathematics, which was taught in the spring of 2015, are presented in reverse chronological order.

### **History of Mathematics**

Since the fall of 2012, the first author taught the History of Mathematics course every semester. This course is taught using a low-tech flipped model adopted by many schools. Two texts are used: *Journey through Genius*, by William Dunham (1990) and *Math through the Ages: A Gentle History for Teachers and Others, Expanded Edition* by William P. Berlinghoff and Fernando Q. Gouvêa (2003). The first text highlights the twelve “greatest” theorems in the mathematics world, and it discusses what happened in history at the time in a humanistic way. For example, one chapter presents the Pythagoreans and their discovery of the famous theorem which bares their name (Dunham, 1990). Each week, the students read one chapter prior to class. In class and in small groups, the students work on mathematics problems, which are extensions of the mathematical concept about which they had previously read. The second

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