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We will report on two NSF funded programs that involve pre-service (and in-service) secondary mathematics teachers in undergraduate mathematics research. One of the programs, the Teacher Scholar Program (TSP), is a capstone research experience. The second is a Research Experiences for Undergraduates Site (REU) for both pre-service and in-service teachers. Both programs are collaborative efforts between mathematicians and mathematics educators to provide teachers authentic mathematical experiences. The experience of doing mathematics has caused a change in our teachers' views of the nature of mathematics and subsequently their beliefs about teaching and learning.

In addition to the mathematical component of REU and TSP, we will discuss the educational topics that were connected to these mathematical experiences. For instance, we conducted an investigation of how middle school students develop mathematical generalizations, and the role that representations played in this process. In conclusion, we will present data that characterize the changes in our students beliefs and then provide an opportunity for the audience to discuss the role of authentic mathematical experiences in the preparation of mathematics teachers. (Received September 16, 2009)