The purpose of this dissertation project is to explore preservice science teachers’ development of pedagogical content knowledge for targeted aspects of NOS and NOSI. Through multiple data sources, it is examined how preservice science teachers’ understanding of NOS and NOSI have changed over the program, and manifests itself in their classroom practice. This is an exploratory multiple-case study of participants’ experiences and developments during the Experiencing Research for Teaching Science (ExpeRTS) program. This study requires a case study method due to the nature of the research questions, which seek a better, richer understanding of and insight into preservice teachers’ PCK for NOS and NOSI, and its translation into their teaching practice. Data is collected in the form of open-ended surveys, interviews, observations, lesson plans, video materials, and teaching documents. After all data was collected, two participants, Rose and Charlie, were purposefully selected among those who participated in this program in order to show a successful case. All data is analyzed in three stages. The first stage includes the analysis of all the questionnaires, interviews, students’ works and assignments, and classroom observations before the two-weeks teaching practicum. These data are analyzed in order to describe of the development of their views and schema of their PCK for NOS and NOSI. The second stage includes the analysis of two-
weeks teaching practicum. The data from preservice teachers’ teaching videos, teaching reflections, and observations by the researcher are analyzed in order to understand what and how they taught regarding NOS and NOSI. In the last stage, two analyses are compared for consistency/inconsistency to answer how their PCK is (or is not) represented in their teaching practice. Then, by analyzing exit interviews, the final representation of development of their PCK for NOS/NOSI, and the factors mediating their teaching is compiled. All data was uploaded into Hype-research software program for coding the data, category generation, and emergent themes.

Data analysis indicates Charlie began the program with mixed views, while, Rose had better views of NOS and NOSI at the beginning of the program. During the program, both two preservice teachers definitely improved their understandings of almost all of the NOS and NOSI aspects throughout involving research, taking a NOS/NOSI course, and teaching practice. Data analysis about development of Rose and Charlie’s PCK for NOS/NOSI indicates at the beginning of the program, Rose had better ideas of teaching NOS and NOSI than Charlie. She had a clear, organized plan to teach specific NOS and NOSI aspects. She was aware of different teaching strategies and assessments techniques, and how to use those while teaching NOS and NOSI. On the other hand, Charlie had very general ideas and views of teaching science. At the end of the program, there was great improvement in both Rose’s and Charlie’s understanding of PCK. For integrating their knowledge, and factors mediating their abilities and teaching experience, Rose and Charlie successfully integrated the components of their pedagogical content knowledge (e.g., knowledge of representations and instructional strategies, knowledge of students’ understanding of science, knowledge of assessment, knowledge of curriculum) to create learning opportunities for their students. They relied upon their knowledge of subject matter, representations, instructional strategies, assessment, and curriculum to create opportunities, which engaged students in making and testing predictions as well as supporting claims and conclusions with evidence. Also, some additional factors such as, teacher self-efficacy, lesson planning, and general pedagogical knowledge had quite a few impacts on their teaching practicum. This study will add to the growing body of literature on science teachers’ PCK for NOS and NOSI. It will provide a description of how PCK for NOS and NOSI is developed over time, and what factors mediate preservice teachers’ abilities and teaching experiences to enact their PCK for NOS and NOSI for preservice teachers during a professional teacher development program.