Statement of Teaching Philosophy—Carrie J. Beyer

Preparing education students to teach science has been a very rewarding experience for me. It has provided me with the opportunity to help students develop confidence in their ability to teach science as well as grow and develop as a teacher myself. As a science teacher educator, I aim to develop students' understanding of scientific inquiry, helping them visualize science as a process of asking questions about phenomena, conducting investigations to answer those questions, and building explanations based on evidence. I also aim to develop their enthusiasm for teaching science and their ability to develop and teach lessons that engage children in scientific inquiry and promote a deep understanding of science.

To help my students achieve these learning goals, I use a variety of pedagogical methods grounded in my beliefs about teaching and learning. First, before introducing any new topic, I elicit my students' preexisting knowledge and beliefs. Students do not come into our classrooms as blank slates; rather, they have a range of ideas that shape how they make sense of new information and construct new knowledge. Therefore, I uncover my students' prior knowledge in order to help them become cognizant of their own ideas, and in turn, build upon and refine them during the learning process. For example, at the beginning of a science methods course, I have students complete two pre-assessments. One is a reflective journal entry that asks them to share what they think are the key characteristics of effective science teaching. The other is a lesson plan analysis task that has them identify the strengths and weaknesses of a science lesson plan and make adaptations to address those weaknesses. These assessments enable me to see to what extent they think teaching science as inquiry is important and are able to adapt curriculum materials for inquiry and students. At the end of the semester, I administer the same assessments, enabling me to see how my students' ideas and abilities have evolved during the course.

To help my students expand their initial ideas and abilities, I provide them with a variety of learning activities and experiences. For example, I have my students participate in scientific investigations just as they might do with their own students. Theses investigations provide them with the opportunity to experience the different aspects of scientific inquiry as learners themselves before engaging their own students in the inquiry process. I also have my students critically examine and share their ideas about different representations of practice, including examples of science lesson plans, written cases of practice, examples of assessments and accompanying student work, video recordings of lesson enactments, and direct observations of classroom teachers. These representations of practice make visible particular facets of teaching to my students, such as learning goals, anchoring questions, investigations, sensemaking, assessment, and equity. In turn, they help students develop new ways of seeing and understanding professional practice, thereby developing their understanding of science teaching.

To foster reflection on these representations of practice, I use a variety of small- and large-group discussion formats, including think-pair-share activities, jigsaw groups, fishbowl, and concentric circles. These discussions hold students accountable for developing their own ideas about the topics and enable them to share their views with others, promoting a diversity of perspectives. These interactions can also challenge students' thinking and prompt them to consider new ideas and concepts when making sense of experiences and constructing their own knowledge. To orchestrate discussion among students, I serve as a guide and facilitator, encouraging students to

accept responsibility for their own learning rather than maintaining responsibility and authority myself. I also encourage students to respond to one another's ideas rather than responding directly to me and display and encourage respect for all students' ideas. These strategies help foster a community of learners, where I am but one voice among many.

I also provide students with the opportunity to reflect individually on the representations of practice through journal writing. In their journals I have students consider a variety of aspects of teaching, including the characteristics of their school and classroom context, strategies for addressing diverse student needs, alignment between learning goals and assessment, and the strengths and weaknesses of various science curriculum materials. As students reflect on these different topics, I encourage them not only to share their perspectives but also to support their ideas with evidence. Having students learn how to make evidence-based assertions prepares them to justify the pedagogical decisions they will make as future teachers. I provide frequent feedback on students' reflections, through written comments and class discussions, in order to further facilitate their development as learners. These journals also serve as ongoing assessments for me in order to gain insights into my students' evolving understandings as they learn about new ways of teaching science, thereby helping me to make informed decisions about how to further support their learning.

To encourage my students to synthesize and demonstrate what they have learned, I use performance-based assessments. In these assessments, students participate in different aspects of professional practice that they will be expected to enact as teachers. These activities enable students not only to apply their new knowledge and skills but also to simulate aspects of teaching within a low-stakes, supportive context. Additionally, they enable me to assess my students' ability to foster an inquiry-oriented learning environment. One of the assignments that I use in my class asks students to develop a scenario or activity for finding out children's initial ideas about a science topic and then put their plan into action. This gives them the opportunity to identify potential ideas—both misconceptions and normative ideas—that children may have about a particular science topic. It also helps them develop their abilities for eliciting and interpreting children's ideas—something they will do as practicing teachers. Other authentic activities that I use in my classroom include having my students prepare and teach a science lesson in their field placement and assess and provide feedback on their own students' work.

Finally, I know I still have much to learn about what it means to be an effective science teacher educator. To continue to grow as a teacher myself, I participate in ongoing assessment of my own teaching in my science methods course. For example, I interact with colleagues at weekly planning meetings to reflect upon and improve teaching practice. I also use student assessments to guide my teaching, making modifications to plans from class to class and from year to year. Additionally, I conduct research on my own teaching, analyzing patterns in student thinking within course assignments and student interviews. For example, I have examined how to support my students in analyzing science curriculum materials and found that helping them learn about a criterion-based approach can help them engage in productive analyses. This research enables me to gain insights into ways in which I can improve the course as well as share my insights with other science teacher educators in research journals and at conferences. Possessing a reflective disposition and maintaining flexibility in my teaching enables me to be responsive to students, providing them with the experiences they need to develop and grow as science teachers.