Building Capacity for Elementary Science Teacher Education

Julie Kittleson
University of Georgia

VEXATION

Last spring I attended a mathematics education conference about proof and proving. I ended up at this conference because a colleague, who is a math educator, and I presented a paper on conceptions of proof in math and science. When I tell people I attended an entire conference on proof some respond by saying, "Ugh, I hated proofs." I concur. This conference, however, helped me realize that proof is much more meaningful and elegant than I ever recognized; it made me appreciate something in a way I had never appreciated it before. The proof tale parallels realizations I have made in my professional life, particularly in terms of appreciating aspects of teacher preparation I had previously overlooked.

When I began a faculty position I had certain conceptions about teacher education, shaped primarily by experiences, albeit limited, during graduate school. Since then I have learned a great deal about how teacher educators, scientists, school district personnel, people in administrative roles, etc. conceptualize teacher education programs. Over the past few years I have had opportunities to interact with people who exert various degrees of influence over the teacher education program at the university where I work. On the whole, people seem to agree that supporting the development of competent teachers—elementary teachers and beyond—is a worthwhile and necessary goal. A tricky piece, however, seems to be figuring out how to blend varied goals and intentions while establishing the visions and experiences that constitute the program. Since my focus is science, my vexation pertains to preparing elementary teachers to teach science. In thinking about this vexation I realize that there are two distinct directions (and potential research opportunities) to consider. The first involves thinking about how science content courses that were recently initiated by the state potentially impact elementary teacher preparation, and the other involves harnessing the potential of a budding university-school partnership.

In Georgia, as is likely the case in many other states, there is emphasis on science teacher preparation, including elementary science teacher preparation. Georgia's Board of Regents (BOR) put forth a statement indicating they believe it is important for P-5 teachers to develop stronger science content knowledge. The BOR cited studies indicating that elementary teachers' science experiences influence their abilities to impact student learning. To meet the goal of increasing teachers' content knowledge, the BOR instituted new science content courses for pre-service elementary teachers. Previously, pre-service teachers took any 2 science courses to fulfill their science content requirement. The science content requirement has increased from 2 courses to 4 courses, and now the BOR has specified that 2 of the 4 courses required for Early Childhood Education (ECE) majors are to be Integrated Science (ISCI) courses. These courses are to be taught by science faculty, are to emphasize the content in the state science standards, and are to be for adult learners. The ultimate goal of these courses is to improve elementary science education by improving teachers' science content knowledge. It is fair to argue that future elementary teachers should know science content, yet we ought not lose sight of issues beyond content knowledge that contribute to teaching competency. Also, the actual implementation of the ISCI courses could have a significant influence on their effectiveness. One potential area of research involves investigating ways in which these courses contribute to teacher education.

The second issue involves finding ways to capitalize on a budding university-school partnership. This partnership has existed in conversation for over a year, but the school that serves as the centerpiece of this partnership opened at the beginning of this academic year. At this point, I think people are still sorting out the details of how to effectively capitalize on this arrangement. I feel very fortunate that I have the opportunity to teach a site-based elementary science methods course. I see much potential in this partnership, and I am optimistic that by way of having class in a school my students and I will find opportunities to engage in issues associated with science in elementary classrooms. I also realize that I have to negotiate my ideas with different stakeholders and that different people have different agendas. As a university-based teacher educator, I need to consider how to provide learning experiences for my students and I know that they need opportunities to try things out and learn from their mistakes. School personnel need to consider what is in the best interest of the students in their classrooms. These agendas are not incompatible, but I recognize we need to find a middle ground for testing out ideas related to teaching and learning and taking advantage of one another.

Julie Kittleson
University of Georgia

Overall, my vexation centers on questions about preparing elementary teachers to teach science and how to take advantage of situations that have the potential to impact the pre-service teachers enrolled in our program. In one case, we now have science content courses intended to improve elementary science education. In the other case, there is the issue of how to use site-based methods course to my advantage. I think both cases have the potential to inform elementary science education, but the issue involves figuring out how to use these cases to inform the efforts of our program as well as contribute to the wider conversation about elementary science education.

VENTURE

For this year's Crossroads conference, the organizers asked participants to consider social capital. They described social capital as "an inherent property of community relationships. Within a group network, social capital is represented by the trust among individuals and their sense of obligation to each other, the flow of information among the actors in the network, and the interactional norms and expectations that sustain the collective good" (see call for proposals). This characterization of social capital seems appropriate with respect to teacher education, particularly dimensions such as obligation and sustaining the collective good. In terms of the university-school partnership, and I believe it is fair to say that people associated with this partnership share a sense of obligation to prepare future teachers. I believe the same can be said of the efforts to get pre-service elementary teachers to develop deeper understandings of science content. In terms of a venture, it seems that an appropriate path is to find ways to harness these efforts in ways that sustain the collective good, which in this case pertains to supporting science in elementary classrooms.

I realize I need to think in terms of my role in teacher education. I teach elementary science methods. I believe science in the elementary grades is important because students' early experiences likely establish a foundation for their future experiences with science. Since students' experiences with science are influenced by teachers it is important that teachers develop competencies that support science teaching. In terms of elementary teacher preparation (and I am thinking in terms of the program at my university), an issue that deserves attention is how to establish a coherent program. Science is one of several subject area methods courses students take in the program. One thing I am trying this semester is collaborating with a colleague who teaches a general education course. She. . She also teaches a site-based course, and we are looking for ways to make our courses complement one another. I know that sounds like a relatively simple action, but it is one of the first times I have collaboratively planned with someone who teaches in the elementary teacher education program. (The program is housed in one department and faculty and graduate students from multiple departments teach courses associated with the program.) In addition, there could be potentially interesting projects involving the ISCI courses. At this point I am trying to figure out how to build infrastructure for such projects.

With respect to conversations about elementary science taking place in the broader science education community, I was excited to see a paper set in the July 2009 issue of Science Education that focused on elementary education. In this paper set, the authors discuss issues facing people responsible for elementary teacher preparation. A feature of the paper set that appealed to me was that the authors talked about working in different programs but facing similar problems. Additionally, this paper set represented different research programs and the authors discussed how their work had evolved over time. I thought this perspective was quite informative because it illustrated researchers' decisions about how to structure learning experiences for pre-service elementary teachers, as well as how such experiences were refined over time. As with my experience at the proof conference, there were points in the paper set that helped me appreciate things in new ways. To continue the conversation, I would be interested in hearing people's responses to the following:

- How are other elementary teacher education programs structured and how is science integrated into the program?
- What kinds of partnerships do people have with schools/districts and how have these partnerships contributed to teacher education?
- What kinds of partnerships would be beneficial for capacity building for elementary science teacher education?