

LEARNING TO CREATIVELY ENACT, INTERPRET, AND REPRESENT SCIENCE TEACHING

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Vexation

Each year, I begin to think about my future methods sections and come to the conclusion that I remain dissatisfied with the structures and experiences I offered students in terms of practical experiences teaching. I have many models of practical experiences, yet each approach has not led to the outcomes I desire for my students. Particularly this year, as I anticipate transitioning from a research-intensive institution to a teaching-intensive institution, this vexation bubbles up again. I find myself thinking, ‘so how will I structure practical experiences in this version of my methods course?’

I believe we might agree that a challenge of teacher education involves transforming the teaching practices we believe are effective into practices deemed useful by prospective teachers. I believe we might also agree that our work is important, but tenuous. Part of the tenuousness is a product of disagreement between views about knowledge and experiences needed to become an effective elementary science teacher. In my experiences, students often feel that the best way to become an effective teacher is by practice teaching. I agree that those experiences are important, but for me experiences alone are not sufficient. I believe that some teaching practices are best learned through careful, deliberate, focused analyses and interpretations of experiences to develop understandings of teaching practices – it is more than practicing and reflecting.

This belief about teaching practices is situated in my understandings of science and also effective elementary science teaching. I think of science as a practice of observing phenomena, finding patterns in observations, and being able to explain patterns. If we think of learning as a phenomenon, there are elements to observe, which hopefully have patterned relationships that are explainable. Thus, from a scientific perspective, understandings of effective elementary science teaching practices can develop through making observations of students learning science, identifying patterns in those observations and being able to explain those patterns. Furthermore, just as scientific understandings can predict future observations and outcomes of phenomena, I believe effective teaching *can* be predictive of future learning phenomena. However, this becomes a vexation when I consider my experience teaching prospective elementary science teachers. Prospective teachers are often concerned about developing and being creative about ‘fun’ activities they believe will help children learn science. This is not bad, but I want them to do more than identify and develop activities – in a sense make observations of phenomena. I want them to examine, think about, analyze, interpret and represent teaching.

Venture

As I think about my vexation, I begin to think that I need to more fully embrace my comparison between science and science teaching. One gap I recognize is between teaching practices and aspects of the Nature of Science like the relationship between creativity and analysis. In addition, I am rethinking the structures that will support prospective teachers in becoming effective elementary science teachers. In terms of rethinking, my venture involves a more conceptual re-orientation instead of developing new forms of practical experiences. Before talking describing this venture, I want to briefly explore the relationship between creativity, analysis, and interpretation as the background for my conceptual re-orientation.

The role of creativity in science has not been in the foreground might thoughts about learning effective science teaching practices. A challenge with creativity is that many equate it with highly affective and artistic activities. Another challenge is that there seems to be the assumption that in terms of creativity is that there are no norms or standards. However, from the perspective of the Nature of Science, creativity is different. Scientists are creative when imagining variables, designing investigations, and identifying patterns in observations. All of these aspects of creativity rely on norms and standards of scientific practice. It seems that engaging prospective teachers in creative thinking around the practical experiences they have in learning to teach could be a useful venture in re-orienting my planning for practical experiences. At this point, I am not confident about how to embrace creativity while retaining norms and standards. However, I am thinking that it may be important to consider ways that I reveal my own creativity in science teaching and interpretation of teaching, while also supporting the prospective teachers’ creativity in and interpretation of teaching.

An aspect of science that I have attempted to include, though not found productive, is analysis of evidence. I believe that prospective teachers can learn a lot about teaching through careful and detailed examination of their experiences teaching. I challenge prospective teachers by asking them to support the claims that they make about the effectiveness of their teaching using evidence. For example, rather than saying a lesson ‘helped

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students develop appreciation for the role of questions in science,' I ask them to provide and analyze evidence of that claim. Evidence could include student work, students' comments, or other artifacts that might be produced in the process of teaching. However, it is infrequent that prospective teachers engage with this process to the level of analysis that I believe will make them better teachers. More commonly, they will provide evidence, but fail to analyze or interpret the evidence. I have learned that my modeling of analysis of teaching is important. But this often falls short because the prospective teachers have not been part of the teaching event. Furthermore, they do not get help or support from me in engaging in similar analysis of their own teaching. Finally, a missing element is a representation of the interpretation that can be examined and discussed. Thus, I come to the venture that I plan to pursue.

My venture, a re-orientation towards practical experiences in learning to teach, draws on the ideas of scholars working in schools in Reggio-Emilia, Italy. One construct is the Atelier – or studio. Schools following the Reggio-Emilia approach use the Atelier to suggest that learners engage in creative expression of ideas and understandings. A central task for children in the Atelier is to develop methods and skills to represent their understandings of phenomena in the world. This involves both creativity and analysis. Children are invited and provoked to observe, describe and explain their ideas and understandings of the world in the Atelier. Often this is done through creation of visual arts pieces (drawings, paintings, sculpture, etc.). Throughout their work, children are shown new approaches to creating representations and helped to develop skills in approaches they already know. The Atelierista (the artist – the teacher) engages with the child dialogically around the representation, models new techniques, and questions and challenges the child. Thus, the Atelierista both models and scaffolds for children but also engages in parallel activity. The Atelierista is expected to represent his/her understanding of the child's representations, understandings of phenomena, and also the child's developing capacities. Thus, the concept of Atelierista is multifaceted including modeling and scaffolding, creativity and analysis of children's actions, as well as representation.

You may wonder how this model represents a conceptual re-orientation towards teaching. From one perspective this sounds like a traditional approach to learning to teach. From a different perspective, we could just say this is a restatement of the notion of laboratory in learning to teach. However, I would argue that it is different. In the Atelier (in Reggio-Emilia schools), participants engage in parallel, though complementary activity. The learner is working on a project that attempts to develop new or richer understandings. The provocateur (the teacher) examines and reflects on the actions of the learner, models approaches and strategies, and also questions and challenges the learner. Additionally, all of this is done in an open atmosphere of creativity and analysis in which participants are encouraged to be open, curious, and also engaged.

So what would this look like in practical experiences in learning to teach? My vision and approach to developing an Atelier in teacher education involves several components. First, I plan to go with prospective teachers to a school, where I prospective teachers and I will collaboratively teach science lessons to children. Next, the prospective teachers and I will concurrently examine, analyze and attempt to represent our understandings of our students' developing understandings in the context of the lesson. The challenge will involve being open to various approaches and methods (as well as being able to support those practices) about how to represent our understandings. However for me, I will need to fully embrace the role of Altierista. I will need to model and scaffold for prospective teachers, while also challenging each individual to strive for greater sophistication and creativity. Finally, all our representations will be made public and discussed. My role will also be challenging here as I attempt to scaffold discussion about the prospective teachers' representations while also trying to understand the meanings within the representations. The goal will be to understand the deeper meaning that the individual is striving to present and helping that become apparent to all. My hope is that this venture will challenge and provoke prospective teachers while concurrently engaging their creativity in the analysis and interpretation of teaching.

Questions for discussion:

1. How can norms and standards be conceptualized to support scientific thinking, facilitate learning about teaching science, without also stifling creativity?
2. Given that this is contextualized in a course, what criteria and processes will be useful in the evaluation of the representations of understanding that prospective teachers produce?
3. What approaches will help prospective teachers engage with teaching and understanding teaching as a creative and analytic process?