KURT HASTE, *University of Connecticut*

Hegemonic Teacher Education in Science

I am a recovering science classroom teacher. I had the very fortunate experience to have taught middle school science in districts that represented the extremes on the socioeconomic continuum. I have since made the commitment to a PhD program in an effort to help to "fix" teaching. You might say that I've got the "science teaching blues" mostly because of the disconnect that I have seen between the academic approach to teaching science and the reality of what I saw happening in the classrooms (my class not excluded). I'll be the first to point out the mistakes that I made while I was a classroom teacher, but at the same time, I am rather confident that I was able to make the kind of learning happen in the classroom that academic science education community has prescribed. We are so quick to point out the discrepancies between the academic's prescriptions of science education and the actions of the teachers in those primary and secondary classrooms. However, how much do we need to step back and be more critical of those prescriptions? While I was a teacher, I found that taking that step back and going through that critical process was key to my students' success in classroom.

Success

I am very happy to say that regardless of the district in which I taught, I have been able to use constructivist methods along with inquiry style activities. However, I am also confident that those methods alone would not have produced the type of success that the academic research promoted. Within the first year of teaching, I found myself doing voluntary and rigorous self-discovery on topics that were at best marginally included in the college classroom. I can think of maybe two classes that allowed me to start that process while I was in college, but neither was science education focused. In both cases, it was known that these classes were on the margins of mainstream education. Additionally, I felt that I was fighting the tide. I doubt that it comes to anyone's surprise that the teaching styles in the mainstream setting are heavily content/test oriented. In fact, I found that both teachers/administrators as well as parents preferred this common method. However, I sensed that there was this underlying desire for change in my classrooms pertaining to this situation. The more I continued this process of self-discovery and growth on my own after college, the more my students became enthusiastic about learning in my classroom. Even though they might beg for me to teach to them in the way in which they were most familiar, there became a time when I simply refused to. Initially, this caused much controversy in and out of the classroom. However, even the most ardent of students changed their stances over enough time and consistency. Students increasingly stated that they felt I worked diligently at giving them the space and time to think for themselves, consider meaningful and controversial topics, grow as individuals, and maintained the respect needed to continue the process the next day. In effect, I was very conscious of student attitudes towards learning. Science learning was something that happened because students learned to care more deeply about the environment and related government policies as they developed more informed opinions. I challenged them daily to question their own thoughts about issues they had with how to run a society. Additionally, I always found that students initially felt that there was a "they" who was in charge of society/government/other institutions, and "they" could not be influenced. Overcoming this notion of the impenetrable "they" was probably the greatest challenge that I worked with. Honestly, I am not even sure that this challenge was completely surmounted because my students would say that I should run for office and change things. I always took that to mean that they were still looking to others to solve problems for them. However, this attitude did become less and less over time, too. Additionally, my students developed a very tangible need for science education so that they could take part as responsible citizens in their communities to begin to understand the process of working to create change that they preferred. Science was merely a platform for creating change. By the end of the school year, my students were usually very interested in questions that pertained to what methods worked to create change in the past. During the school year, they wrote at least one letter to a government official addressing some environmental issue to which they received letters back from their respective officials. This was the beginning of their understandings for change. However, the question that was left in my mind was if they were going to continue this process on their own, or would the status quo of the educational process suppress it just as it did in the past.

Vexation

Was inquiry and constructivism key to this process? Undoubtedly, yes. Inquiry is a very good model to teach students the important process of observing and questioning. Yet, it seems to me that inquiry and constructivism were not at the core of my students' learning and growing. I would argue that beyond the need for constructivism in the science classroom is a need for teachers who are: enthusiastic about their profession, knowledgeable about current topics, comfortable with controversial issues, conversant in social hegemony, and receptive to diverse perspectives. Without these characteristics, constructivism and inquiry, are different but equal ways of spoon-feeding content and process skills in order to become more standardized. Do schools of education effectively allow the space for these characteristics to develop within pre-service teachers? Does science education have a need for the incorporation of these characteristics?

Perhaps there is a need to be critical of the current status of constructivism and inquiry. What are our goals as educators who promote the use of this epistemology? Are we still teaching science like our grandfathers and grandmothers did (focusing mainly on content mastery), but with a slight twist called inquiry? I raise this simply because that is what I have seen. Teachers and administrators often equate inquiry to mean hands-on. Of course, we know that this is not true. True inquiry allows for true exploration and for multiple conclusions. It also allows for the construction of meaning and knowledge. True science exploration does the same. However, in a classroom where curriculum and textbooks often force students into thinking what they are told and mirror that in assessments, pre-service teachers often times become teachers who do as they are told not unlike their students. It seems rather critical at this point to investigate the science teacher education process.

Here are some questions I have developed not necessarily for the purpose of answering at this particular conference. The following questions are necessary to understand the context of the two most important questions that I provide at the end that I view as the essential questions to discuss. These are, what I am going to refer to as "detail-oriented" questions that are not meant to be answered at this point. They exist as "context builders." The first set deals with our own practices modeling the teaching methods that we espouse our pre-service teachers to include in their teaching practice. Are we content-oriented at the college level, as well? Is the process of educating our teachers one which is constructivist and exploratory? Perhaps the apple doesn't fall far from the tree. Do pre-service teachers even have functional understandings of constructivism and inquiry prior to entering the real world? The second set of questions deal with the level at which our pre-service teachers become critical and active thinkers. Is the process of becoming a teacher of any content area rigorous enough to allow for the inclusion of not only key educational theories but also for self-growth, discovery, and diverse conclusions? Are we helping pre-service teachers effectively recognize the real world barriers they may face in their districts as well as ways towards meaningful solutions? Should we consider integrating media literacy as a way to demonstrate how the questioning process is increasingly being defeated in our immediate gratification, hyper-consumeristic society?

It seems that there is almost a complete lack of an educational model in the academic arena that suggests how to develop a teacher rather than a person who gets students to become standardized. As a future teacher educator and a recent classroom teacher, I feel that it is imperative that we consider each of these questions immediately and transparently. However, all of these questions fit under the umbrella of the following two questions:

Do we ask our pre-service teachers to delve into themselves and know themselves better mentally, emotionally, physically, and perhaps even spiritually (not necessarily indicating religion here)?

The word education can be defined in many ways where at least one of them is "an instructive or enlightening experience." Do we choose to make it an instructive experience or an enlightening one?