# Collaborative Research on Diversity Issues while Learning to Teach Science

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## Vexation

The issue I find myself facing is a research challenge related to my own teaching practices. For many years, I have worked at the intersection of science education and student diversity in its many forms (race, ethnicity, language, ability, gender, immigration status, etc.). Even though I am coming to accept that I may never fully grasp all there is to know about student diversity and its relationships with science teaching and learning, it feels that after all these years that I should be approaching a more complete understanding. I read about the issues. I attend research colloquia where others share their work. I incorporate the theories and associated strategies into my teacher education courses. But just when it seems I have a firm grasp on the slippery beast, I discover that it has more heads, sharper teeth and a stronger torso than I believed. When I worked in Cleveland, my mind was opened to the issues of inner city African-American learners. In Utah, my world expanded to include recent political refugees and unique religious forces. Now in New England, diversity issues emphasize English language learners and the associated puzzles and challenges.

Some research I have conducted has taken the form of self-studies of an advanced elementary science methods course that I teach in the fall semester. Perhaps because I am paying more attention but it seems there are an increasing number of science educators who are similarly engaged in disentangling second language and science learning. As I have moved ELL considerations to a more prominent position in my course, I have discovered this provided a fascinating entry point for opening my students' minds to broader diversity concerns. The resistance I normally detected from preservice teachers when I broached questions about race was not as strong when language learner considerations serve as our starting point. The standard defensive moves my students displayed whenever "multicultural" was uttered seem milder when the emphasis was upon children whose first language is not English. Better yet, with ELLs as a foundation, it felt as if the future teachers were more receptive to broader and more contentious aspects of power and privilege. Fortuitously, these efforts turned into an AERA paper (Settlage, Gort & Glenn, 2007) and a contribution at a recent TESOL meeting (Gort, Glenn & Settlage, 2008). Somehow, and this has a great deal to do with my wonderful collaborators, these efforts have been positively received by a wider audience. However, I am not satisfied with telling my own story.

I do not wish to disparage efforts by others who use self-study of diversity issues (e.g., Tidwell & Fitzgerald, 2006). While it has its place, as a consumer this methodology is unfulfilling. I wish to study the influence of the various aspects that methods course have upon my preservice teachers. The problem I am facing is that I view their growth as very personal and emotion-laden. In addition, rather that represent their growth as a smooth line tailing upwards, the process of change is punctuated: resistance (no change), advances (sudden shifts), regression (falling backward) — and even precipitated by non-classroom events (e.g., a dawning realization when overhearing a conversation in the teachers lounge). The sudden mini-transformations are of great interest to me, in part because the process contradicts developmental representations of learning. In my role as mentor to future teachers, the evolution I sometimes am able to witness fills me with delight. As a regular instructor of this course, I am uncertain about ways to evoke those successes each term. And as a researcher, I am puzzled about approaches that would allow me to capture, analyze and interpret what transpires.

My students have been forthcoming and articulate about the course topics. By way of illustration, we regularly schedule an immersion experience during which a colleague from the physics department comes to teach a lesson. Carolina uses appropriate science pedagogy but inappropriate language supports. This is deliberate and diabolical because uses Spanish exclusively and expects that of everybody else. The responses by my preservice have become part of the discourse about the course: unsolicited commentaries about the immersion event are made months after the semester has concluded. This past year, the interesting behaviors on display included palpable tension between the guest instructor and a few preservice teachers. Also, as has been our practice, we re-organize the work groups to redistribute the occasional Spanish speakers among my students. Within one group, the removal of their Spanish-speaking peer actually empowered the monolingual group. When there was a translator in the group, the others acquiesced to him and I had noticed how uncharacteristically detached the others had been during the hands-on activity. The sudden absence of a language interlocutor prompted the others to take control of their work. As their teacher and a researcher, I find this all of this to be fascinating. My difficulty is in how to appropriately conduct a formal study of such events.

# COLLABORATIVE RESEARCH ON DIVERSITY ISSUES WHILE LEARNING TO TEACH SCIENCE

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**Venture**

While I confess being susceptible to novelty, that is not the motivation for this venture. My goal is to recruit the preservice students enrolled in my method course as both research participants and the co-researchers. Learning to teach science in ways that are appropriately responsive to student diversity is very complex. By drawing upon my students' perspectives my intent is to capture the complexity in ways that would impossible if I pursued this as a solo effort. I am less concerned about using my students to validate my findings because I will be relying upon them to enrich the story (Pillow, 2003). I too would participate by reflecting about my role as the instructor. This reflexivity would similar to how I will encourage my students to contemplate their views about teaching to diverse student populations (McCorkel & Myers, 2003). Realizing that we will come to these issues from varying perspectives, I hold onto the expectation that collaborating will be informative for everyone even though we may not all benefit in the same ways.

This will unfold during Monday evenings within a graduate science methods course. Though we are a month into the semester by the time we discuss my Venture, I would appreciate input from fellow Crossroaders. I should mention that my theoretical frame is James Gee's identity framework. I would like to examine how my students' report shifts with their affinities toward certain practice systems (e.g., social justice, teacher advocacy) as well as examining the ways in which they shift in their views about the salience of their "nature" identities (e.g., ethnicity, language, and other background features). Realizing that the catalog description of this course mentions "materials and methods in elementary science" the students will reasonably anticipate learning about teaching strategies and curriculum resources. I am confident that we can strike a balance between practical issues and the more pressing considerations of student diversity.

My plan is to supply my students with experiences that will prompt them to consider the implications of student diversity upon science teaching. There are course readings meant to expand their perspectives along with activities (e.g., the Spanish immersion lesson) that will enliven the course. New pieces will provide opportunities for reflection and discussion. One will be a network of reflexive blogs with restricted access between each participant and me. They can include others from the class if they wish. Doing this online will allow for a freer exchange of ideas – and it makes the documentation from a research perspective smoother, too.

Last year, I gave the students an introductory questionnaire that included a few items such as "How relevant do you feel your cultural or ethnic background is as you think about your role as a teacher of science over the next few years?" At the end of the semester I returned their original responses to them. This generated an interesting discussion wherein many were aware of their shifts in perspectives. With that in mind, I have identified several surveys that my students will take and then we will discuss the results with each other. The first is a Multicultural Ethnic Identity Measure.

In summary, my venture is to engage my students in a collaborative investigation of their shifting views about teaching science in diverse educational settings. Rather than stepping back and studying them, my goal is to engage them as partners in this investigation. I anticipate there will be some challenges and would offer the following as questions that would help me:

- What examples of similar research exist that you would recommend that I consult?
- Are there activities or readings you would suggest we use in the course so as to push my students to confront issues about student diversity and science learning?
- What other dimensions of this venture (the course, the study, the collaborative authorship) would you advise me to contemplate as we move ahead?
- What kinds of frameworks would you suggest I become aware of: I have only recently learned about "interest convergence" and I suspect there are other conceptual tools that would be helpful to me and/or my students?