

Getting Science Teacher Candidates to Get Along

Nate Carnes

University of South Carolina

A VEXATION

My vexation emerges from my efforts to prepare middle level science teachers who must exhibit the dispositions listed in the College of Education (COE) Conceptual Framework and demonstrate competencies advocated by the National Middle School Association and National Science Teachers Association. The COE dispositions include the following:

- **Integrity** – consideration of actions that are ethical, open, and forthright.
- **Intellectual spirit** – pivotal to the responsibility that candidates should accept in constructing, generating, and sharing knowledge.
- **Justice** – appreciation for and recognition of diverse groups of people and perspectives that are rooted in democratic principles.
- **Stewardship** – an attitude that recognizes the importance of collaboration and professional responsibility to serve others (College of Education, 2006).

Within the context of the science methods course that I teach, the disposition of integrity promotes honesty, genuineness, and other behaviors of an upstanding science educator. Candidates who consistently exhibit this disposition seek to avoid plagiarism. Through the demonstration of lifelong learning behaviors and contributions to the learning of others, candidates demonstrate the disposition of intellectual spirit, closely related to the curiosity that drives the science enterprise. A commitment to justice embraces the tenet that all students, regardless of physical characteristics or cultural backgrounds, can learn science (National Resource Council [NRC], 1996). Finally, the last disposition serves as an elemental role in the development of social capital and is well aligned with conceptualizing science as a social enterprise, one of the strands embedded in the nature of science (Lederman & Lederman, 2004; Settlage & Southerland, 2007).

Additionally, these four key behaviors listed in the Conceptual Framework highlight the importance of participating in a community of learners and working with others toward a productive end. If I am successful in my campaign to contribute to the development of my preservice teachers, they will engage in practices and behaviors that develop their competencies as professionals. One of these competencies includes working collaboratively and professionally with others (Arth, Lounsbury, McEwin, & Swaim, 1995; Powell, 2005).

My expectation is that my science teacher candidates should come prepared to discuss the assigned reading assignments, seek connections to their practicum experiences, and actively construct meaning from our course experiences and discussions. To some extent, it seems that my lessons are successful in that lively debates or interactions occur in a way that embraces a sense of community. On the other hand, growing numbers of teacher candidates become irritable with me, insisting on “the right answer” and/or tricks that will work in their future classrooms without fail. “Do we have to know this for the Praxis II exam?” “So, for which of the content areas should we use this instructional strategy?” “What is the best way to teach photosynthesis? Can’t you just tell us?” A voice from my past resurfaces from time to time stating, “I feel that you should just be giving us tons of activities that we can use in our class.” Furthermore, an increasing number of candidates make attacks on others who do not “sing off of their page of music” during our discussions of creationism vs. evolution, whether or not to include “effort” in the calculation of grades and other debatable topics. These protests and pointed criticisms suggest a sense of egocentrism, “I only am interested in what is good for me” tone and a decided stance against small group work and activities that require teacher candidates to develop relationships with others and to value multiple perspectives on science education topics. In the past, my complaints about teacher candidates' who are unwilling to engage in critical thinking and social construction of fundamental science concepts and how to teach them were rooted in my intentions to develop reflective thinkers. In light of social capital, my goals also include the teacher candidates' increased awareness of and competency in developing relationships with others in a way that would help them navigate through the unfamiliar terrain of science teaching.

Why do I care? First, there is a moral imperative that drives me to provide opportunities for collaboration and appreciation for diverse perspectives; it is the right thing to do. Social construction of knowledge bodes well for making sense of the course material and experiences in a way that benefits the quality of science instruction that the candidates' future students will receive. The attention to building relationships with peers and potential colleagues is clearly related to an often overlooked aspect of the Nature of Science. Specifically, science is a social enterprise that consists of sharing and debating scientific ideas and methods with knowledgeable others to gain a deeper understanding of the particular phenomenon or set of phenomena (Chiapetta & Koballa, 2006; Settlage, & Southerland, 2007). As Settlage & Southerland (2005) stated, the nation's schools need classroom teachers who will help to deconstruct the myth that scientists do their work alone and advanced knowledge under the cloak of secrecy. How can they help debunk this myth if they don't demonstrate the ability to care and work with others? In light of accreditation, the National Middle School Association (1999- 2006), expects my colleagues and I to prepare teacher candidates who show some confidence in working with various partners within the education community.

A VENTURE

Toward the end of one semester, I had an epiphany of sorts. My teacher candidates are often in a different place than I am, particularly those who are disagreeable and disrupt my efforts to establish a sense of community of learners. My ability to build relationships and to work with those who have different orientations and perspectives than those of my own had developed from several years of experiences and reflective moments that my teacher candidates have not yet had. It is important for me to consider where they are and need to go. Initially, this realization was painful because the lack of social capital was due to my failure to recognize the lack of development that the science teacher candidates brought into my classroom. This dilemma reminds me of scenarios in which we, science teacher educators, require our candidates to demonstrate certain competencies. Yet, we never take the time to teach them how to develop the tools that enable them to meet our expectations. For example, my teacher candidates are required to write several reflective pieces over the course of their college careers. As a result of several personal conversations and other anecdotal data, they generally have not received instruction about how to reflect or what it means to reflect. Similarly, very little time in my course is devoted to providing my teacher candidates with experiences in developing relationship with various members of the education community. One might assume that adult learners are already competent in doing so. If this is the case, why is the importance of collaboration threaded through all of the practices and key behaviors listed in the Conceptual Framework? Does it make sense that our College of Education would establish goals for what our candidates can already do?

Consistent with the theme statement for this conference, a commonly cited definition for social capital suggests, “Social capital refers to the norms and networks that enable people to act collectively” (Woolcock, 2001, p. 12). The application of this definition to my science methods course underscores the need to provide experiences for my candidates to participate as active learners and collaborate with all members in the class, including me, to realize the complexities of science instruction and to construct viable images of science teaching. Each individual in the class must be valued. Prior to instances of tension and disagreements, all community members must be equipped and prepared to resolve differences in a collegial and productive manner.

My intent to establish a community of learners in which each member is valued and each perspective is respected as is fraught with challenges. Almost all of the teacher candidates have “a history” with each other before they begin the semester with me. Compared to other degree programs, there are relatively few of them. Given the expectations for the degree program, they are in several classes together and have grown to like or dislike each other. What can I do to resolve adverse relationships within a semester? Additionally, change takes time. Generally, adult learners are not as impressionable as learners who are much younger and can be skeptical about suggestions to make changes in their behaviors. To what extent can we become a cohesive unit within one semester?

In my venture, I am considering the incorporation of instructional practices that employ the concepts of Zone of Proximal Development ([ZPD] Vygotsky, 1978) and cooperative learning (Johnson & Johnson, 1987). In doing so, I intend to facilitate the teacher candidates' learning and further development of prosocial skills by effectively designing and maintaining an affective environment in which they engage in inquiry and reflection to further their personal knowledge while contributing to in promoting the knowledge of others. Perhaps some activities that promote positive interdependence during the first day of class will take precedent over a laborious explanation of the syllabus to set the tone for the rest of the semester. Additionally, Lederman & Lederman suggest that the nature of science must be taught explicitly. So, I plan to spend more time exposing teacher candidates to this collection of values and assumptions. In my own mind, the COE integrity and intellectual spirit dispositions can be linked to empirical activities that lead to viable findings and conclusions. Great care should be taken to represent perspectives and information as they are discovered or created. The disposition of justice acknowledges that science is socially and culturally embedded (Lederman & Lederman, 2004); therefore, diverse views and learners deserve respect. As I indicated earlier, stewardship is fundamental to the development of social capital. I am eager to have conversations with other Crossroads 2009 invitees with regard to concrete experiences that I might share with my science teacher candidates, present my connections between the COE dispositions and the nature of science for critique, and to better inform my intended venture.