

Chapter 6

Science Teacher Education, Epistemic Agency, and Multicultural Education

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ABSTRACT

In order to effectively cultivate epistemic agency for science teachers, candidates require a holistic practice-based approach grounded in a theory of learning teaching. The components of agency included in this discussion represents one approach to preparing science teachers to educate students in a multicultural society. By creating coherency and consistency across a teacher preparation program, the author was able to create learning experiences that systematically guided candidates to develop a science teacher practice that was effective for diverse students. In each of these learning experiences, candidates engaged in focused inquiry, directed observation, and guided practice. Epistemic agency was cultivated when candidates acquired the confidence to make decisions about the nature of teaching and learning problems and the criteria to solve them.

INTRODUCTION

Research has suggested that grounding teacher-learning experiences in a multicultural/culturally sustaining learning perspective is an effective approach to developing teacher practice and ensuring positive academic outcomes for the diverse student body entering American Schools. (Gay, 2002b; Lee, 2017; McGee Banks & Banks, 1995; Paris, 2012). The demographic of U.S. schools come from all over the world, including both developed nations such as South Korea (5.4%), Canada (2.5%), Taiwan (2%), and Japan (1.7%), and developing nations such as China (32.5%), India (17.3%), Vietnam (2.1%), Mexico (1.6%) and Brazil (1.2%) (Dennis, 2020). There has been a growing interest in closing the opportunity gaps within and across these groups (Dover & Rodriguez-Valls, 2018; Noguera, 2008; Valenzuela, 2016). However, according to the National Assessment of Educational Progress (NAEP), in 2015, 38% of Pacific Islanders, 39% Asian American, 29% of European American, 6% African American, and 9%

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LatinX students scored above proficient in science. Missing were Native Hawai'ian, Native American, Arabian, Middle Eastern students' scores. There is no demographic student population that has 50% achievement on any scientific metric. This underperformance is alarming given the changing demographics of students when compared to teachers. By 2050, most students entering public school will be from non-White groups, while the teaching workforce has changed little in the last 100 years (United States Census Data, 2010).

In the last 40 years, multicultural education has been the standard approach to solving the academic opportunity gap problem. Banks (1989) provided multicultural approaches to teaching and framing curriculum, advocating for responsive teaching practices for diverse students. This approach relies heavily on the teacher's will to create a flexible, culturally friendly classroom to acquire the necessary skills to live harmoniously in a culturally diverse society. Multicultural education emphasizes schooling as an agent of social change (Hollins, 2008). The challenge of this approach is its heavy reliance on teachers shifting their ideologies about communities and children of color (Gorski, 2016; Weiss, 1995; Zeichner & Grant, 1981). Hollins reported that learning experiences should be developmental, cumulative, and provide carefully constructed social activities that allow teachers to acquire the language, behaviors, beliefs, and attitudes based on a particular teaching perspective (Hollins, 2011). This chapter discusses one secondary credential program's interconnected learning experiences intended to influence the skill development of preservice teachers and the closing of opportunities gaps of the diverse students they teach. These courses are experiences grounded in a particular learning theory to teaching focused on developing candidate epistemic agency. The concept of epistemic agency comes from Kawasaki and Sandoval (2020). They define it as the authority to make decisions about the nature of a problem and the ability to solve it. The idea is to support candidates' ability to identify, address and reflect on practice problems while teaching in a multicultural society. (Kawasaki & Sandoval, 2020).

Using this idea, the author asked, what is epistemic agency for preservice science candidates, and what would a series of learning experiences include? How might this be materialized as a developmental and cumulative series of socializations that allow candidates to acquire the professional skills of becoming a science teacher? Of central importance is the framing of learning how to teach science within a culturally and linguistically diverse society while empowering the K-12 students to be first-class citizens within their communities. These questions are central to providing educational experiences that facilitate K-12 students' global competence, citizenship, and awareness (Byker & Marquard, 2016). Answering these questions required a holistic-practice-based approach for developing candidate epistemic agency for learning to teach. Hollins (2011) introduced this concept to the literature through three epistemic practices, focus inquiry, directed observation, and guided practice. With these three practices, the work of planning coherence and continuity across a credential program began.

Brief Literature Review

Using four broad perspectives to ground learning to teach in multicultural societies: community-focused, critical race theory, culturally sustaining/responding, and holistic practice-based teacher preparation. There are significant relationships between the knowledge, skills, and understandings developed by candidates and the particular perspective proposed.

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