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Book Review

Deep Knowledge: Learning to Teach Science for Understanding and Equity. By Douglas B. Larkin. Teacher's College Press: New York, 2013. 160 pp.

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In *Deep Knowledge: Learning to Teach Science for Understanding and Equity* (2013), Douglas B. Larkin looks closely at how teacher education programs prepare K-12 science teachers to teach for diversity. He presents an ethnographic account of six student teachers enrolled in teacher education programs in four different universities in the United States. Larkin focuses these accounts on the learning process of each student teacher during their first year of teaching within their respective programs. He argues that most research on teaching and teacher education to date identifies the knowledge, skills, and beliefs that teachers need to teach effectively in urban classrooms, yet little attention has been paid to determining how prospective teachers actually develop them.

Specifically, Larkin identifies how these student teachers learned to teach culturally diverse student populations "science for understanding and equity." He highlights how and if student teachers incorporated aspects of race, ethnicity, and culture into their science curriculum. He presents each student teacher's science classroom experience as its own chapter, and describes how the teachers interacted with students, curricular materials, and classroom diversity in general. Larkin notes that at the start of their program, the six pre-service teachers expressed a belief that youth culture was uniform and that incorporating multiculturalism was not an important pedagogical consideration. By the end, four of the six teacher candidates had changed their view based on their experiences.

One student teacher, Roberta, recognized that in order to create the emotionally safe learning environment for which she was striving, she needed to account for the diversity of her students in her lesson planning. In her final weeks of student teaching, she wrote and implemented a unit on evolution and made sure to include culturally relevant material in order to address some conflicting beliefs that might exist in the classroom. Two other student teachers, Jethro and Kathy, realized they needed to better understand their students' interests and cultural identities in order to make learning more engaging. For example, Jethro tried incorporating a video game example in his lesson plan in order to discuss the scientific method with his students. However, his students had never played the game before and were confused by the entire activity. From this he learned that his impressions of student interests were not necessarily accurate, and that in order to design engaging curriculum he needed to understand his students on a more genuine level.

Overall, this book provides engaging accounts of six science teacher-candidates that describe how they learned how to incorporate diversity in their pedagogical practices. Larkin's concluding chapter nicely weaves together important common experiences across the six student teachers. Based on these experiences, he identifies four major challenges for teachers learning how to teach science successfully in a multicultural context: (a) the struggle between classroom management over active learning engagement; (b) working with a low level of content knowledge; (c) overemphasizing conflict avoidance in their teaching practices; and (d) viewing science as a domain of infallible facts. Larkin argues that it was only when student teachers developed the skills to more effectively mitigate these four challenges that they were able to focus on the importance of incorporating diversity into their class discussions and lesson plans. Thus, in explicating these challenges, Larkin highlights some important considerations for how new teachers can facilitate equitable learning experiences in diverse classrooms.

Larkin also observed that five out of six student teachers received minimal guidance and mentorship from their cooperative teachers throughout their teaching appointments. The student teachers therefore relied heavily on resources from their teacher education coursework when they were confronted with problems of practice in the classroom (e.g., how to grade fairly and accurately based on differences in communication style between Black and White students). Given this lack of direct mentorship, assigning the student teachers coursework on how to teach with social equity became an important component in their education.

In addition to this minimal mentorship, student teachers also cited an inability to make changes to their cooperating teachers' lesson plans. Five out of six teachers identified this as another impediment to incorporating multicultural learning into their science curriculum. In other words, student teachers experienced almost no level of autonomy with respect to how to structure their lesson plans. The author notes this as source of frustration in their experiences. While these teachers often relied on resources from their coursework to inform their practice, they were not in a position to modify their practice so that they could integrate principles of multicultural learning. This was notable contradiction that emerged from Larkin's account, though he neglected to address its implications in his conclusion.

In chronicling the experiences of these six student teachers, Larkin was able to closely examine their individual learning processes. Overall this approach was both engaging and insightful, as it allowed him to document specific challenges to teaching for social equity that may have gone unnoticed in a larger, quantitative study. However, broad applications of this work should be cautioned due to the limited diversity within the student teacher sample (five were White, one was Latino), as well as the variation in grade level (classrooms ranged from middle to high school). Even with these limitations this book is useful for student teachers and teacher educators alike in that it explores first why it is important to address diversity in science classrooms, and second what those types of strategies may look like in practice.

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