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BOOK REVIEW

The Nuts and Bolts: A Review of *Culturally Specific Pedagogy in the Mathematics Classroom: Strategies for Teachers and Students*[1]

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Since the passage of the No Child Left Behind Act of 2001 (NCLB),[2] increasing attention has been given to the academic achievement of students in U.S. public schools, particularly historically marginalized populations such as students of color, students living in poverty, and students who are English language learners. This unprecedented era of high-stakes accountability tasks teachers and school personnel with ensuring that *all* students attain academic success (albeit, most often through the misguided measures of standardized tests). Gone are the days where it was commonplace for school and school district personnel to show limited—or, dare I say, superficial—concern for the lack of achievement of certain student populations. Students' race, ethnicity, socioeconomic status, gender, language, or other attributes can no longer be posited as explanatory variables and detractors from accountability measures. Instead, student attributes of difference shift from functioning as barriers to teaching and learning to being a statement of fact.

While scholarship related to culturally specific (or relevant, responsive, etc.) teaching was delineated in the field of education generally, and mathematics education specifically, long before the enactment of NCLB (see, e.g., Ladson-Billings, 1995a, 1995b), its visibility has increased substantially as school and school district personnel grapple with how to promote the academic excellence of all students. Jacqueline Leonard's book *Culturally Specific Pedagogy in the Mathematics Classroom: Strategies for Teachers and Students* (Routledge 2007) is indeed an invaluable resource for mathematics teachers and school personnel as

[1] Leonard, J. (2007). *Culturally specific pedagogy in the mathematics classroom: Strategies for teachers and students*. New York: Routledge. 207 pp., $43.95 (paper), ISBN 978-0-8058-6105-1 http://www.routledge.com/books/details/9780805861051/

[2] *No Child Left Behind Act of 2001*, Public Law 107-110, 20 U.S.C., §390 *et seq*.

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they engage in the day-to-day work of realizing that admirable and attainable goal. In chapters one through three, Leonard articulates a theoretical backdrop for culturally specific teaching. Chapters four through six provide the reader with concrete examples of what culturally specific teaching "looks like" in the mathematics classroom. Chapters seven and eight collectively conclude the book; these chapters discuss empowerment in diverse mathematics classrooms and race and achievement in mathematics, respectively.

Intertwining Theory and Strategies Throughout

Chapter one, "Culture, Community, and Mathematics Achievement," opens pointedly with Leonard recalling an experience she had with a young African American man at a bus stop where the discussion of whether a person needs to know mathematics beyond the "basics" was the topic of a chance, casual conversation. After the conversation, Leonard pondered why the young man did not "see" algebra, statistics, and other domains of mathematics as relevant to his everyday life. The inclusion of this story, I believe, introduces the fundamental premise that culturally specific mathematics teaching promotes connections to the real world and fosters positive beliefs about the need for mathematics. This chapter highlights the recent Trends in Mathematics and Science Study and National Assessment of Educational Progress datasets, and U.S. school demographic data in general. Using these datasets, Leonard critiques educational reform for its inability to achieve equity in education for the majority of students of color and students living in poverty, a sentiment shared by numerous other scholars, whose research and scholarship she amply cites throughout to support her critique.

Leonard not only provides a critique of the current state of education in chapter one but also outlines the theoretical framework guiding culturally specific pedagogy: critical race theory (CRT). She articulates how CRT has been adapted and used by scholars and outlines its six major themes: CRT (a) recognizes that racism is endemic to American life; (b) expresses skepticism toward dominant legal claims of neutrality, objectivity, colorblindness, and meritocracy; (c) challenges ahistoricism and insists on a contextual/historical analysis of the law; (d) insists on recognition of the experiential knowledge of people of color and their communities of origins in analyzing law and society; (e) supports an interdisciplinary perspective; and (f) works toward the end of eliminating racial oppression as part of the broader goal of ending all forms of oppression. She shares prior research on culturally based education such as work done with American Indian/Alaska Native and Native Hawaiian children. Leonard also includes a poignant discussion of teachers' beliefs about culture and learning mathematics, the culture of power, and the role of mathematics identity and socialization. Here the widely held notion of America as a "melting pot" is explored through excerpts of

teacher comments from a graduate mathematics education course. Leonard delineates a solid argument for why framing instruction within the context of diverse students' culture is a well-founded paradigm for mathematics teaching and learning.

Chapter two, "Cognition and Cultural Pedagogy," addresses cultural transmission and cultural capital, and situates culturally specific pedagogy within the context of cognitive theory. Leonard highlights several cognitive theorists including Saxe and Vygotsky and the extent to which culture plays an important role in learning mathematics. Saxe's belief that individuals create new knowledge while participating in culturally mediated activities is explicitly tied to culturally specific teaching. Similarly, Vygotsky advocated that cultural artifacts might be used to facilitate children's learning. This chapter is vital in that it responds to critics of culturally specific pedagogy who often assert that it lacks substantial theoretical grounding. That is to say, in this chapter, Leonard provides a context for centering the work, making sound connections to broader paradigms such as social constructivism. To further support the theoretical grounding of cultural specific pedagogy, Leonard reports on (and makes connections to) a number of other more familiar studies that examined children's cognition, including Cognitively Guided Instruction and the QUASAR (Quantitative Understanding: Amplifying Student Achievement and Reasoning) project. Reported are the research studies of Malloy and Jones (1998) who examined how African American middle school students engaged in mathematical problem solving, and Ku and Sullivan (2001) who explored the problem solving strategies of Taiwanese students. These studies are valuable to the chapter because they explicitly attend to the cognitive activities of diverse student populations.

Chapter three, "Cultural Pedagogy," delineates the various domains of cultural pedagogy including culturally relevant teaching, cultural brokering, border crossing, culturally responsive teaching, culturally specific pedagogy, and diversity pedagogy. Leonard offers clear, concise definitions of the various types of cultural pedagogy. Furthermore, vignettes are presented to help the reader understand how a teacher might engage in culturally specific pedagogy. The inclusion of the vignettes is crucial because it introduces practical examples of how culturally specific pedagogy plays out in the classroom. In courses, workshops, and conferences the question of what culturally mediated mathematics teaching actually "looks like" persists. Leonard further illuminates this question by outlining teachers' pedagogical practices and presenting examples and counterexamples of instructional interactions. For example, she shared the counterexample of Ms. Harding who attempted to implement a culturally relevant activity by asking her students, who were Hispanic, to make tortillas. This activity met resistance from some of the students' mothers regarding their sons' participation. Ms. Harding had not anticipated this cultural conflict and Leonard uses this situation to high-

light the importance of using parents and other community members as a resource when planning culturally relevant activities as they can offer insight into cultural norms and values. It should be noted, however, that these examples and counter-examples are not intended to be a recipe, but rather a purposeful lens for thinking about teacher and student instructional interactions.

While the first three chapters articulate a theoretical backdrop for culturally specific teaching, chapters four through six provide the reader with classroom-based, concrete examples of culturally specific teaching. Chapter four, "Problem Solving, Problem Posing, Multicultural Literature, and Computer Scaffolding," discusses the problem-solving process and the role culture plays in how students approach a problem. One example included is the widely cited bus problem shared by Tate (1994):

> It costs $1.50 each way to ride the bus between home and work. A weekly pass is $16. Which is the better deal, paying the daily fare or buying the weekly pass?

This problem, used on a district-wide assessment, highlights the disconnect that often exists between test developers and test takers. In the case of the bus fare problem, the test developers assumed that students would choose to pay the daily fare because it was cheaper. That assumption, however, was not consistent with the lived experiences of many of the students taking the assessment. Students indicated that the weekly pass was cheaper because it could be used more than once a day and shared with other members of the family. A "typical" test developer is likely to be middle-class, own a car, and work only one job. Thus, her or his perspective is markedly different from many students of color living in urban areas and significantly influences the mathematical lens through which the problem is seen. Leonard also refers to the use of multicultural literature and computer-assisted instruction to facilitate students' problem posing and problem solving. To this end, she highlights the Intelligent Computer-Assisted Instruction program—a Benjamin Banneker project that examined the engagement and strategies of elementary African American students as they read culturally relevant stories and solved problems on the computer. Vignettes and excerpts from teacher interviews from a similar project at Parker Charter School in New York are highlighted as well.

Chapter five, "The Underground Railroad: A Context for Learning Mathematics and Social Justice," discusses notions of equity and social justice. Leonard describes in detail a thematic unit about the Underground Railroad that was used to engage students in culturally specific pedagogy. Two teachers, Ms. Baker and Ms. Cho, are highlighted and vignettes of their classroom instruction analyzed. Examples of students' journal writings maintained during the unit are also shared. Collectively, the vignettes and writings provide a thick description of the lives of classroom teachers implementing culturally specific and empowering mathemat-

ics instruction to diverse student populations. The chapter is indeed powerful in that it brings tangibility to the construct of culturally specific pedagogy.

Similarly, chapter six, "Women in Aviation and Space: The Importance of Gender Roles in Mathematics Education," delves into gender and academic achievement in mathematics education. Here Leonard explores gender differences in standardized testing, the gender imbalances of advanced mathematics courses, and teacher beliefs of mathematics as a male domain. She reports on projects aimed at counteracting these trends. For instance, The Bessie Coleman project, which aimed to foster female and African American students' achievement and positive attitudes toward mathematics, is highlighted along with Space Links, a similar program, that integrated space science and mathematics.

Chapter seven, "Learning Mathematics for Empowerment in Linguistically and Culturally Diverse Classrooms," addresses language acquisition and parental involvement, and discusses projects aimed at fostering the mathematics learning experiences of students who are English language learners. Teacher beliefs and reflections on practice are illuminated through vignettes. The chapter also illustrates examples of multicultural literature that can be used to engage linguistically and culturally diverse students in mathematical discourse. For example, Leonard highlights several texts, including: *Grandfather Tang's Story*, *One Grain of Rice*, *The Spider Weaver*, *The Three Little Javelinas*, *Sadako*, *First Day in Grapes*, *Harvesting Hope*, and *A Migrant Child's Dream: Farm Workers Adventures of Cholo, Vato, and Pano*. She provides the reader with a brief synopsis of these texts and underscores embedded mathematical content.

In the final chapter, "Race and Achievement in Mathematics," Leonard provides a historical perspective on race and schooling, the achievement gap, the mathematics socialization and identity of African American students, and links to everyday mathematics. Leonard uses Martin's (2000) scholarship to explore the salience of race and its role in the underachievement and low achievement of African American learners. Though a complex construct, the implications of race are stated in an easily understood manner and links are made to principles of culturally specific pedagogy.

An Indispensable Staple

Culturally Specific Pedagogy in the Mathematics Classroom: Strategies for Teachers and Students is a must-have resource for mathematics teachers, teacher educators, and school personnel who serve (diverse) student populations. Collectively, the chapters articulate a theoretical backdrop for culturally specific teaching and illuminate concrete examples of what culturally specific teaching "looks like" in the mathematics classroom. The book is filled with vignettes, teacher reflections on practice, and other instructional artifacts that provide the reader with

the "nuts and bolts," so to speak, of culturally specific teaching. The text is solid in scope and depth, yet easy to read. It introduces individuals who might be novices to culturally specific pedagogy, but crystallizes the knowledge base for those who are more advanced. This book indeed moves the field of mathematics education forward and should be an indispensable staple on the bookshelves of preservice and inservice mathematics teachers and mathematics teacher educators.

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