

for a physics teacher of a course in which few African American students are enrolling or successfully completing than is a search for ways to infuse African contributions to physics into the course. Of course, in the best possible world both goals would be attained. However, given the real world of the schools, we might experience more success in multicultural teaching if we set limited but essential goals for teachers, especially in the early phases of multicultural educational reform.

The development of a phase conceptualization for the implementation of multicultural educational reform would be useful. During the first or early phases, all teachers would be encouraged to determine ways in which they could adapt or modify their teaching for a multicultural population with diverse abilities, learning characteristics, and motivational styles. A second or later phase would focus on curriculum content integration. One phase would not end when another began. Rather, the goal would be to reach a phase in which all aspects of multicultural educational reform would be implemented simultaneously. In multicultural educational reform, the first focus is often on content integration rather than on knowledge construction or pedagogy. A content-integration focus often results in many mathematics and science teachers believing that multicultural education has little or no meaning for them. The remainder of this [article] describes the dimensions of multicultural education with the hope that this discussion will help teachers and other practitioners determine how they can implement multicultural education in powerful and effective ways.

CONTEXTUALIZING MULTICULTURAL EDUCATION

We need to do a better job of contextualizing the concept of multicultural education. When we tell practitioners that multicultural education implies reform in a discipline or subject area without specifying in detail the nature of that reform, we risk frustrating motivated and committed teachers because they do not have the knowledge and skills

to act on their beliefs. Educators who reject multicultural education will use the "irrelevance of multicultural education" argument as a convenient and publicly sanctioned form of resistance and as a justification for inaction.

Many of us who are active in multicultural education have backgrounds in the social sciences and humanities. Consequently, we understand the content and process implications of multicultural education in these disciplines. A variety of programs, units, and lessons have been developed illustrating how the curriculum can be reformed and infused with multicultural perspectives, issues, and points of view from the social sciences and the humanities (Banks, 2003; Derman-Sparks, 2004). As students of society and of the sociology of knowledge, we also understand, in general ways, how mathematics and science are cultural systems that developed within social and political contexts (Harding, 1998).

Most mathematics and science teachers do not have the kind of knowledge and understanding of their disciplines that enables them to construct and formulate lessons, units, and examples that deal with the cultural assumptions, frames of references, and perspectives within their disciplines. Few teachers seem able to identify and describe the assumptions and paradigms that underlie science and mathematics (Kuhn, 1970). They often make such statements as, "Math and science have no cultural contexts and assumptions. These disciplines are universal across cultures." Knowledge about the philosophical and epistemological issues and problems in science and mathematics, and the philosophy of science, is often limited to graduate seminars and academic specialists in these disciplines (Harding, 1998; Powell & Frankenstein, 1997).

Specialists and leaders in multicultural education, because of their academic backgrounds, have been able to identify the basic issues and problems in mathematics and science but have not, in my view, provided the field with the clarity, curriculum work, and examples of lessons that mathematics and science teachers need in order to view the content within their disciplines from