PREFACE

Culture and Language in Science Education: What Do We Know and What Do We Need to Know?

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Received 3 January 2001; accepted 30 January 2001

As the nation’s student population becomes more culturally and linguistically diverse, science educators are increasingly aware of the need to address equity for these students. The motivation for this special issue of JRST on language and culture in science education is to examine what we know and what we need to know to ensure that all students achieve high academic standards.

The research on culturally and linguistically diverse students in science education challenges conventional notions of science content, learning, teaching, and assessment (Lee, 1999). The research has led to questions that ask what counts as science, what should be taught, how science is taught, and how student learning can be assessed in valid and fair ways. As the “one size fits all” approach from the mainstream perspective is challenged, alternative views of science and science education are proposed.

Research on diversity and equity stimulates science educators to examine the nature of science and science education as it has traditionally been defined in Western science (Lee, 1999; Loving, 1997). What counts as science or what should be taught in school science is critically important because this definition determines school science curriculum. Western science, as traditionally practiced in the science community and taught in school science, is the “high status knowledge” to which every student should have access in order to function competently in the mainstream, in a global economy, and in an information society. There is no equity if students are not provided with opportunities to learn Western science. At the same time, students from diverse languages and cultures bring to the science classroom ways of knowing, talking, and interacting that are sometimes different from those in the mainstream. When disparities abound between school science and students’ cultures, the quality of educational experience suffers if Western science is imposed on students who do not share its system of meanings, symbols, and practices.

Equitable instruction and assessment practices for diverse students involve consideration of their cultural and linguistic experiences in preparing them to function competently in the
institutions of power as well as in their homes and communities. Instruction should enable diverse students to connect their cultural norms with mainstream expectations. Instruction should also allow diverse students to meet national standards as well as maintain their cultural and linguistic identities. In addition, assessment practices should maximize opportunities to demonstrate diverse students’ knowledge and abilities in ways compatible with their backgrounds.

To achieve equitable outcomes with diverse students, teachers need to have both knowledge of science and understanding of the students’ languages and cultures (Lee & Fradd, 1998). It is a challenge for teachers to integrate science and students’ languages and cultures in ways that are meaningful and relevant for their students. It is particularly challenging when cultural norms for students’ classroom participation and mainstream expectations may be incompatible (Fradd & Lee, 1999). Because of such differences, teachers may fail to recognize, ignore, or even disparage the knowledge and experiences that the students bring to the learning process. The demands placed on teachers are exacerbated by the fact that culturally and linguistically diverse students are often found in inner-city schools with limited educational resources and low academic expectations. From early grades on, these students are often tracked into low performing schools, classrooms, and groups.

The articles in this special issue examine science content, learning, teaching, and assessment with students from diverse languages and cultures. They illustrate dilemmas that arise when the nature of science traditionally defined as Western science is in conflict with alternative views of science in diverse languages and cultures in instruction (Tippins et al.) and assessment (Solano-Flores & Nelson-Barber). Tensions also arise between the ways science is taught in school and alternative views that diverse students bring to the science classroom in secondary (Yerrick & Gilbert) and post-secondary settings (Lewis & Collins). On the other hand, when diverse students are provided with equitable opportunities, they capitalize on their linguistic and cultural resources in ways that may be unrecognized in science classrooms (Solano-Flores & Nelson-Barber and Warren et al.). These contrasting but potentially complementary views—diversity as a barrier to be overcome versus diversity as a potential asset enriching the resources of learning communities—run through all these papers, with varying degrees of emphasis on one side or the other.

This special issue consists of articles, followed by conclusions from Sharon Lynch highlighting key themes emerging from this set of papers as well as unique contributions of each paper. In addition to advancing our research agenda, these papers have implications for other topics and questions that also need be considered, such as educational policies related to standards-based and systemic reform, high-stakes testing and accountability, instructional technology, and school–community connections. For example, the authors suggest potential difficulties and conflicts when culturally based approaches to instruction and assessment are put into practice in the context of high-stakes testing and accountability (Solano-Flores & Nelson-Barber and Warren et al.). To explore the links between research, on one hand, and practice and policy, on the other, both large-scale and in-depth studies need to be conducted using a range of research methods. As educational practices and policies on culturally and linguistically diverse students gain attention, a corresponding research agenda will continue to expand. We hope that by extending our research knowledge base, this special issue on language and culture in science education will inform practitioners and policy makers who seek to provide equitable educational opportunities for all students, including those from diverse languages and cultures.

The editors of this special issue thank the authors of these five articles for advancing our understanding in this area, as well as express our gratitude to the authors of 17 other manuscripts submitted for publication consideration. Due to space limitations for this issue, some of these
papers have been relayed to other issues (see Fusco & Barton in March 2001 and Moje et al. in April 2001) or are in the revision and resubmission pipeline and may appear in the future. The editors also acknowledge the constructively critical and thoughtful comments by the reviewers of the submitted manuscripts. Finally, the editors appreciate the guidance and insights of Andy Anderson, JRST editor, throughout the process of this special issue.

References


