Preparing More Confident Preservice Elementary Science Teachers: One Elementary Science Methods Teacher's Self-Study

Diana C. Rice
Department of Elementary and Early Childhood Education, The Florida State University, Tallahassee, Florida 32306, U.S.A.

Anita Roychoudhury
Department of Mathematics, Science, and Technology, The Ohio State University, Columbus, Ohio, 43210, U.S.A.

Introduction

In September, 2000, after a year and a half of hearings, discussions and deliberations, the National Commission on Mathematics and Science Teaching for the 21st Century (Glenn Commission) released its final report titled, “Before It’s Too Late.” The report concluded that “the current preparation that students in the United States receive in mathematics and science is, in a word, unacceptable” (U.S. Department of Education, 2000, p. 7). The Glenn Commission pointed out that, despite the rhetoric about our children being “first in the world in mathematics and science achievement” by the year 2000 (p. 12), data from the latest Third International Mathematics and Science Study (TIMMS) and the National Assessment of Educational Progress (NAEP) provided a picture of continuing poor performance. In fact, the Glenn Report stated, “. . .our students are losing ground” (p. 9).

Despite this damning evaluation, the report also suggested that achievement in mathematics and science in the United States can be improved and that “better teaching is the lever for change” (U.S. Department of Education, 2000, p. 15). The Commission prescribed a plan of action that would involve all stakeholders including school boards, school administrators, teachers, parents, state governments, higher education and business. A cornerstone of the Commission’s vision for change was the improvement of teacher preparation in science and mathematics so that teachers enter the classroom with an understanding of science content, skills to motivate children, and a knowledge of effective teaching methods. The Glenn Commission Report clearly stated that the “most powerful instrument for change, and therefore the place to begin, lies at the very core of education— with teaching itself” (p. 5). Research indicates that the elementary school is the most effective level for intervention leading to improved attitudes, higher achievement and increased access in science (Beane, 1988).

As a teacher of elementary science methods, I (first author) regularly work with future elementary teachers. I have witnessed firsthand the stress and apprehension

This study was supported in part by a University of South Carolina Research and Productive Scholarship Grant. Any opinions or recommendations expressed by the author do not necessarily reflect the views of the University of South Carolina.
the thought of teaching science causes them. My experiences give personal credence to the challenge for science educators, particularly those responsible for methods courses, of helping preservice elementary teachers develop the attitude, self-efficacy, and teaching skills that will allow them to try teaching science. Over the years, I implemented changes in the elementary science methods course in an ongoing effort to enhance the effectiveness of the course. Eventually, I realized that I had never evaluated my performance in the methods course in any consistent, organized way. This realization led me to implement a formal study of my teaching in the science methods course.

Paulsen and Feldman (1995) advised that the ultimate responsibility for improving teaching lies with the individual faculty member and that reflection can lead to an awareness of differences between what we espouse and what we actually do. They also pointed out that college faculty often fall into habits of mind and behavioral routines that we take for granted, leaving unexplained some of the ideas and concepts that we take for granted. To provide an opportunity for me to contrast my teaching actions and practices with my teaching goals in the methods course, I chose to engage in a process of self-study (Newman, Hubbard, & Abell, 2001). This decision, although made prior to the release of the Glenn Commission’s report, was quite in keeping with their recommendation that change in teaching practice comes about through high quality professional development. By understanding better my role in the development of my students, I might improve my effectiveness as a teacher of teachers. While the primary goal was improvement of my individual teaching practice, a secondary motivation was the possibility of sharing my findings with other science educators committed to the improvement of elementary science teaching.

Background

Science Teaching in the Elementary School

Elementary science educators in the United States are familiar with the literature characterizing the generally less than desirable state of elementary science education in this country today. Comparisons of data collected over the last 25 years indicate that the amount of time spent teaching science in the elementary grades is up slightly (Glasgow, 1983; Rowe, 1980; Weiss, 1978, 1994, 1997). While these statistics may be encouraging, a sampling of descriptions of elementary science instruction—what goes on during science class—over approximately the same time period reveals a more discouraging picture. In 1981, Pratt reported that elementary science lessons typically came straight from the book or from worksheets and noted that teachers tended to teach science at the end of the day, and then, only if there was any time left. As a result, he characterized the typical experience of elementary children in science classes at that time as, “at best very limited” (p. 73).

A decade later, Stefanich (1992) described elementary science instruction in much the same way, noting that in too many classrooms, elementary science consisted of a routine of reading, taking notes and completing worksheets. Weiss (1994) reported a similar picture, stating that “traditional” teaching methods such as lecture