Chapter 2
Mentoring Girls in Science: Eight Case Studies of a Science Camp Experience

Donna Farland-Smith
The Ohio State University, USA

ABSTRACT:
Content area specialists (scientists) are often recruited as mentors of students to address issues in science education. These scientists are frequently recruited to help with the teaching of science, however, quite often do not have the pedagogy skills needed to be role models for young children. Guidance in the selection appropriate mentors would help maximize the potential influence on students understanding of who does science, where science is done and what scientists do. This study illustrates six case studies of scientists as they worked with middle school girls and identifies five characteristics educators should look for in selecting science mentors successful in broadening students’ perceptions of scientists. The data was collected during ‘Side-by-Side’ interaction with scientists/mentors during a summer camp experience and has implications for classroom practice as the use of mentors can be structured to support the infusion of Science as a Human Endeavor. As the students’ experiences with mentor scientists helped to shape their perception of those who pursue careers in science and what it is that scientists do, careful consideration and preparation of mentors were critical to the success of the program, and so this paper also provides suggestions to help highly trained and highly educated scientists in these mentorship roles.

INTRODUCTION
Without clear boundaries or definitions of the characteristics of science content specialists who will likely be successful in the classroom, all scientists may be welcomed. Recently, President Barack Obama, in the National Math and Science Initiative, requested that scientists do their part in helping young students achieve better grades in science by occasionally visiting school classrooms. However, the indiscriminate use of visiting scientists should be cautioned, because all scientists don’t necessarily make teachers.

Classroom teachers are limited by time and responsibility. They must attend to day-to-day issues while worrying about meeting instructional standards and the requirements of end-of-course tests. As a
result, classroom teachers need guidance in working with appropriate science content specialists for their students. As this will maximize the potential influence mentor scientists have on students’ understanding of who does science, where science is done, and what scientists do. This paper explores the approaches of content specialists when working with middle school girls and suggests as to how scientists should be prepared to serve in these mentorship roles.

Literature Review

Reform in science education has always been a top priority for science educators and an interest of the Obama presidential administration. Recruitment and retention of students are the two main areas targeted for reform, because many students who initially display an interest in science do not remain in science fields. As more students choose to pursue interests unrelated to science, there is growing concern about attracting future scientists, especially females, in the United States. The lack of female scientists has been a concern in the science and science-education fields for some time, as women are under-represented in the profession (Buck et al., 2007). Professional scientists interacting with students in a formal, classroom setting is often suggested as a possible solution. Yet this approach remains under-researched from the perspective of the classroom teacher and the benefit students derive from interacting with a scientist.

The research on visiting-scientist programs is built on the assumption that a scientist in the classroom will benefit children’s perceptions of who scientists are and the work they do. Bozdin and Gerhinger (2001) and Flick (1990) reported that visits from scientists in classrooms resulted in a decrease in many stereotypical beliefs about scientists, indicating that children’s images of scientists can indeed be influenced by a visit from a scientist. However, it cannot be assumed that these relationships are successful in every classroom.

While much is known about mentoring new teachers in science, the research concerning scientist mentoring individual students remains unexamined. A science camp was selected as the context for this study, as it has been established that it is successful in establishing a transformative experience for young female students, broadening their perceptions about scientists (Author, 2009). The data collected over the last four years appears to be enough to start guiding educators towards selecting, preparing, and maintaining successful interactions between middle-school girls and working scientists.

The National Science Education Standards, used as a framework for this summer camp/“Side-by-Side” experience, advocate that Science as a Human Endeavor should be taught as early as the elementary grades, “in order to provide a foundation for the development of sophisticated ideas related to the history and nature of science that will be developed in later years” (NRC, 1996, p. 141). The narrow and erroneous impression of science held by many students has, in part, inspired science reformers to create The National Science Education Standards (NSES) (National Research Council [NRC], 1996). The standards recommend the teaching of specific science content and science processes, as well as emphasizing the human element of scientific enterprise. The new version of standards, Next Generation of Science Standards continues support this idea about learning about science and the human beings who have made significant contributions by identifying the goal for K-12 science education is to develop a scientifically literate person who can understand and the nature of the scientific knowledge. According to NGSS Science and Engineering Practices in the school setting have three interrelated aspects; a) asking questions and defining problems, b) developing and using models, and, c) planning and carrying out investigations.