The Impact of Having a Research Scientist as a Guest Lecturer in a College Biology Course

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Introduction
Not enough young people are being educated or inspired to pursue careers in science, technology, engineering, and math (STEM). As one researcher noted, “the education in American junior high schools, in particular, seems to be a black hole that is sapping the interest of young people, particularly young women, when it comes to the sciences” (Friedman, 2005: 351).

In the past, the United States was known as the world leader in scientific innovation and STEM education. Now only 15 percent of U.S. graduates are attaining degrees in the natural sciences and engineering, compared to 50 percent in China (Freeman, 2008). Clearly, the country’s position as a global leader for innovation may be lost without a strong, focused commitment to ensuring that more students pursue advanced education in science, technology, math, and engineering. A report from the National Science Foundation states that:

In the 21st century, scientific and technological innovations have become increasingly important as we face the benefits and challenges of both globalization and a knowledge-based economy. To succeed in this new information-based and highly technological society, all students need to develop their capabilities in science, technology, engineering, and mathematics (STEM) to levels much beyond what was considered acceptable in the past” (NAS, 2007).

What are some of the reasons for this lack of interest in science, engineering, math and technology? A recent National Science Teachers Association Report entitled Steer Your Students to a Science Career (Shapiro, 2008) identified the several causes for the decline, including a shortage of scientific mentors, parental pressure on kids to seek more lucrative careers, discrimination against science-bound women and minorities. These and other factors continue to discourage many students from going into STEM careers. What, if anything, can faculty members do to reverse this negative trend in STEM areas? Throughout a student’s educational experience, science teachers often play a key role in inspiring their students to become scientists. It is imperative, especially at the college level, that teachers engage students in meaningful learning, a rigorous curriculum, real-life examples of STEM careers, and authentic
research opportunities. In order to accomplish this, a variety of activities should be included in the classroom experience in order to inform participants about science as a possible career by offering content in the context of the real-life experience of working scientists. By connecting academic courses and the curriculum with STEM professionals from the community, students will have a more grounded understanding of what scientists do and have a better understanding of the real-world applications of what they are learning. The goal of this article is to highlight the positive impact that a research scientist can have as a guest lecturer in today's biology classroom.

According to the National Science Education Standards, teachers of science should be able to put a science curriculum/lesson into social context for their students and by doing so, relate it to the community, the field of biology, and their future careers (NAS, 2007). One effective way to accomplish this is to involve people from the community in the teaching of science in the classroom. Guest speakers share up-to-date, realistic information and bring their own distinctive perspective on a subject that more than likely would not be found in a textbook (Mullins, 2001). They contribute to the topic being presented and offer a different way to think about the topic and related issues. Speakers often offer a peek into the things students are studying and thinking about for their future.

To be effective, a number of steps should be followed when inviting a guest speaker. Host faculty members should:

- Find a speaker who conveys relevant and reliable information—someone who is credible.
- Engage a speaker who knows both the topic and the audience.
- Invite speakers who have knowledge that is interesting to the students—in this case, science/biology. The speaker's topic should enhance the material covered in the curriculum.
- Encourage speakers to talk from personal experience—to speak from the heart.
- Prepare the students—let them know there will be an “evaluation” and they will be graded (Mullins, 2001).

Methods
In order to discover the impact of having a research scientist as a guest lecturer in a college biology course from the students’ perspectives, Dr. Paul Wheeler, a biochemist and senior scientific officer at Veterinary Laboratories Agency in Great Britain, was invited to a biology class at Harold Washington College in January, 2009, to share his experience as a professional scientist. As a part of this class, each student was required to write a summary of this experience and address the impact of his visit. This short paper was submitted by students for a grade in the class. Their feedback will be considered as a key result and will be discussed in the section that follows.

A second contact was made with the same group of students (electronically) in September 2009 through a follow-up survey, which asked them to respond to a set of questions. The format was such that it required them to indicate which of a series of statements best reflected their response to each question. These results will also be discussed in the following section.

Results
The Class Assignment of the Paper
Twenty-seven students completed the paper addressing the questions that were discussed in the classroom. Drawing conclusions from this type of classroom assessment requires the reader to look for common themes and words within the narrative responses of the students. Overall the feedback was positive in nature.

Every responding student described their impressions of Dr. Wheeler as positive. He was depicted as having a “joyful and inquisitive nature” that was ideal for his work. He was described as “intellectual and creative,” and it was noted several times that he obviously takes pride in his work. Two quotations said a great deal about the visit:

“Observing him I got a great sense of devotion and passion for his work, which made me very excited about what is to come as I continue my education in the science and health care field.”

“Regardless, of what career path I take, I was definitely inspired by his passion.”

When assessing what they had learned, students wrote:

“Each day is different and there is not a typical day in the life of a scientist.”

“The experience with a scientist in the lab was incredible. I have never met a scientist before, and just to be in his presence was amazing.”
• “I found Dr. Wheeler’s talk to be fascinating and also valuable because he dispelled many of my misconceptions about the work of a research scientist.”
• “I stayed after class to talk a bit about it with him and I found everything he had to say extremely interesting.”
• “Overall, the class learned that a research scientist must juggle many responsibilities, including the lab work itself, staff supervision, coordinating funding efforts, collaboration with other scientists.”

The Electronic Survey

Twenty-seven students were mailed the survey electronically, of these twenty-five responded. This is a response rate of 92.5 percent which is notable considering the fact that eight months had passed since they had met Dr. Wheeler. The questions used in the survey mirrored those in the original assignment for the paper. However, because the students were provided with a series of statements to select from, there was more uniformity in their responses. In an attempt to be concise, the responses to several of the survey items are included in the charts that follow.

In addition, students were asked to respond to a short essay question which asked: “Why is it important to meet scientists or to be exposed to the science environment?” There were twenty-two responses to this, several of which are listed below.

• “There are many exciting innovations taking place in science—to hear about some of these firsthand adds interest to a course.”
• “Students get a better view of science through a professional.”
• “Personal account is 100 time more valuable than anything in a book.”
• “I think it’s easy to make assumptions about what scientists do. It’s nice to have one tell you what her/his career actually involves.”
• “It is important because it helps connect our studies to real professions. It also helps us gain a little more perspective on what exactly happens in a laboratory, and on why this work is done. Lastly, they can also instill realistic expectations as Dr. Wheeler helped me understand that it takes a lot of time and patience to work in research.” (Figure 1)
• “Not only was meeting a scientist a perfect introduction to the field, it helped me focus on how my own career will take direction.” (Figure 2)

Conclusion

We can conclude that the addition of a research scientist, whether a biologist, chemist, astronomer, geologist, or physicist (Figure 3), as a guest lecturer in the classroom would have a positive impact on the students’ viewpoint and understanding of what a research scientist is required to do to be successful. The papers written as a part of an assignment, and relating
to the original class visit, reflect the positive and enthusiastic responses that students had to meeting a “real” scientist. Their initial positive feedback might have been attributed to the excitement of the event that took place that day in class. However, the positive impact of Dr. Wheeler’s visit was reinforced when in September 2009 students responded to an electronic survey with a response rate of nearly 93 percent, after a eight month lapse since the classroom visit. Not only was the response rate high, students also had an overwhelmingly positive response to the questions asked. One excellent example of this is that 88 percent of the students taking the survey responded that it was very useful or useful to the question “How useful was meeting the scientist and learning ‘how scientists do science’ and the scientific method of inquiry?” (see Table 1).

The proposition that was put forward at the beginning of this article was that the addition of a research scientist as a guest lecturer in today’s biology classroom would have a positive impact on the students’ comprehension of the materials covered in class. It was also proposed that, in accordance with the National Science Education standards, teachers of science should be able to put a science curriculum/lesson into social context for their students and, by doing so, relate it to the community, the field of biology, and their future careers. We have concluded that a classroom visit by a research scientist from the scientific community is an effective way to accomplish both of these goals. Guest speakers share up-to-date, realistic information and bring their own distinctive perspective on a subject that more than likely would not be found in a textbook. They contribute to the topic being presented and offer a different way to think about the topic and related issues. Speakers often offer a peek into the things students are studying and thinking about for their future. In Figure 3, students indicated other scientists they would like to meet.

So, with this in mind, it would be logical to conclude that the addition of a research scientist as a guest lecturer in a biology classroom had a positive impact on students’ comprehension of the materials covered in class and their perception of what a scientist does. Not only did it have an impact, the students remembered the guest lecturer seven months later with as much enthusiasm as when they completed their first assignment seven months before.

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References