

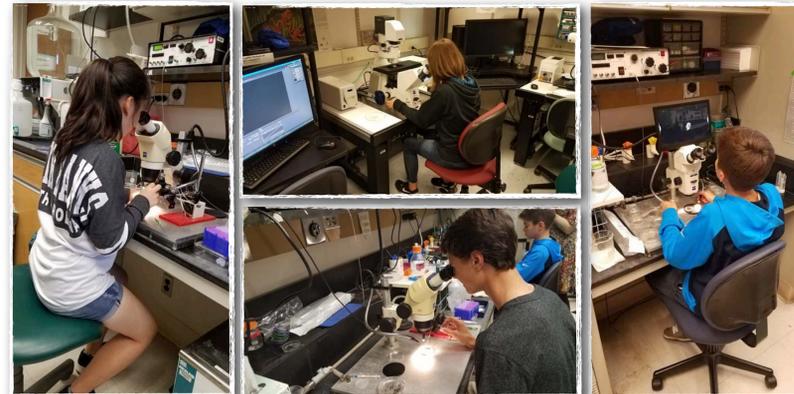
Research Questions

What are the benefits of partnering high school students with science experts to participate in authentic lab experience?

Sub Question 1: In what ways does working with science professionals broaden students' understanding of what scientists do and what background knowledge is necessary to do it?

Sub Question 2: Does an authentic lab-based experience increase students' understanding of science content?

Student Scientists



Field Experiences

Experience 1: Frog embryo research

Dr. Dzamba, Senior Scientist, University of Virginia

Experience 2: Process of diagnosing cancer and other diseases

Dr. MacMillan, Pathology, Martha Jefferson Hospital

Experience 3: Tour of Pathology labs

Briana MacRae, University of Virginia Hospital

Motivation

During the three summers I have spent taking science field courses through Montana State University I have felt privileged to work with such knowledgeable and dedicated professors who have inspired me to continue my growth as a science educator. For my action research I wanted to provide my students with similar experiences by providing opportunities for them to work alongside experts and participate in authentic science work. I hope these experiences will spark an interest, expose them to a variety of science professions, and show them that the work we do in class provides the foundational knowledge for many careers.

Background

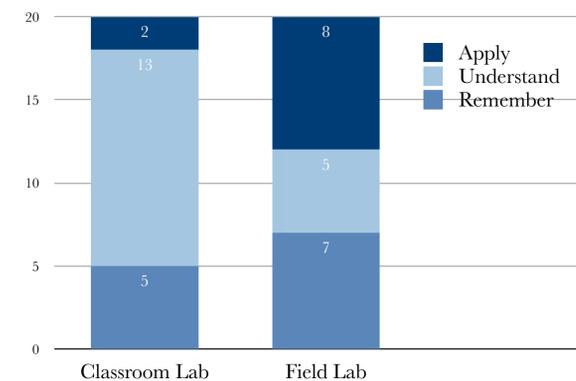
- * Albamarle High School is central Virginia's largest school with an enrollment of 2,000 students
- * Students are from 50 different countries with over 30 languages spoken.
- * 30% of students qualify for free or reduced lunch.
- * All participating students are currently enrolled in honors biology
- * 15 of the 20 students are sophomores, five are freshmen
- * All students applied to be part of the experience due to an interest in the topic or future career path.

Methods and Data

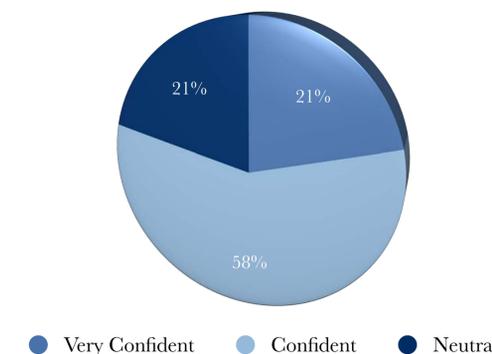
Field experiences consisted of either a one-day frog embryo lab exploration, a three-day pathology department experience or a one-day tour of pathology labs.

- * Students were interviewed before and following the field lab experiences. The questions focused on their motivation to participate, prior lab experiences, and perceived value of school versus field labs as a learning tool.
- * Student overall views of the field labs varied by the type of experience. Seventy-five percent ($N=9$) of participants in the two hands-on experiences stated it was much better than expected. While 62% ($N=5$) of students from the lab tour experience spoke negatively of it.
- * More students had a higher, apply level of content understanding, (6 versus 2), following the field experience than they did from a traditional classroom lab.
- * Students were asked what they felt they gained the most from the experience, 54% ($N=13$) responded content understanding, 13% ($N=3$) said it helped them develop specific skills, and 33% ($N=8$) stated it helped them narrow down a career field.

Categorized responses of lab content understanding ($N=20$)



Following the field lab, I could re-teach the lab content to a different group of students. ($N=20$)



Student Feedback

"It was cool to actually be able to touch cancer"

"I want to put what we are learning into a real life experience, you can't look at human cancer cells at home."

"I liked that a lot (working with an expert), especially since it was one-on-one. I like being able to ask my own questions and not have someone beat me to the question. I tend to be very quiet and don't get to ask my questions. I liked being one-on-one with someone who really knew what they were doing."

"I want her job!"

Conclusion

Partnering with outside scientists to provide hands-on laboratory experiences for students is highly beneficial. They provided unique, highly motivating experiences that increased student's interest in science, confidence that an understanding of science is attainable, and knowledge of science related careers.

This is supported by student responds to interviews that they:

- * Felt "confident" to "highly confident" that they could share the field content materials with other students; and
- * Desired additional field lab experiences and more one-on-one interaction with scientist in a real lab.

As the teacher, I learned that:

- * When developing field experiences it is important to focus on the transfer of information that occurs through hands-on experiences. These experiences were much more impactful than the tour.
- * Students valued the time spent in the labs, following the experiences, 100% of the students ($N=20$) would participate in another experience.