Benefits of Partnering High School Students with Scientists.

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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

* Albemarle 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.
* 90% of students qualify for free or reduced lunch.
* All participating students are currently enrolled in honors biology.
* 30% of students qualify for free or reduced lunch.
* 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=20) would participate in another experience.

Categorized responses of lab content understanding (N=20)

<table>
<thead>
<tr>
<th>Classroom Lab</th>
<th>Field Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remember</td>
<td>8</td>
</tr>
<tr>
<td>Understand</td>
<td>10</td>
</tr>
<tr>
<td>Apply</td>
<td>2</td>
</tr>
</tbody>
</table>

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

21% Very Confident
21% Confident
38% Neutral

Student Feedback

* Students valued the time spent in the labs, following the field experiences.
* Desired additional field lab experiences and more one-on-one interaction with scientist in a real lab.

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 responses to interviews that they:
* Felt “confident” to “highly confident” that they could share 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, and 100% of the students (N=20) would participate in another experience.