Inspiring Future ESA Members in Elementary or Middle School, Using Place-Based Inquiry

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CHICAGO BOTANIC GARDEN

Introduction

Problem – Many students in many schools do not have the knowledge or skills necessary to score proficiently on state or national tests. Students in low-income communities typically score significantly lower than their peers (National Center 2011).

Causes –A lack of achievement may result, in part, from students' attitudes toward further learning in science education (Milne 2010).

Question – How can teachers overcome a lack of motivation and interest in science and motivate the next generation of ecologists in the US, particularly in low-income schools?

Hypothesis– I hypothesize that combining inquiry and place-based education will invest and motivate students to learn science.

Background

What is inquiry? Inquiry is scientific work that involves collecting data, using logical reasoning, and applying imagination and evidence to devise hypotheses to explain patterns in data. Scientific inquiry requires students to use curiosity, openness to new ideas, and informed skepticism (National Assessment 2010).

What is place-based education? Place-based education is the process of using local community and environments as a starting point for a wide range of disciplines (Sobel 2004, Smith 2007). It allows students to explore their environments and develop a sense of wonder that may motivate students towards further interest in science education (Milne 2010).

Study Site

This exploratory study was conducted at a low-income, middle school in a rural part of northwestern New Mexico (Figure 1).

Figure 1. Map of the school location (letter B) in New Mexico. © 2012 Google.

Materials and Methods

During 2011-2012, approximately 160, seventh-grade students engaged in an ecology project (Figures 2, 3, 9). Students worked in groups of two or three. Students brainstormed and observed before deciding on a question to investigate.

Students completed all applicable parts of the scientific method. A class survey was given at the end of the year to determine which type of learning motivated my students the most.

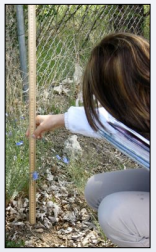

Figure 2. A student measures the height of a flower that was found growing on the school campus.

Figure 3. Students prepare a pitfall trap to investigate the types of insects on campus.

Results

I surveyed all students in my classes (Figure 4). Most students were interested in conducting their own experiments as a way to learn.

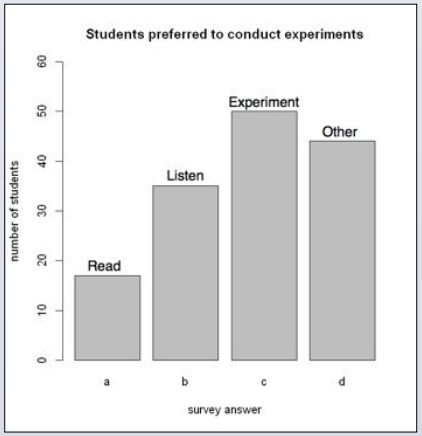

Figure 4. Results of student survey, answering, *Which would interest you the most?* A = reading; B = watching and listening to teacher; C = conducting experiments; D = Other. n= 150

Student Work Samples

Student work samples show independence, motivation, and responsibility that was not seen in other projects. The following are some example questions that students investigated: What insects live on campus (Figure 3, 7)? Which plants have the largest flowers (Figures 5, 6, 9)? Which plants grow the fastest at this time of year (Figure 8)?

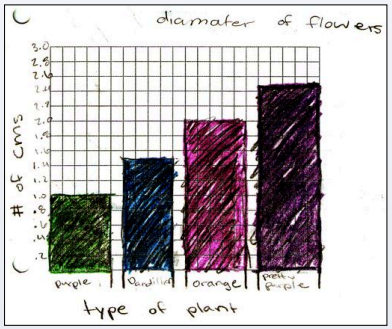

Figure 5. (Above) Student graph showing the diameter of flowers on campus.

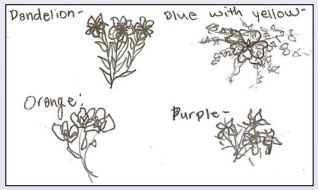

Figure 6. (Right) Student scientific drawings to show different types of flowers that were investigated.

order of Insect	Amount caught
Coleoptera	11
Orange	1
Orthoptera	1

Figure 7. (Left) Student data table showing orders of insects caught in a pitfall trap.

Figure 8. (Below) Student table showing heights for common flowers on campus.

Height of Flowers

	Day 2	Day 2	Day 3	Day 4
Purple Flower	26cm	29cm	37cm	41cm
Blue Flower	36cm	36cm	36cm	36.5cm
Yellow Flower	29cm	31cm	29.5cm	37cm

Conclusion

Incorporating inquiry and place-based education may increase student motivation and interest in learning science (Figure 4).

Students used a range of scientific skills that are applicable across the curriculum -- plant and insect identification, metric measurement, collecting data, working collaboratively, and forming conclusions (Figure 9).

Place-based inquiry may motivate the next generation of ecologists, perhaps even some future ESA members.

Figure 9. A student measures the diameter of a flower.

References

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the echinacea project

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