Assessing the Effects of Expeditionary Field Science Courses on Student's Environmental Literacy

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ECOLOGY PROJECT INTERNATIONAL

Purpose

The purpose of this action research project was to determine the effects on environmental literacy of a 5-day expeditionary field science program for students local to the GYE.

The Program

EPI's programs take students out of their classrooms to unique and remote places where they work hand-in-hand with local researchers on endangered species conservation projects. During the 5- to 9-day experiences, students contribute volunteer hours by collecting scientific data and participating in restoration field-work. They are also immersed in an educational curriculum that—through hands-on lessons including the development of field investigations, ecosystem analysis, and team-building activities—fosters the development of Environmental Literacy in line with the U.S. Next Generation Science Standards (NRC, 12).

Students digging snow pits

Methods

- This study was completed with 6 middle school students from Gardiner, MT
- Students participated in a 5 day citizen science expedition into Yellowstone national Park
- During the treatment, students worked side-by-side with park biologists to collect data on a bison ecology and management study. Students also participated in science education modules and spend time working on small group research projects.
- Students were given a pre/post assessment of their environmental literacy, as well as a progressive Draw-an-Ecosystem model

Students collect big horn sheep fecal for a diet analysis

Focus Question

How does the environmental literacy of middle and high school students respond to a 5-day expeditionary field biology experience?

- *Where do we find the greatest changes in environmental literacy sub-components pre/post treatment?*
- *How do changes in environmental literacy sub-components related to knowledge compare with group generated Drawn-an-ecosystem progressive models?*

Background

- EPI's organizational mission is to improve student's environmental literacy
- Environmental Literacy can be broken into four components: knowledge, dispositions, science competencies, and behaviors (NAAEE, 2000)
- By assessing each component pre and post treatment, we are able to generate concrete measurements of learning outcomes and show students and teachers evidence of growth (Walvoord, 1998).
- Additionally, formative assessment offers opportunities for teachers to gauge student understanding in real-time, giving them a broader view of their classroom and providing valuable direction for planning tomorrow's lesson (Black, 1998)

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Students use radio telemetry equipment to track down collard animals

References

- Black, P., & Wiliam, D. (1998). Assessment and classroom learning. Educational Assessment: Principles, Policy and Practice. 5(1), 7–74.
- North American Association for Environmental Education (NAAEE) 2000 P Street N.W., Suite 540, Washington, DC, 20036, USA http://www.naaee.net/framework
- National Research Council. (2001). Knowing what students know: The science and design of educational assessment. Washington, DC: National Academy of Sciences. Retrieved from https://doi.org/10.17226/10019.
- Walvoord, B., Anderson, V., (1998). Effective Grading: A Tool for Learning and Assessment. San Francisco: Jossey-Bass.

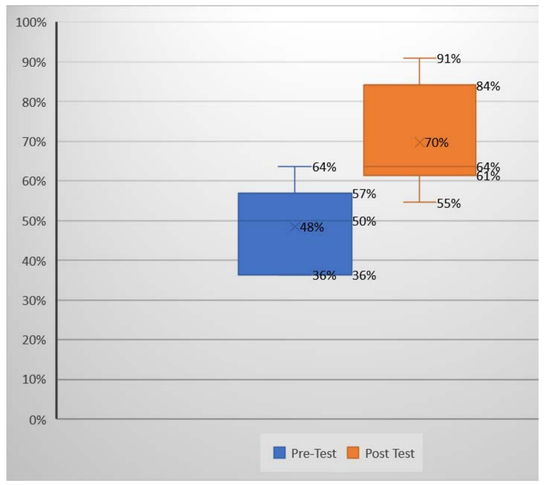
The Results

- Generous improvement in self-reported confidence with science competencies was displayed
- There was little change in students' dispositions: views of the environment, but a large number of student's posttreatment indicated strong confidence in dispositions: empowerment and intention to act.
- G value for pre/post ecological system's knowledge was .42 as compared to .57 for the Draw-an-ecosystem model indicating moderate learning

"This experience made me open my eyes and realize that there is always something to do outside" – Anonymous Student

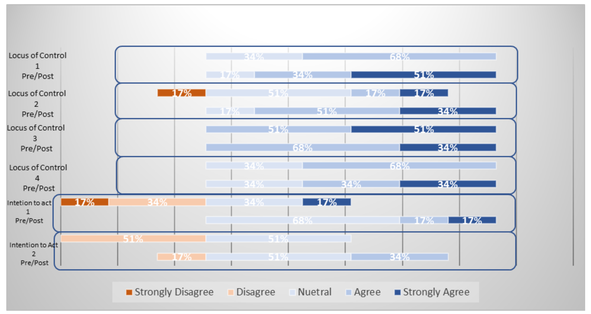
Download the Assessment Summary Report here

Ecological Knowledge

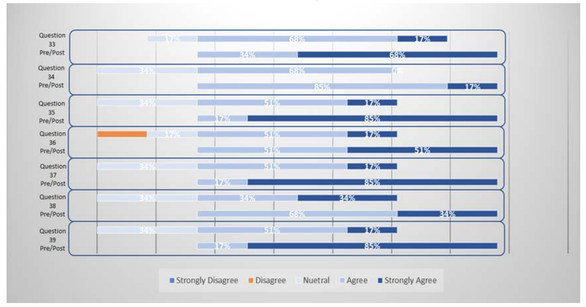


Box and Whisker plots showing Ecological Systems test percentages as well as Likert data representing alteration in dispositions and science competencies pre-treatment vs. post-treatment, and (*N*=6).

Dispositions

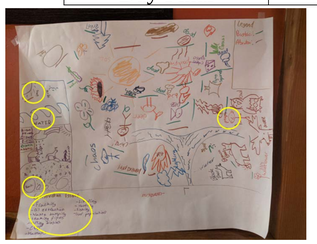


Science Competencies



Progressive Model Results

Model Iteration	Percent Score
Day 1	30%
Day 3	48%
Day Final	70%



Student generated ecosystem model day one (at left) as compared to day three (below)