DETERMINING THE EFFECT OF USING OUTDOOR INSTRUCTION ON INREASING STUDENTS' ACADEMIC ACHIEVEMENT AND ATTITUDES TOWARDS THE ENVIRONMENT

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Master of Science in Science Education

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BACKGROUND: The study was conducted at Penncrest High School in three 9th grade Environmental Science classes. Students spend less time outdoors than their parents, which has made students less comfortable with being in the outdoors, and therefore less connected to the outdoors and the environment. The purpose of this study is to determine the effectiveness of utilizing outdoor education to increase student achievement in science, and to increase students' positive attitudes towards the environment. In this study, students were taught in an outdoor classroom several times throughout a unit of instruction. This classroom was built by Penncrest students and faculty with grants provided by the Philadelphia Eagles and Axalta Coating Systems.

FOCUS QUESTION: Does utilizing outdoor instruction have an impact on students' learning?

Sub-questions	Data Collection Instruments		
Sub-question 1: Does learning in an experiential outdoor setting increase student understanding of topics in Environmental Science	Pre-Test	Post Test	Student Interviews
Sub-question 2: Does learning in an outdoor setting increase students' interests towards learning about topics in Environmental Science?	Pre-Survey	Post-Survey	Student Interviews
Sub-question 3: Does learning in an outdoor setting increase students' positive attitudes towards the environment?	Pre-Survey	Post-Survey	Student Interviews

METHODOLOGY

The intervention for this study will be to utilize an outdoor classroom setting for part of one unit of instruction in ecology with a group of roughly 75 ninth grade Environmental Science students across three sections. The outdoor lessons included:

- Foodweb and foodchains lecture and discussion
- Organism scavenger hunt and niche identification
- Outdoor foodweb project
- Trophic ecology lecture and discussion
- Ecological cycles and succession scavenger hunt

DATA

- Students showed statistically significant growth between pre-test and post-test with an average growth of 42.6% (N = 55, SD = 9.1).
- From these scores, the normalized gains were calculated with an average value of 0.7008, which indicates significant gains.
- A two-tailed paired T-Test was calculated from the pre- and post-test scores, which yielded a value of ($p < 0.0001$) between pre- and post-test scores.
- Student Quote: "Doing things hands-on helps me remember; you remember experiences more than what you learn in a classroom"

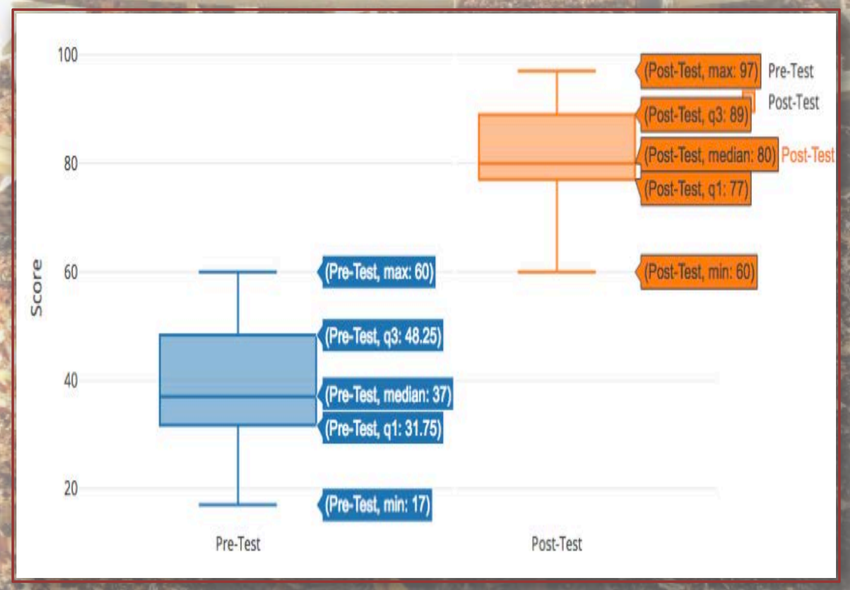

Figure 1. Box and whisker plots of pre-test score (blue) and post-test scores (orange), showing score minimums, Q1, medians, Q3, and maximum scores (N = 55).

VALUE AND CONCLUSION:

- Utilizing outdoor experiential learning does work in high school science education. Students showed significant growth in their learning during the treatment unit.
- Students showed positive attitudes towards learning and being outdoors, but the Likert survey data did not show a statistically significant change in attitudes due to treatment.
- Student interviews overwhelming supported that students enjoyed learning outdoors, and that it enhanced their learning and overall educational experience.