Increasing Middle School Students' Energy Literacy

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McCALL OUTDOOR SCIENCE SCHOOL

Introduction

Energy is considered one of the most important issues of the 21st century.
Individuals and communities without a basic understanding of energy, energy sources, and conservation strategies cannot make informed energy-related decisions[1]. As we look for innovative ways of increasing students' energy literacy levels, outdoor education has the potential to be an important avenue for addressing energy literacy. Increasing students' energy literacy can lead to more informed decisions, promote sustainable energy use, and reduce environmental risks and negative impacts.

Energy literacy is:

Comprehension and understanding of the nature and role of energy on Earth and in our everyday lives.[1]

Project Overview

An energy literacy curriculum was developed and taught in both outdoor and traditional classroom settings at the University of Idaho's College of Natural Resources McCall Outdoor Science School (MOSS). Pre, post, and 1-month later surveys were used to examine in which context students show greater gains in energy literacy knowledge, attitude, and behavior.

Research Question

In which setting, outdoors or indoors, do students show a greater increase in energy literacy?

Energy Literacy Survey

In order to quantitatively measure students' energy literacy knowledge, attitude, and behavior, a survey was developed to be administered pre, post, and one-month after the energy literacy lessons. Portions of the Energy Survey developed by Northwest Advanced Renewables Alliance[2] were used to obtain knowledge questions. For the attitude and behavior sections, questions were used from the Energy Literacy Survey- Middle School Issue[3]. The survey is composed of six attitude and behavior questions that use a 5-part Likert-type response (with one neutral response) and 20 multiple-choice questions.

Sample Population

- 130 6th grade students attending five-day residential education program
- 66 students were taught in an indoor classroom setting
- 64 students were taught in an outdoor setting

Survey Question Type	Evaluates
Knowledge	energy content understanding
Attitude	attitude about energy production and use
Behavior	behavior regarding energy consumption

Results

Knowledge

OUTSIDE	Mean Score	INSIDE	Mean Score
Pre	9.86	Pre	9.70
Post	12.09	Post	11.18
1-month later	11.97	1-month later	9.77

Knowledge questions used a 3-option multiple-choice format. Maximum score in knowledge section is 20.

Attitude

OUTSIDE	Mean Score (Per Question)	INSIDE	Mean Score (Per Question)
Pre	4.15	Pre	4.17
Post	4.47	Post	4.39
1-month later	4.49	1-month later	4.19

Attitude questions used a 5-part Likert-type response. Values for each Likert-type question ranged from 1 to 5. 1 representing "strongly disagree" to 5 representing "strongly agree".

Behavior

OUTSIDE	Mean Score (Per Question)	INSIDE	Mean Score (Per Question)
Pre	3.33	Pre	3.51
Post	3.81	Post	3.65
1-month later	3.88	1-month later	3.68

Behavior questions used a 5-part Likert-type response. Values for each Likert-type question ranged from 1 to 5. 1 representing "never" to 5 representing "always".

Conclusions

- **Students experienced a greater increase in energy literacy knowledge, attitude, and behavior in an outdoor setting** than compared to students taught indoors.
- Students taught in an **outdoor setting experienced greater retention rates** in their knowledge, attitude, and behavior regarding energy.
- All students that participated in the project increased their energy literacy!

NARA
Northwest Advanced Renewables Alliance

References:
[1] *Energy Literacy: Essential Principles and Fundamental Concepts for Energy Education* (Version 3 ed.). (2014). Washington, DC: U.S. Department of Energy.
[2] Northwest Advanced Renewables Alliance (NARA) Energy Literacy Assessment, 2015 (in progress)
[3] DeWaters, J.E. (2009). Energy Literacy Survey, Middle School Issue (version 3). Energy Literacy Assessment Project, Clarkson University, Potsdam, NY

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