

THE EFFECT OF FIELD TRIPS ON ENHANCING THE TEACHING OF
CONSERVATION EDUCATION

by

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ABSTRACT

Conservation education has become an important way to understand natural sciences and the complex interactions of social, political and economic issues. The purpose of this study was to determine if field trips enhance my effectiveness in teaching conservation education and science. Four different lesson plans were conducted in two fifth classrooms located in Bozeman, Montana in two different schools. The study focused on comparing the same lesson plan taught in the field to one taught in the classroom. Questionnaires, worksheets, and evaluation techniques were administered in each experiment to quantitatively and qualitatively evaluate the differences in the field vs. in the classroom. Data suggested that teaching lessons in the field were more qualitatively successful than in the classroom, however, it was more difficult and complex to ascertain differences quantitatively.

INTRODUCTION

BACKGROUND

Outdoor and environmental education provides an opportunity to learn and integrate biological principles and processes in an experiential experience. Finding the best methods to accomplish this in teaching would be a desired and powerful goal to make a difference in the world, one person at a time. “Education about the environment is the key to the survival of our planet” (Russell, 1985).

When first arriving to Yellowstone National Park during the summer of 1974, I was struck by the words written in stone at the northern entrance placed there by Teddy Roosevelt to explain why Yellowstone was created as the first National Park in the world, and set aside as a national treasure. This represented to me, what I wanted to do with my life...”For the benefit and enjoyment of the people”. That is the context of this action research study, to enhance the teaching of environmental education for the benefit and enjoyment of the students of life, not only in places such as the Yellowstone ecosystem, but in backyards, communities, and natural places all over the world. Getting out into nature on a field trip seems a way to facilitate this connection, and integrate the knowledge of science into everyday life.

Conservation or environmental education is a way to understand how the natural world meshes with the social, political, and economic human worlds. In today’s world, environmental education is becoming a more important avenue to enhance the quality of our lives and to connect people with nature in the form of environmental education. One of the problems to address is how to provide not only a connection, but an understanding

that people are not separate from the environment, but that they are part of it (Whitney in Roberts and Huelbig, 1996).

I am continually learning about the most effective way to teach science. Teaching and learning depend on the individual child's approach to how they perceive nature, what they know about the environment and their different learning styles (Shuttlesworth, 1952).

Schiff (1993) wrote "The world needs youth who will grow up prepared to make informed, responsible and constructive decisions to conserve and protect the quality of the environment." In addition, Cornell (1989) adds wisdom in how to create this: "Direct contact with trees, birds, and summer meadows awaken a natural wonder and curiosity.... Too much emphasis on facts, before genuine interest has been aroused, generally does more harm than good. Personal discovery, carefree play, and use of the physical senses are much more effective approach to awakening an interest in nature. Learning to love and care for nature in one place will encourage a love for all nature." Education and information will provide the desire to protect and conserve wildlife and habitat (Meriless, 1989).

Integrating and applying scientific knowledge for everyday use and how it applies to the individual student is a complex issue. Science appreciation enhances the quality of an individual's life. It creates an awareness of how important it is to sustain a healthy environment for the future.

I teach conservation education to students in Bozeman, Montana and in the field in Yellowstone National Park. I wanted to bring the field experience into the Bozeman elementary classrooms. In addition, I wanted to evaluate how I could improve teaching

biological principles in these classrooms. Getting kids out into the real world seems to make a difference in how they understand and observe the world. I wanted to test the hypothesis that getting students in contact with the outside environment through the use of a field trip/outdoor experience would increase learning and appreciation of nature. My treatment was conducting an outdoor experience by use of a field trip and comparing the same lesson to an indoor classroom experience. I hoped to understand and evaluate if this made a difference in my ability to teach conservation/ environmental science.

Context of Study

I conducted this study with the cooperation of two teachers: Linda Babcock: 5th grade/ Longfellow elementary school and Jon Wayne Johnson: 5th grade/ Whittier elementary school), and their students in a public school setting.

Area of Focus Statement:

The objective of this study was to describe the effects of outdoor field trips versus indoor classroom lessons on enhancing the teaching of conservation education through action research.

RESEARCH QUESTION:

This study attempted to answer the following question: What effect did field trips have on enhancing my teaching of conservation/ environmental education? Quantitative and qualitative data collected tried to answer the following questions:

1. Did the outdoor field trip experience enhance my effectiveness in teaching conservation education?
2. Did using outdoor field trips and teaching scientific principles in the field increase awareness and knowledge of biological and physical sciences for students?

3. Did field investigations enhance a student's personal interest and opportunities for exploring nature as an everyday adventure?

LITERATURE REVIEW

THEORETICAL FRAMEWORK

Field trips can create interest, excitement and enhance classroom learning. Researchers have found that outside classrooms are a positive avenue to the understanding and application of information presented (Lisowski and Disinger, 1991). They provide enthusiasm and interest to otherwise unmotivated students. They also provide an alternative way to learn concepts and learning styles. Some children that are not totally interested in a lesson will become very engaged when involved in a field trip. Field trips provide fun, information and connection to nature (Cornell, 1994).

The value of field trips as an important and significant contribution to further knowledge has been studied by many educators (Hazelworth and Wilson, 1990). It is important to integrate curricula with the field trip or outdoor experience to complement the classroom as an instructional strategy. Literature shows that this strategy enhances and provides opportunities for investigation, exploration, and deeper understanding of biological principles (Driver and Johnson, 1984).

Many teachers find that they do not have the extra time and resources to conduct field trips (Cronin-Jones, 1992), and further do not feel it is their responsibility to teach environmental education (Simmons, 1991).

The benefits of outdoor field experiences can create a strong foundation of interpersonal relationships between students, connection with nature, but most importantly strong increases in self-esteem (Dresner and Gill, 1994). This is an especially important factor since high self esteem increases interest and curiosity in learning a subject. Self esteem is difficult to evaluate since there are so many variables involved, especially in an outdoor field experience (Hazelworth and Wilson, 1990).

There are different opinions about the quantitative and qualitative assessments of outdoor field education. Some studies using field-based instruction have statistically shown to increase understanding and retention of ecological information (Lisowski and Disinger, 1991). However, other studies show that it is difficult to assess environmental concept knowledge statistically, and argue that, more importantly, the positive attitude could be measured after a field experience. Attitudes of the students toward the environment were influenced by a strong conservation program (Ryan, 1991). Another study indicated that quantitative values were difficult to evaluate on increased positive attitudes, and are more effective on evaluating topics learned (Shepherd and Speelman, 1986).

METHODS

Subjects and Population Sample

This action research project was conducted with the involvement and help of 5th grade students at two elementary schools and their teachers: Linda Babcock (Longfellow) and Jon Wayne Johnson (Whittier). Both schools are located in Bozeman, Montana. Bozeman is a college town with approximately 30,000 residents. Both classes had all Caucasian students, and are situated in middle class neighborhoods. The classes had

different numbers (20 to 30) of boys and girls on a given day, and in a given time period. Students were often called away for other duties or activities. Therefore the sample number and percentage of boys and girls were different each day of the project. The school of class #1 (Longfellow) had a history of taking many field trips and was situated on a quiet street with a nature area within a few minutes walking distance. The school of class #2 (Whittier) which was located on the corner of two very busy, noisy streets limited the amount of off- campus activity.

Data Collection Instruments

I employed quantitative and qualitative methods to evaluate the research questions posed. I used various methods from questionnaires, worksheets, and evaluation techniques (Appendices A-D). For the last lesson I used the same questionnaire (Appendix E), and worksheet (Appendix F) as a pre- and post-test. The data were evaluated by comments written, and then a number value was assigned to an answer indicating the following information: 0= No response, 1=Wrong response, 2=Sort of right, and 3= Right. An average was taken whenever possible to determine patterns of understanding of the data. In addition, one of the teachers provided another source of qualitative data in the form of thank-you letters from class #2 (Appendix G).

Unfortunately, Class #1 did not supply this form of data.

The treatments were in the form of field trip outdoor activities. For each lesson, one set of data included field trips, and the other set of data was collected in the classroom. The same four lessons were taught using two different schools and classrooms. Two of the lessons involved field trips with class #1, and two of the lessons involved field trips with class #2. The same lesson was taught using both classes. Each

lesson was taught twice, one as a field trip, and one as a classroom activity. I gave the first lesson to class #1 in the field, then gave the next lesson to class #2 in the field, and alternated the same way for lessons 3 and 4.

Interview techniques used included a written questionnaire concerning historical knowledge about conservation education, and an after the lesson questionnaire regarding knowledge obtained from that lesson.

The lesson titles, class schedules, and treatments (Table 1) were conducted from October 2004, to April 2005, for a total of eight lessons.

Table 1. Lesson titles, treatments by class/school, and month conducted.

Lesson	Lesson Title	Outdoor/ Field treatment	Indoor Classroom Treatment	Month
1	Bird- General Biology	Class #1- Longfellow	Class #2-Whittier	Oct. 04
2	Natural Selection	Class #2-Whittier	Class #1- Longfellow	Oct. 04
3	Water Conservation	Class #1-Longfellow	Class #2-Whittier	Nov.04
4	Bird Identification	Class #2-Whittier	Class #1- Longfellow	Apr.05

I began my study by enrolling three teachers to become my validation support group. One was a high school biology instructor; the other two were 5th grade teachers in two different Bozeman elementary schools. I then obtained permission to visit the two 5th grade classes and asked the students' permission to be part of my research project.

Initially, I had difficulty obtaining permission for one of the schools. The principal was concerned on how my lesson would fit into the curriculum guidelines for the district. I obtained a copy of the guidelines, and designed my lesson to accommodate that concern.

I addressed the curriculum objectives under the Life Science subject: #4- Observe,

record, and explain relationships and interactions that link plants and animals to each other and their habitat. # 11- Explain and provide examples of environmental problems involving pollutants that are complex with solution that involve tradeoffs.

I visited the first classroom, and introduced myself, explained that I was doing a project for MSU, to become a better teacher in science. The students were very receptive, and willing to be part of the project. I gave them a pre-test (Appendix A) to determine previous knowledge, and attitudes. My lesson focused on urban wildlife, specifically birds. I went over the answers of the questionnaire before leaving that day so that students could learn what the answers were. The following day, I returned and gave my lesson. The lesson consisted of an introduction to how birds fit into the animal world, food habits, adaptations, and the main requirements they need to live. After this short introduction, I took the students on a short walk behind their school. We stopped at four locations, and discussed differences in habitat. At each location, I divided them into equal groups facing each direction: North, South, East, and West, and had the students close their eyes. I then asked them to report on what they heard, how many different birds, and in what direction. This turned out to be very successful, in that we heard many birds. The neighborhood behind the school is very rich in bird habitat. There is a stream, with riparian vegetation, and a nice prairie-like environment.

After the lesson, I administered the Classroom Assessment Technique the Muddiest Point (Appendix B), and an adaptation of the Group Instructional Feedback Technique-GIFT (Angelo and Cross 1993). The class was asked to list one new thing they learned during the lesson, one thing that was very confusing, and one thing that they would now like to learn more about after the lesson.

The following week, I visited the second classroom at school #2 (Whittier), approximately 1 mile from #1 (Longfellow). I presented the pre-assessment (Appendix A) identically to this class as the previous one, with a short introduction. I went over the answers of the questionnaire before leaving. I then returned to the classroom to do my in-class lesson, without a field trip. The lesson involved using taxidermy mounts to relate the same information as observing live birds in the field. I then administered the same two techniques of a pre-test and a post-test as the previous class (Appendix B)

The second lesson on natural selection was adapted from a lesson plan (Doran et.al, pp. 99-101). I started the lesson with an overview on what natural selection was. In addition, I brought in a live axolotl as an example of salamander natural selection and as an attention grabber. An axolotl is the larval form of a salamander. This animal has a very dramatic ability to show how an animal (salamander) with gills lives in the water, and then through the evolution of the population, using natural selection, has developed the possibility to exploit a land environment by becoming an adult salamander. Some axolotl populations do not change into a terrestrial salamander, and will even reproduce in this juvenile form in the water.

I first gave a pre-assessment test to find out what the students knew already (Appendix C-1). I went over the answers of the questionnaire, so that the students could learn from the exercise. The students then were asked to pick out 10 of each food item (an assortment of beans and marshmallows) and put them all into a baggie. I gave a brief overview defining the word natural selection as being the process of organisms competing for resources to survive. I included the concepts of predator and prey, and how organisms have different strategies for survival. Some of this includes how they

obtain food or prey, and how the prey adapts to try to survive also, and not be eaten. I took the class (Whittier –class 2) outside in the open park area at the school. The students were asked to space themselves out, and draw a square foot of area in front of them. The ground was covered with a light amount of snow, so this was helpful in showing how camouflage can make a difference in survival. The students were then asked to dump out their food items, and told that they were going to act like a predator and they would have a limited time to try to obtain as much food as they could. I timed them for 30 seconds, and told them to stop. They then took the baggie full of food items inside to count and to fill in the worksheet (Appendix C-2). For the non-field treated class #1, I conducted this lesson inside, using the same technique except for giving each student a piece of newspaper to rip up into shreds so as to represent habitat. The class was timed for 30 seconds also, and then asked to fill in the worksheet. After they completed the worksheet, I had them fill out the post-test (Appendix C-3).

The third lesson was on water conservation. For this lesson I used an adaptation from “A drop in the Bucket” lesson plan found in WOW the Wonders of Wetlands -pp. 158-161 (Slattery, 1995). I first asked the students two questions, and asked them to write down the answers on an index card (Appendix D-1). The questions were: How much of the world is made up of water? (percentage or fraction). The other question was: Do you think there is A: a lot of water per person, B: not a lot of water per person, or C. do not know. After they handed in the questionnaires I went over the correct answers. With the field treatment class, I took them for a walk to the creek behind their school. I brought along a blow up globe of the world, and a bucket, with 1-liter container of water, a pill container, a cup like container and an eyedropper. I also brought a saltshaker, blue

food coloring, and ice. The lesson involved having the students form a circle, and with the globe of the world, each student would throw and catch the globe with the student across from them in the circle. Each student had one turn. When they caught the globe, they would call out where each thumb landed, water or land. I then recorded the data on a white board. This was to show what percentage of the globe was made of water. The second part of this lesson involves a demonstration from A drop in the Bucket (Appendix H).

After this demonstration I gave them the post-test (Appendix D-2) with the following questions:

1. What is one thing that you learned from this lesson?
2. What is one thing that is confusing?
3. What is one thing that you would like to know more about?

I conducted the same lesson on Class #2 (Whittier) in the classroom setting.

The fourth lesson was on bird identification modified from a lesson developed by Alas (Appendices E and F). Alas is a Nicaragua project for migratory bird education. At this year's Montana Environmental Education Association (MEEA), I heard a presentation from this group. Alas has three objectives:

1. To increase understanding of local environments, and biodiversity through using birds.
2. To unite biologists with students and teachers.
3. To help teachers through workshops.

I realized that it would be a great way to facilitate the capstone that I was working on. I modified their questionnaire, and used it for my fourth lesson plan and

evaluation. I used a tape recorder with 10 bird songs recorded on it, and pictures of the same 10 birds. Initially, I handed out the questionnaire on attitudes and knowledge. Then I played the 10 bird songs, and asked the students if they had ever heard any of them before, and if so, to write down the names. I then showed them pictures of the 10 common birds in their neighborhood, and asked again if they had ever seen them, and if so could they identify them by name. I then gave a presentation of bird identification by song and by sight. After the lesson, I handed out the very same questionnaire, and again played the songs and showed the pictures of the 10 birds. They were asked again to write down if they had ever seen or heard the bird, and identify them by song and by sight. I went over the answers to both questionnaires on bird identification by sight, and by sound.

Letters that I received from the students of Whittier were analyzed by separating all of the comments into four categories. These categories were: 1. Student had a good experience, 2. Knowledge of student increased, 3. Attitude of student increased, 4. Student expressed a negative experience.

RESULTS AND ANALYSIS

Lesson 1: Bird Ecology

The results of the questionnaires (Appendices J and K) for school #1 (average=2), and school #2 (Average= 1.8) were remarkably similar (Table 2). Both classes had a high level of knowledge on how to define birds, and what they require for survival. Neither class knew much about the number of types of birds in Montana, Bozeman, and in their neighborhood. Class #2 (Whittier School) had more previous knowledge about why

birds sing, and where they go in the winter, because they had previous lessons on birds from the school librarian.

We heard a lot more birds in the grassy area than in the riparian area. This was a surprise to all of us. They speculated why this was so. Some great answers were: “You can hear better in the grassland”

“ Maybe in the early morning there are more birds in the riparian”

“ Maybe it is too late”

“or maybe we scared them away.”

The GIFT assessment (Appendix I) showed that both classes had eleven categories of topics that they had learned. The categories were different however, between the classes. Both classes indicated that they had learned a lot about the differences between some birds. The field class indicated that they learned about how birds lived in different habitats, and they learned by observing how ducks were waterproofed. The inside class said that they understood more things about eggs after the lesson. When the Muddiest point assessment was administered, again Class #1 had five more categories about which they were confused from my lesson than Class #2. The inside class students (Class #2) were more confused about the different species, whereas the outside field class students were more confused about how birds fly, and not understanding the differences between crows and ravens.

Table 2. Summary of averages of 3 point scale questionnaires administered before presenting the bird ecology lesson

	Question 1: What is a bird?	Question 2: Four things birds need to survive?	Question 3: Different types of birds in Bozeman?	Question 4: Different types of birds in Montana	Question 5: Different types of birds by school?	Question 6: Why birds sing?	Question 7: What birds do in winter	Overall Ave.
Classroom #1 (Longfellow)- Field treatment N=24	2.8	2.3	1.3	1.4	1.5	1.9	1.6	1.8
Classroom #2 (Whittier)- In classroom N=21	2.8	2.3	1.5	1.3	1.3	2.6	2.0	2.0

(Key: 1=wrong, 2=sort of correct, 3=correct)

Lesson 2: Natural Selection

The results for this treatment showed that Class # 2 (the field treatment) was slightly more knowledgeable in the before-the-lesson questionnaire (an average value of 2.1) than Class #1 (an average value 1.9). When given the post-test the field class showed a slightly higher (2.1) understanding of the overall lesson than the classroom students (1.8). There were no substantial differences between the pre-assessment questionnaires and the questionnaire following the lesson. There was much confusion about the subject of natural selection, and it was a difficult concept to explain to this age group. Only one student (0.05%) from the non-treated sample could answer what natural selection was, whereas 60% the field-treated class could answer this question. Only 14% of the non-treated class understood how they as a biological organism fit into this concept. Interestingly, 55% of the treated class could answer, at least sort

of, how they fit into this concept. It was interesting to me that I did not get that message across very clearly, and would work at a better way to explain it.

Table 3. Summary of averages of a 3 point scale to questionnaire data administered for the natural selection lesson.

	Question 1:Name 3 types of wildlife by school	Question 2:What is Natural Selection?	Question 3: What is a predator?	Question 4: What is prey?	Question 5: Official Montana Animals?	Question 6:How many types of wildlife by school?	Question 7: Definitions of Food habit types	Ave.
Before Lesson								
Classroom #1 Longfellow – In-class N=25	2.7	.1	2.2	2.4	2.2	1.5	2.3	1.9
Classroom #2(Whittier) In field N=23	2.5	.4	2.5	2.5	2.6	2.4	2.1	2.1
After Lesson	Which descriptions helped you pick out seeds	What represents prey?	What represents predator?	What is natural selection?	How do you fit in?	Students learned concept		
Class #1(Longfellow) In-class N=25	2.5	2.5	2.5	.4	.5	2.3		1.8
Class #2 (Whittier) In Field N=23	1.8	2.8	2.4	1.8	1.7	2.7		2.1

(Key: 1=wrong, 2=sort of correct, 3=correct)

Lesson 3: Water Conservation

The results for this treatment showed very little difference in both pre and post tests between the field class and the inside classroom. The field class (#1) had a pre-test average score of 2.0, whereas the field class had a slightly higher knowledge at an average of 2.2. The post-test results indicated that the treatment group tested almost the same (average 2.7) as the untreated class at the average of 2.8. Actually the untreated class was slightly higher; however, they did have more knowledge going into the lesson.

The post-lesson assessments indicated that the in-class lesson produced a result of 68% of the students being confused over at least one topic, and 21% wanting to know more about certain subjects. The field class was a lot less confused (0.8%), and wanted to know a great deal about more subjects from this lesson (77%).

Table 4. Summary of averages of 3 point scale to questionnaire data administered for the water lesson.

	BEFORE LESSON: What is the percentage of water on the earth?	AFTER LESSON: Concept of water conservation was understood	Percentage of class confused about lesson	Percentage of class that would like to know more about lesson
Class #1 (Longfellow)- In field N=24	2.0	2.7	0.8 %	77%
Class #2 (Whittier)- In class N=22	2.2	2.8	68%	21%

(Key: 1=wrong, 2=sort of correct, 3=correct)

Lesson 4: Bird Identification

Since the process of action research is one that gives on-going feedback, I realized that to be able to determine more quantitatively how effective I was in teaching a lesson, I needed to use the same exact questionnaire as a pre-test and a post-test. The results of this treatment (Table 5) showed differences in the knowledge acquired and retained in both field and classroom activities. In addition, the field experience provided a real life laboratory for bird identification. The field class had however been studying bird identification for many weeks with the school librarian, whereas the other class did not have this previous knowledge.

Both classes were the same age, approximately eleven years old. Class # 1 (Longfellow) had lived in the area one year less (6.8 years) than class #2 (7.8 years). Both classes noticed birds at least once everyday, and that did not change in the post lesson. There were no substantial differences between the classes and the pre and post-tests in the topics of using binoculars (94%), liking to go bird watching (80%), and going to national parks (92%). Class # 1 (Longfellow) did seem to like birds more than class #2 (Whittier); however, there was no change in the pre- and post-tests on liking bird watching for both classes.

The results of the opinion questions indicated that class #2 (Whittier) wanted to learn more about birds than class # 1 (Longfellow), but the pre and post tests showed no differences within each class. Both classes indicated that they strongly cared about birds, but again the pre- and post-tests showed no substantial differences within each class. Class #1 (Longfellow) indicated that they considered themselves a scientist a little bit more than class # 2 (Whittier). Biology as a subject was not considered as a favorite in either of the classes. Both classes thought that learning about birds was fun (7.3 on a scale of 1 to 10), easy (7.0), and was very important (7.6). There were no substantial differences comparing pre to post tests in these categories.

Table 5. Averages of Pre and Post-Questionnaire summary for bird identification lesson.

5-A				
Question/Topic	Field Class (Whittier) Pre-Lesson N=23	Field Class (Whittier) Post-Lesson N=21	Inside Class (Longfellow) Pre-Lesson N=26	Inside Class (Longfellow) Post-Lesson N=25
Average age of student	10.9 years		10.8 years	
No. of years lived in area	7.8 years		6.8 years	
5-B				
Key #1: 1=many times a day, 2=at least once a day				
How often do you notice birds?	1.5	1.4	1.3	1.2
5-C				
Key #2: 1=no, 2=sort of, 3= yes				
I have used binoculars	3.0	2.8	2.8	3.0
I go bird watching	1.5	1.3	1.7	1.5
I like to bird watch	2.2	2.0	2.7	2.7
We have a bird feeder	2.7	2.3	2.2	2.2
I have used a field guide	2.1	1.8	2.4	2.6
I have been to a national park	2.9	2.6	2.9	3.0
I have killed a bird with a BB gun	1.4	1.3	1.7	1.5
5-D				
Key #3: Scale 1-5 (1=Totally agree, 5=Totally disagree)				
I would like to learn more about birds	2.3	2.4	1.9	1.9
It bothers me that bird populations are declining	1.9	1.7	1.9	1.6

I don't care about birds	4.7	4.2	4.5	4.7
Biology is one of my favorite subjects	3.0	2.9	2.9	3.2
I like to study birds outside	2.4	2.2	2.0	2.2
Killing birds for fun does not affect the environment	4.3	4.2	4.4	4.5
Scientists have discovered most things about birds	3.3	3.5	3.1	3.4
I consider myself a scientist	3.4	3.3	3.9	3.6
5-E				
Key #4: Scale 1-10 (Learning about birds is...)				
Boring -Fun	7.3	6.7	7.4	7.9
Hard - Easy	7.0	6.8	7.0	7.2
Not Important - Important	7.8	6.8	7.4	6.7

There were substantial differences in bird identification (Table 6) between the pre-test, and the post-test for both audio and visual tests in both classes. These differences included the number of correctly identified birds by sound were 35% for the Whittier class, and 37% for the Longfellow class. After the lesson, there was an increase to 64% correctly identified by the Whittier class, and 57% correctly identified by the Longfellow class. Both classes showed an average improvement of an additional two birds being correctly identified by sound after the lesson, and one additional bird being correctly identified by sight. The field class improved 29%, whereas the inside class improved 20% in sound identification. In sight identification, the field class improved

15%, and the inside class improved 18%. There were no substantial differences between the field class, and the inside class treatments.

Table 6. Summary of pre and post-audio/visual bird identification lesson by percentage of each class and each treatment..

Treatment	Student had heard bird before	Number of birds correctly identified by sound by student	Student had seen bird before	Number of birds correctly identified by sight by student
Field class(#2-Whittier) Pre-test N=23	58 %	35 %	82 %	58 %
Field class(#2-Whittier) Post-test N=21	91 %	64 %	91 %	73 %
Inside class(#1-Longfellow)- Pre-test N=26	69 %	37 %	85 %	53 %
Inside class (#1-Longfellow)- Post-test N=25	86 %	57 %	95 %	71 %

My results did not point in any direction quantitatively as far as indicating if outdoor field trips really enhanced my teaching of conservation education. There were no substantial numerical differences between the field and the classroom.

The preceding is the quantitative analysis of my data. The qualitative analysis, (Appendix G), showed a very strong indication that the field trips not only created more awareness and interest, but engaged the students on the outdoor field trip treatment more with the environment and the organisms around them. The results of the analysis of comments revealed that from a total of 25 comments, 9 indicated that they had increased their knowledge, 8 comments showed that the students had a good experience, 8 comments indicated an increased attitude, and there were no negative comments. The

students indicated from their comments that they had more fun going outside, and were more connected with live organisms that they saw.

INTERPRETATION

Effectiveness can be defined as the power or capacity to produce a desired result. In teaching conservation education effectively the desired result for me would be to have students 1. increase their knowledge, 2. have a good experience, and 3. have a better attitude about the environment. I found that teaching conservation education was more effective qualitatively when an outdoor experience in the form of a field trip was conducted with the same lesson content. It was, however, not evident in the quantitative analysis. There were no substantial measurable differences in pre-lesson assessments and post-lesson assessments for all of the four lessons that were taught in the field and in the classroom.

From my field notes, I saw that field trips increased the students' appreciation of their local environments. There was also a big difference in attentiveness, enthusiasm, and interest between being outside and being inside, based on the questions and comments the students wrote. Many of the points I wanted to teach were impossible to do effectively using only the classroom, such as identifying birdcall and bird habitat difference. There also was a big difference between the two schools in their local habitat. The field trip seemed to generate a lot more curiosity, and students asked a lot more questions. It seemed that the lessons taught without the field trip were actually boring at some times, and when asked for what was the muddiest point or confusing part of the lesson, 53% said nothing was confusing. This indicated to me that they were not thinking about the parts of the lesson as much. The field trip students inquired more about the

details and ask creative inquisitive questions about specific information regarding organisms, their behavior, and their habitat.

VALUE, KNOWLEDGE AND CLAIMS

Through this study, I learned that although I could not prove quantitatively that outdoor field trips were the most effective way for me to teach conservation education, I would still choose to teach students outside in nature as much as possible. This claim came from a qualitative evaluation based on my own overall impressions, field notes, and the letters I received from the students. Lecturing and inside demonstrations did not seem as effective in engaging students in nature, providing connection with the environment, and enhancing learning conservation principles.

I am now aware that I may have not asked the right questions in my assessments. Action research provides an avenue to explore new strategies. I would in the future ask students more about their attitudes, enthusiasm, and interest in the field and in the classroom on a given topic. In addition, I am realizing that human behavior is difficult to assess, and is not an exact science. There are so many variables that conclusions are not predictably made. Knowledge comes more from a gut feeling. Gut feelings are difficult to prove statistically.

This study seems to validate some of the other studies (Ryan 1991) that show that it is difficult to quantitatively evaluate field based lessons to in-class lessons. Positive attitude, however, is qualitatively shown to increase in an outdoor field experience, and that provides a much richer and more effective learning environment for students, and teaching environment for their teachers.

I hope to teach in other countries, and provide opportunities for people that do not have the education and awareness to be connected with their environment. This study helped me to understand how I could create a learning experience that created interest, and enthusiasm in efforts to understand conservation education.

CONCLUSION

In conclusion, the qualitative data show that outdoor field experiences in the form of a field trip did enhance my effectiveness in teaching conservation education by the statements made in the form of letters, field notes, and overall impressions. It was not shown quantitatively that field trips and teaching scientific principles in the outdoors increased awareness and knowledge of biological sciences for students. Outdoor field investigations did not quantitatively enhance a student's personal interest and opportunities for exploring nature as an everyday adventure; however qualitatively it provided a much more enthusiastic and positive attitude in the students.

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APPENDICES

APPENDIX A.

Bird Lesson: General Biology

Before Lesson

1. What is a bird? (Describe what a bird is to someone who has never seen one)_____
 2. Please list four things that birds need to live?
 - a. _____
 - b. _____
 - c. _____
 - d. _____
 3. How many different types of birds do you think live in Bozeman?_____
 4. How many different types of birds live in Montana?_____
 5. How many total numbers of birds do you think live around your school? (4 blocks)_____
 6. Why do you think birds sing?_____
 7. What do birds do in the winter?_____
 8. What is your favorite bird?_____
 9. What would you like to know about birds?_____
- _____
- _____

APPENDIX B.

Bird Lesson: General Ecology

After Lesson

1. What is one new thing that you learned about birds?
2. What is the most confusing point, or something that doesn't make sense about today's lesson on birds?
3. What is one thing now that you would like to know or learn about since you have been part of this lesson on the topic of birds?

APPENDIX C

C-1

Natural Selection Lesson

Before lesson

1. Name three different types of wildlife that you could find in your school block?
 - a. _____
 - b. _____
 - c. _____
2. What is Natural Selection?
3. What is a predator?
4. What is prey?
5. What are four things that all wildlife needs to survive?
 - a. _____
 - b. _____
 - c. _____
 - d. _____
6. Do you live in town or in the country?
7. Official Montana State Animals are:
 Bird: _____ Mammal: _____
8. How many different types of wildlife do you think are in the school block?
9. Define the following words:

Omnivore:	_____
Herbivore:	_____
Carnivore:	_____
10. What would you like to know about any type of wildlife?

APPENDIX C-2

Natural Selection Lesson

After lesson

1. Which descriptions helped you pick out more of a certain seed than the others?
 2. What represents the prey? _____
 3. What represents the predator? _____
 4. What is Natural Selection?
 5. How do you think You as a biological organism fit into this idea?
 6. What is the most important thing you learned from this lesson?
 7. What is the most confusing thing?
- What is something that you would like to know now after learning this lesson

APPENDIX D

D-1

Water Conservation Lesson

Before lesson

1. What percentage or fraction of the world is made up of water?
2. Do you think there is :
 - A. a lot of water per person
 - B. not a lot of water per person
 - C. Don't know

D-2

Water Conservation Lesson

After lesson

What is one thing you learned about water?

What is one thing that you are confused about after this lesson?

What is one thing you would like to know more about water?

APPENDIX E

Bird ID Lesson –Questionnaire (Before Lesson and After Lesson)

Name_____

School_____

Date_____ Age_____ Sex: F M

How long have you lived here?_____

1. Name 3 types of birds in your town_1._____2._____3._____

I notice birds: Please circle one of the following:

1. many times a day
2. at least once everyday
3. at least once a week
4. at least once a month
5. at least once a year
6. never

Read the following statements. Circle “Yes” or “No” according to your personal experience.

1. I have used binoculars before.....Yes No
2. I go bird watching on my free time.....Yes No
3. I like to bird watch.....Yes No
4. We have a birdfeeder at my house.....Yes No
5. My cat sometimes hunts and kills birds.....Yes No I don't have a cat
6. I have used a field guide before to identify birds.....Yes No
7. I have been to a national park to go hiking or camping beforeYes No
8. I have killed a bird with a BB gun or a slingshot before.....Yes No

What’s your opinion? After reading each sentence carefully, circle the number that corresponds to your feelings about that sentence..

1. I would like to learn more about birds.

Totally Agree Agree Neither Agree nor disagree Disagree Totally Disagree
 1 2 3 4 5

2. It bothers me that bird populations are declining.

Totally Agree Agree Neither Agree nor disagree Disagree Totally Disagree
 1 2 3 4 5

3. I don't care about birds;

Totally Agree Agree Neither Agree nor disagree Disagree Totally Disagree
 1 2 3 4 5

4. Natural science (Biology) is one of my favorite subjects

Totally Agree Agree Neither Agree nor disagree Disagree Totally Disagree
 1 2 3 4 5

5. I like to study science outside.

Totally Agree Agree Neither Agree nor disagree Disagree Totally Disagree
 1 2 3 4 5

6. Killing birds for fun does not affect the environment.

Totally Agree Agree Neither Agree nor disagree Disagree Totally Disagree
 1 2 3 4 5

7. Scientists have discovered most of the things there are to know about birds by now.

Totally Agree Agree Neither Agree nor disagree Disagree Totally Disagree
 1 2 3 4 5

8. I consider myself a scientist

Totally Agree Agree Neither Agree nor disagree Disagree Totally Disagree
 1 2 3 4 5

9. Learning about birds is.....boring 1 2 3 4 5 6 7 8 9 10 very fun

10. Learning about birds is.....very hard 1 2 3 4 5 6 7 8 9 10 very easy

11. Learning about birds isnot important 1 2 3 4 5 6 7 8 9 10 very important

APPENDIX F

Bird ID Lesson

Name: _____

You will hear the song of ten different kinds of birds that live in this area. If you recognize the song, circle "Yes". IF you know what bird sings that song, write its name in the blank. If you have never heard the bird before, circle "No"

1. Yes _____ No (Mallard Duck)
2. Yes _____ No (Flicker)
3. Yes _____ No (Robin)
4. Yes _____ No (Chicadee)
5. Yes _____ No (Magpie)
6. Yes _____ No (Meadowlark)
7. Yes _____ No (English Sparrow)
8. Yes _____ No (Raven)
9. Yes _____ No (Crow)
10. Yes _____ No (Owl)

You will see a picture of 10 different birds that live in this area. If you recognize the bird, circle "Yes". IF you know what bird it is, write its name in the blank. If you have never seen it before, circle "No"

11. Yes _____ No (Owl)
12. Yes _____ No (English Sparrow)
13. Yes _____ No (Raven)
14. Yes _____ No (Crow)
15. Yes _____ No (Magpie)
16. Yes _____ No (Mallard Duck)
17. Yes _____ No (Meadowlark)
18. Yes _____ No (Flicker)
19. Yes _____ No (Chicadee)
20. Yes _____ No (Robin)

APPENDIX G

Results of Natural Selection: Qualitative comments (After lesson).

Class #2 (Inside classroom experience- Lesson on Natural Selection)

COMMENTS:

“The thing I enjoyed most was when you showed us the axylotyl and the Tiger Salamander....when you fed them and told us, they only have sharp gums...
...I liked second the game we played with the world...The last thing was about the stuffed birds and prey and predator.”

“I enjoyed and learned that basically the world is make most of water and also another thing I enjoyed was seeing the Tiger Salamanders because it is always ecsiting to see such asom animals.”

“...learned a lot today, I also had fun with the prey and predators and I really really liked your tiger salamander...”

“learned that concerving water is very important...The Amphipians were awsome. It is fasinating that they swolowed the worms slowly.”

“I enjoyed when we walked outside with are seeds and had to see how many seeds we could pick up”.

“I especially liked it when you brang in the Axylotylys. I think they are cool. I also liked when we played that game with the globe. Overall I liked everything that we did!”

“Water is important to all of us...water we can’t exist without it.”

“The most interesting thing I learned about birds is that their bones are hollow so they are very light so they can fly better.

When I saw the Axylotyl I was amazed to see it’s gills. They were cool looking. It was neat to see it eat the worm. Do the Axylotyl squeeze the worms until they turn pail?”

“I learned so much about predator and prey. I loved the field trip and picking up seeds. It was groovy and sausy .”

“This was my favorite lesson, it was about the tiger salamander and the axyloty. It was cool to watch them...it was funny how the tiger salamander lifted up it’s leg when it wanted a worm. I liked the axylotyl more because I liked the gills and I thought it looked cooler but that was my opinion. They both were really cool though.”

“That was one of my favorit classes so far...”.

“I didn’t even know what predator meant until now...When we got to be the predators. I got 32 I think”

“I had a great time and I hope you come back soon. I learned what it kind of is like to be a preditor and prey. Also I learned that you can tell what kine of food a bird eats by the way its beak is formed. I also was interested about all the water on the earth and what most of it is used for. There are lots of things it is used for. I am happy for you on getting your masters in school especily if it is in science. ...PS The game was fun.”

APPENDIX H

A DROP IN THE BUCKET (Slattery, B. et al. 1995).

The Activity

1. Show the class a liter (1000ml) of water and tell them it represents all the water on Earth.
2. Ask where most of the water on Earth is located (refer to a globe or map). Pour 30 ml of the water into a 100 –ml graduated cylinder. This represents Earth's fresh water, about 3 percent of the total. Put salt into the remaining 970 ml to simulate water found in oceans, unsuitable for human consumption.
3. Ask students what is at the Earth's poles. Almost 80 percent of Earth's fresh water is frozen in ice caps and glaciers. Pour 6 ml of fresh water into a small dish and place the rest (24ml) in a nearby freezer or ice bucket. The water in the dish (around 0,6 percent of the total) represents non-frozen fresh water. Only about 1.5 ml of this water is surface water; the rest is underground.
4. Use an eyedropper or a glass-stirring rod to remove a single drop of water (0.003 ml). Release this one-drop into a small metal bucket. Make sure the students are very quiet so they can hear the sound of the drop hitting bottom of the bucket. This represents clean, fresh water, which is not polluted or otherwise unavailable for use, about 0.00003 percent of the total! This precious drop must be managed properly.

Discuss the results of the demonstration. At this point, many students will conclude that a very small amount of water is available to humans. However, this single drop is actually a large volume of water on a global scale. ...The paradox is that for some, water may appear plentiful, but for others it is a scarce commodity. Why are some people in need of more water? Geography, climate and weather affect water distribution. Land and water use for agriculture, industry, and homes affect the quality and quantity of available fresh water.

APPENDIX I

Results of Bird Lesson: General Ecology: Class #1 and #2 (After lesson).

Question: What have you learned from this lesson?

Subject	PERCENTAGE	
	(n=18)	(n=25)
	Class # 1 (Field Treatment)	Class # 2 (In-class Treatment)
Learned more		
About Mammals	4	0
Learned differences bet.		
Ravens and Crows	18	22
Vertebrates	0	17
Goshawks	0	7
Food Habits	0	7
How birds live	16	7
How birds sing	0	7
Differences	16	7
Small owls	0	7
Eggs	12	22
Ducks-Waterproof	12	7
Types of birds	4	7
Nothing	4	0
Feathers	4	0
Flying	4	0
If you stop and listen it's cool	4	0

Question #2: What are you most confused about after this lesson?

Subject	PERCENTAGE	
	(n=18)	(n=25)
	Class #1 (Field Treatment)	Class #2 (In-class Treatment)
Diff betw Crows And Ravens	17	12
Species	0	18
Male/Female	4	6
Populations	4	6
Why ducks have webbed feet	0	6
Eagles dying	8	0
How birds fly	13	0
Feathers	4	0
Food Habits	8	0
Communication	4	0
Habitat	4	0
Eggs don't Hatch	4	0
<u>Nothing</u>	<u>25</u>	<u>53</u>
Total Percentage	99	101

APPENDIX J

Results of Bird Lesson: General Ecology: Class #1- Longfellow School (Before lesson)

0= No Response. 1= Wrong. 2=Sort of Right 3=Right

Class # 1 Longfellow School

Questions:	1	2	3	4	5	6	7	Ave
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Student

1	3	2	1	0	2	0	1	1.3
2	3	2	2	2	2	3	2	2.3
3	3	2	2	2	1	3	2	2.1
4	3	2	1	1	1	1	2	1.6
5	3	2	1	1	1	3	0	1.6
6	1	2	2	2	3	3	2	2.1
7	3	3	1	3	3	3	2	2.6
8	3	2	1	1	1	1	2	1.6
9	3	2	1	2	1	3	2	2.0
10	3	3	2	2	2	2	2	2.3
11	3	2	2	2	2	3	1	2.1
12	3	2	1	1	1	0	2	1.4
13	1	3	1	1	1	2	2	1.6
14	3	2	1	1	1	1	0	2.0
15	3	2	1	1	1	1	0	1.3
16	3	2	1	1	1	2	2	1.7
17	3	3	1	1	1	0	2	1.6
18	3	2	1	1	1	3	1	1.7
19	3	3	2	2	2	3	2	2.4
20	3	2	1	1	1	0	2	1.4

Average

1.8

