EVALUATION OF CURRICULUM-BASED EDUCATION PROGRAMS IN THE GREAT SMOKY MOUNTAINS NATIONAL PARK

Project Report

for

Great Smoky Mountains National Park

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KEY FINDINGS

Introduction

We investigated the impact of curriculum-based education programs provided or supported by the Great Smoky Mountains National Park (GRSM), which are designed to help teachers of local schools meet state education standards through place-based and hands-on, inquiry-based education in GRSM settings. The classes target learning outcomes pertaining to the environment, science skills, ecological processes, appreciation for biodiversity, knowledge of the National Park Service (NPS), and environmental stewardship, among others. The study investigated the immediate impacts of day (Parks As Classrooms programs provided by the North and South Districts and Appalachian Highlands Science Learning Center at Purchase Knob, and Parks In Classrooms program offered by the North District) and overnight (Great Smoky Mountains Institute at Tremont and Eugene Huskey Environmental Education Center) programs. We also investigated the longer term, integrated, GRSM curriculum-based program (multiple trips to GRSM throughout the term) at Pi Beta Phi School in Sevier County, Tennessee.

The study focused on primarily middle school students (90% from grades 5-8) who were involved in a GRSM program during the Spring and Fall semesters of 2010 and Spring semester of 2011. Teachers involved in the GRSM programs (attending with students) responded to a post-visit survey that was focused on their perceptions of program impacts on their students, satisfaction with the GRSM program and intent to engage in teaching and stewardship behaviors. Students attending the day or overnight programs also completed a survey a few days prior (pre-visit) and a few days after (post-visit) their involvement in the GRSM program. Students in the Pi Beta Phi program in grades 5, 6, 7, and 8 completed the same survey at the beginning of the Fall 2010 semester and in December at the end of the Fall 2010 semester. The following student outcomes were measured: self-assessed learning, attitudes toward school, stewardship attitudes, interest in learning, perceptions of social acceptability (social norms) of stewardship, place attachment to GRSM, attitudes toward field trips, and behaviors associated with stewardship. Park staff report that self-assessed learning, attachment to GRSM, and stewardship associated with the Park best reflect the primary goals of their programs, with other goals (e.g., attitudes toward school and field trips and home stewardship behaviors) of secondary interest.

Summary

- According to students and teachers, all of the programs had a positive influence on learning outcomes pertaining to the environment, science skills, ecological processes, appreciation for biodiversity, knowledge of the NPS, and environmental stewardship, among others.
- The GRSM programs appear to be of very high quality and produce very satisfied teachers.

Teacher Outcomes

- Responding teachers agreed that GRSM programs helped their classes meet state curriculum standards, were academically appropriate, taught their students a great deal about important topics, and motivated students to perform better academically.
- Responding teachers indicated that GRSM programs positively impacted their students across a

range of outcomes including: appreciation for the natural environment, environmental stewardship, understanding ecological processes, appreciation for biological diversity, and scientific inquiry skills.

- Teachers were very satisfied with their GRSM programs. On a scale of 1(very dissatisfied) to 10 (Very satisfied), all programs had a mean satisfaction rating of 9 or higher.
- Teachers rated the overall performance of GRSM staff very highly with mean of 4.75 (on a scale of 1=very poor to 5=very good) and felt they were highly knowledgeable, entertaining, organized, interacted positively with students, and worked well with teachers.
- Over half of the teachers reported that they were more likely to volunteer to help the environment, incorporate environmental themes in their teaching, use environmental themes to meet state standards, and incorporate inquiry-based, hands-on activities, and outdoor activities in their teaching as a result of participating in the GRSM experience.

Student Outcomes

- For all programs, students reported learning a great deal to a moderate amount pertaining to the natural environment, Great Smoky Mountains National Park, plants and animals and how they interact, the history of GRSM, and the purpose of the NPS.
- Five of the seven GRSM programs were observed to have a significantly positive influence (before and after) on intentions to perform *Park and Community (Stewardship) Behaviors,* such as volunteering to help the environment, picking up trash left by others, helping clean up a local park, working with others to clean up my community, participating in activities to improve my school, and talking to my friends about the environment.
- Six of the seven GRSM programs were observed to have a significantly positive influence (before and after) on intentions to perform *Home (Stewardship) Behaviors,* such as turning off the water when brushing teeth, collecting aluminum cans for recycling, talking to family about ways to protect the environment, turning the lights out when leaving a room, and recycling paper products.
- Students that visited the park more than 5 times with their schools reported significantly higher self-assessed learning outcomes than students that had not visited the park before with their school and students that had only visited the park between 1 and 5 times.
- The two residential programs, Great Smoky Mountains Institute at Tremont (GSMIT) and Eugene Huskey Environmental Education Center), produced the greatest range of positive change on the indices pertaining to environmental literacy and stewardship. The GSMIT program produced significant increases on 5 of the 7 indices and the Eugene Huskey program resulted in significant increases on 4 of the 7 indices.

EXECUTIVE SUMMARY

Introduction

Currently Great Smoky Mountains National Park (GRSM) provides, directly or through partnerships, a range of curriculum-based educational opportunities that serve thousands of students and hundreds of schools in Tennessee, North Carolina, and surrounding states each year. We investigated the influence of these curriculum-based education programs, which are designed to help teachers of local schools meet state education standards and are focused on providing place-based and hands-on, inquiry-based education in GRSM settings. The classes target learning outcomes pertaining to the environment, science skills, ecological processes, appreciation for biodiversity, knowledge of the NPS, and environmental stewardship, among others.

This study investigated the immediate impacts of GRSM day and residential programs. It also investigated the influence of one semester of the Pi Beta Phi school (Sevier County, Tennessee), which integrates repeat visits to GRSM throughout the school year into the curriculum. The study measured teachers' perceptions of program impacts on their students' academic performance, stewardship, and learning outcomes, teachers' satisfaction with the GRSM program, and their intent to engage in teaching and stewardship behaviors. The study also investigated the following student outcomes pertaining to environmental literacy and stewardship: attitudes toward school, stewardship attitudes, interest in learning, perceptions of social acceptability (social norms) of stewardship, place attachment to GRSM, attitudes toward field trips, self-assessed learning, and behaviors associated with stewardship (park/community and home behaviors). Park staff report that self-assessed learning, attachment to GRSM, and stewardship associated with the Park best reflect the primary goals of their programs, with other goals (e.g., attitudes toward school and field trips and home stewardship behaviors) of secondary interest.

Methods Summary

All attending/participating teachers were asked to complete a survey 10 days after their GRSM educational program regarding their perceptions of student outcomes and their satisfaction with the program. We also investigated the influence of the programs on participating students. Participants in this aspect of the study were primarily middle school students (90% of sample are from grades 5-8). All middle schools (grades 5-8) and their students attending Parks As Classrooms day programs offered by GRSM North and South Districts, during the Spring and Fall semesters of 2010; all middle and high schools and their students attending GRSM Appalachian Highlands Science Learning Center at Purchase Knob[1] during the Fall semester of 2010; and all middle schools and their students that participated in Parks In Classrooms programs offered by GRSM North District during the winter 2011 were asked to participate in the study. The study also included all schools and their students attending the residential program at Great Smoky Mountains Institute at Tremont (GSMIT) during one randomly selected week in the Spring semester and one week in the Fall of 2010 and all students involved in residential programs provided by Eugene Huskey Environmental Education Center during the Spring, 2010. In addition, all students in Grade 5, 6, 7, and 8 that

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[1] Two of the school groups visiting Purchase Knob included overnight camping in the area as part of their trip. This comprised 8.6% of all respondents who attended a program at Purchase Knob.

attended Pi Beta Phi during the Fall semester, 2010, were included in the study. To assess the immediate impacts of the day and residential programs, each student completed a "pre-visit" survey in class 3-5 days prior to participating in one of the educational programs and a similar "post-visit" survey 2 days after attending the program. For the assessment of the longer semester approach (Pi Beta Phi), students completed the survey at the start and end of the fall semester. Each survey took approximately 10-15 minutes to complete.

Survey Response

Seventy-seven school groups from 43 different schools participated in this evaluation. From these groups, 2,486 students completed both pre-visit and post-visit surveys (Table A). One-hundred and two teachers from 62 school groups responded to the teacher survey.

Table A. Number of valid respondents for each GRSM program included in evaluation.

Program	School Groups[1]	Schools	Students	Teachers
Parks As Classrooms (South District)	10[1]	8	401	12
Parks As Classrooms (North District)	21[1]	11	637	43
Parks As Classrooms (Purchase Knob)	19[1]	14	801	17
Parks In Classrooms	13[1]	1	202	0
Tremont (3 day)	4[1]	4	222	18
Eugene Huskey (2 day)	6[1]	4	93	7
Pi Beta Phi (semester)	4[2]	1	130	5
TOTAL	77	43	2486	102

[1]*School group=group from one school visiting during one time period (day or consecutive days)*
[2]*School groups=grade level (5th, 6th, 7th and 8th)*

Teachers' perceptions of student outcomes

Perception of program impacts on students

Teachers generally agreed that the GRSM curriculum-based programs had a positive impact on their students (Table B). The responses were overwhelmingly positive, with all item means above the neutral point and the majority of teachers (between 71 and 100 percent) agreeing or strongly agreeing to all program impact statements.

Also, when asked to indicate the extent to which GRSM had positively impacted their students, teachers indicated that GRSM programs positively impacted their students across a range of outcomes including: appreciation for the natural environment, environmental stewardship, understanding ecological processes, appreciation for biological diversity, and scientific inquiry skills (Table C).

Table B: Response of all teachers (N=101) on statements regarding the GRSM experience

Program impact statements	Mean*	SD	% Agreeing or Strongly Agreeing
This program helped my class meet state curriculum standards.	4.46	.70	89
The program content was academically appropriate for my students.	4.72	.45	100
My students became motivated to perform better academically.	3.96	.76	71
My students learned a lot about important topics.	4.55	.56	97
I would like to do another GSMNP program with my students.	4.75	.46	99
My students had fun.	4.85	.36	100
The program content was relevant to my students' lives.	4.59	.59	95

Scale: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree

Table C. Response of all teachers (N=101) on positive impact of the GRSM program

Outcomes	Mean*	SD
Academic performance.	3.86	0.74
Positive attitudes toward school.	3.98	0.82
Appreciation for the natural environment.	4.59	0.67
Environmental stewardship.	4.39	0.69
Understanding of ecological processes.	4.34	0.68
Knowledge of the history of GSMNP.	3.98	0.82
Understanding of the mission of the NPS	4.06	0.82
Knowledge of GSMNP natural history.	4.06	0.83
Appreciation for biological diversity.	4.36	0.73
Concern about issues and threats facing GSMNP.	4.17	0.85
Interest in taking actions to conserve or improve the environment	4.17	0.85
Scientific inquiry skills.	4.27	0.65

Scale: 1=None, 2=Almost none, 3=A little, 4=A moderate amount, 5=A great deal

Satisfaction
Teachers were highly satisfied with the GRSM program and the staff. The mean for overall satisfaction ranged from 9.00 to 9.86, on a scale of 1=Very dissatisfied to 10=Very satisfied. Teachers also gave high ratings to staff performance (Table D). Across all programs, the mean for overall staff performance was 4.75 out of 5. The highest rated performance qualities across all of the programs were organization (M=4.78), positive interaction with students (M=4.78), and working well with teachers (M=4.77).

Table D: Teacher ratings of staff

Staff qualities	ALL (N=101)	GRSM program mean ratings					
		PAC SD (N=12)	PAC ND (N=43)	PAC PK (N=17)	GSMIT (N=18)	EH (N=7)	PBP (N=5)
Knowledgeable	4.74	4.50	4.67	4.88	4.83	5.00	4.60
Entertaining	4.48	4.42	4.33	4.53	4.78	4.86	4.20
Flexible	4.66	4.33	4.67	4.94	4.67	4.86	4.00
Organized	4.78	4.25	4.81	4.94	4.78	5.00	4.80
Enthusiastic	4.70	4.58	4.65	4.76	4.78	4.86	4.60
Patient	4.76	4.42	4.79	4.88	4.78	5.00	4.40
Charismatic-likeable	4.65	4.42	4.60	4.82	4.72	4.86	4.40
Explained things clearly	4.73	4.42	4.70	4.88	4.78	5.00	4.60
Communicated an explicit message	4.70	4.33	4.63	4.88	4.83	5.00	4.60
Interacted positively w/ students	4.78	4.42	4.79	4.88	4.89	5.00	4.40
Worked well with teachers	4.77	4.42	4.79	4.94	4.89	4.86	4.20
Overall performance	4.75	4.50	4.72	4.88	4.82	5.00	4.40

Scale: 1=None, 2=Almost none, 3=A little, 4=A moderate amount, 5=A great deal

Pre-visit and Post-visit actions

At least half of the participating teachers indicated that they frequently incorporated environmental and outdoor curriculum principles in their teaching prior to their GRSM programs (Table E). The most common action was to incorporate inquiry-based, hands-on activities into the students' experiences. Eighty-one percent indicated "very often" or "often." Teachers less commonly reported volunteering to help the environment (45% indicated very often or often).

Table E. Pre-visit actions for all teachers attending evaluated GRSM programs

Actions	Pre-visit frequency		%				
	Mean[1]	SD	Very Often	Often	Some-times	Rarely	Never
Volunteer to help the environment.	3.40	1.16	23	22	30	22	3
Incorporate environmental themes in my teaching.	3.90	0.98	35	28	31	5	1
Use environmental themes to better meet state standards.	3.84	1.06	35	25	29	10	1
Incorporate inquiry based, hands on activities into the students' school experiences	4.19	0.79	39	42	18	1	0
Incorporate outdoor activities into your classes.	3.69	1.02	29	23	38	9	1

[1]Scale: 1=Never, 2=Rarely, 3=Sometimes, 4=Often, 5=Very often

Following their GRSM visit, the majority (between 56% and 72%) of teachers indicated they would be "much more likely" or "more likely" to include environmental themes and outdoor activities in their teaching (Table F). Seventy-two percent of teachers indicated that they would be "much more likely" or "more likely" to incorporate inquiry-based, hands-on activities into the students' school experiences. Teachers were slightly less likely (56% indicated much more likely or more likely) to "Use environmental themes to better meet state standards."

Table F. Post-visit action likelihood for all teachers attending evaluated GRSM programs

Actions	Post-visit likelihood		%				
	Mean[1]	SD	Much more likely	More likely	Same as before	Less likely	Much less likely
Volunteer to help the environment.	3.69	0.75	11	50	37	1	1
Incorporate environmental themes in my teaching.	3.84	0.62	18	48	34	0	0
Use environmental themes to better meet state standards.	3.78	0.78	23	33	44	0	0
Incorporate inquiry based, hands on activities into the students' school experiences	3.94	0.75	22	50	28	0	0
Incorporate outdoor activities into your classes.	3.92	0.75	23	46	31	0	0

[1]Scale: 1=Much less likely, 2=Less likely, 3=Same as before, 4=More likely, 5=Much more likely

Immediate impacts of programs on student outcomes

This study sought to gauge the immediate influence of GRSM curriculum-based programs on the following students' outcomes, each comprised of a set of multiple survey items:

- *Self-Assessed Learning*: a subjective measure of the amount an individual perceived to have learned from participating in one of the programs (5 items)
- *Attitudes toward School*: enjoyment of school, perceived support from teachers, empowerment (8 items)
- *Stewardship*: attitudes about environmental responsibility and community respect (9 items)
- *Interest in Learning*: desire to learn about natural and cultural resources and explore the outdoors (6 items)
- *Social Norms*: social pressures a person feels to engage, or not to engage, in a potential stewardship behavior (5 items)
- *Attachment to GRSM*: importance and emotional connection an individual places in the GRSM (4 items)
- *Park and Community Stewardship Behaviors*: public stewardship behaviors that seek to influence the use of natural resources or the actions of others through direct or indirect action (6 items)
- *Home Stewardship Behaviors*: personal stewardship behaviors intended to conserve natural resources at home (5 items)
- *Field Trips*: perceptions regarding the benefits of participating in extracurricular activities away from school (5 items)

We measured changes in the mean scores of survey items reflecting each outcome (composite mean score) before and after the programs. The results of the study are reported below, organized by program type (day, residential, semester) and site (see also Tables G, H, and I).

Day Programs

- **GRSM Parks As Classrooms (South District):** The mean for the *Self-assessed Learning* scale was 4.2 out of 5. Overall, the majority (67% or more) of Parks As Classrooms (South District) students believed they learned a great deal or moderate amount on all *Self-assessed Learning* items. This program also had a significantly positive influence on the mean score for the *Home Stewardship Behaviors* scale.

- **GRSM Parks As Classrooms (North District):** The composite mean for *Self-assessed learning* was 3.9. The majority (70% or more) of Parks As Classrooms (North District) students believed they learned a great deal or moderate amount on all *Self-assessed learning* items except for "The history of the people in GRSM"(59%). This program also had a significantly positive influence on the mean score for the *Park and Community Stewardship Behaviors* and *Home Stewardship Behaviors* scales.

- **GRSM Appalachian Highlands Science Learning Center at Purchase Knob (Parks As Classrooms Purchase Knob):** The *Self-assessed Learning* composite mean was 4.0. The majority (77% or more) of Parks As Classrooms (Purchase Knob) students believed they learned a great deal or moderate amount on all *Self-assessed learning* items except for "The history of the people in GRSM"(45%). This program also had a significantly positive influence on the mean scale scores for students' *Stewardship Attitudes*, *Park and Community Stewardship Behaviors* and *Home Stewardship Behaviors* scales.

- **GRSM Parks In Classrooms (North District):** The composite mean for *Self-assessed Learning* was 3.9. The majority (67% or more) of Parks In Classrooms students believed they learned a great deal or moderate amount on all *Self-assessed learning* items except for "The history of the people in GRSM"(40%). This program also had a significantly positive influence on the mean score for the *Park and Community Stewardship Behaviors* and *Home Stewardship Behaviors* scales.

Residential Programs

- **Great Smoky Mountains Institute at Tremont (GSMIT):** The composite mean for *Self-assessed Learning* was 4.3. The majority (69% or more) of GSMIT students believed they learned a great deal or moderate amount on all *Self-assessed learning* items. This program also had a significantly positive influence on the mean scores for each of the following scales: *Attitudes Toward School*, *Stewardship Attitudes*, *Attachment to GRSM*, *Park and Community Stewardship Behaviors*, *Home Stewardship Behaviors* and *Attitudes toward Field Trips*.

- **Eugene Huskey Environmental Education Center:** Eugene Huskey had the highest mean score for student's perceptions regarding learning outcomes across all programs. The composite mean was 4.4 indicating an overall high level of *Self-assessed Learning*. Overall, the majority (82% or more) of Eugene Huskey students believed they learned a great deal or moderate amount on

all *Self-assessed Learning* items. This program also had a significantly positive influence on students' mean score on the *Stewardship Attitudes*, *Social Norms*, *Park and Community Stewardship Behaviors*, *Home Stewardship Behaviors* and *Attitudes toward Field Trips*.

Semester Program

Pi Beta Phi Parks As Classrooms (single semester): This program had the second highest mean score (*M*=4.4) across all programs on *the Self-assessed Learning* scale (Table G). The majority (84% or more) of Pi Beta Phi students believed they learned a great deal or moderate amount on all *Self-assessed learning* items. The study, however, uncovered no statistically significant positive changes in mean scores on the evaluated student outcomes pertaining to environmental literacy and stewardship (except for a single item on the *Attitudes toward school* scale – "I will believe I will go to college"). Because the study only observed a single semester of a nine-year program, there is high potential for what is commonly known as a "ceiling effect." A "ceiling effect" occurs when scores are very high on a pre-visit survey and provide little or no room to demonstrate upward movement. Pi Beta Phi students had the highest pre visitation scores on the *Attitudes toward school, Stewardship attitudes, Social norms, Park and Community Stewardship behaviors*, and *Home Stewardship behaviors* scales (Table H), supporting the presence of the "ceiling effect." Further complicating the interpretation of the Pi Beta Phi program was the study's inability to isolate park-related experiences from the usual school curriculum. All other programs could be measured immediately before and after the program. Meanwhile, we captured a full semester at Pi Beta Phi. Consequently, it may not be valid to attribute any changes between pre-experience and post-experience scores directly to students' GRSM experiences. Additional confounding factors include other activities during the semester, end-of-semester fatigue[2], or cumulative positive effects from prior experiences.

Program comparison
All programs appeared to have a positive influence on students' perceptions of learning outcomes (Table G). The EH residential program and PBP semester program had the highest mean scores on *Self-Assessed Learning.*

Table G. Student Outcomes: Perceptions of Learning (5 items—post only)

Outcome	Mean Score						
	PAC SD	**PAC ND**	**PAC PK**	**PIC**	**GSMIT**	**EH**	**PBP**
Self-Assessed Learning (5 items)	4.24	3.93	4.02	3.92	4.29	4.47	4.40

Response categories included: a great deal=5, a moderate amount=4, a little=3, almost none=2, and none=1.

Comparing the other environmental literacy outcomes across program types (day, residential, and semester) suggests that the residential programs had a significantly greater impact than the day or semester programs on *Attitudes toward school, Stewardship Attitudes, Attachment to GRSM, Home*

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[2] Examples of this can be found in:

Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, *84*, 261–271.
Meece, J. L., & Miller, S. D. (1999). Changes in elementary school children's achievement goals for reading and writing:
Results of a longitudinal and an intervention study. *Scientific Studies of Reading*, *3*, 207–229.
Stern, M.J., R.B. Powell, and N.M. Ardoin 2011. Evaluating a constructivist and culturally responsive approach to environmental education for diverse audiences. *Journal of Environmental Education* 42(2): 109-122

Stewardship Behaviors, and *Attitudes toward Field Trips.* Also, both the day and residential programs had a significantly greater impact than the semester program for *Interest in Learning, Social Norms,* and *Park and Community Behaviors.* However, when interpreting these results it is important to consider the potential presence of a "ceiling effect," which describes the phenomenon when scores are very high on a pre-visit survey and provide little or no room to continue upward. For example, Pi Beta Phi students had the highest pre-visitation scores on the *Attitudes toward school, Stewardship attitudes, Social norms, Park and Community Stewardship behaviors,* and *Home Stewardship behaviors* scales. In these cases when there are high scores on the pre-visit survey, the survey items may not be sensitive enough to detect the influence of a program using a post-visit survey.

Table H. Composite Mean score student outcomes for pre-visit and post-visit*

OUTCOME	SURVEY	MEAN (SD)						
		PAC SD	PAC ND	PAC PK	PIC	GSMIT	EH	PBP
Attitudes toward school (8 items)	pre	4.21 (0.64)	3.95 (0.64)	4.23 (0.56)	4.09 (0.54)	3.97 (0.73)	4.19 (0.60)	4.29 (0.53)
	post	4.17 (0.68)	3.88 (0.66)	4.23 (0.59)	3.99 (0.58)	4.04 (0.70)	4.12 (0.69)	4.24 (0.64)
Stewardship (9 items)	pre	4.16 (0.65)	3.96 (0.63)	4.04 (0.59)	3.94 (0.54)	3.98 (0.68)	4.17 (0.58)	4.26 (0.53)
	post	4.17 (0.74)	3.96 (0.67)	4.15 (0.61)	3.92 (0.66)	4.07 (0.69)	4.30 (0.53)	4.22 (0.62)
Interest (6 items)	pre	4.00 (0.73)	3.41 (0.82)	3.67 (0.80)	3.40 (0.82)	3.63 (0.84)	3.85 (0.81)	3.76 (0.75)
	post	3.92 (0.83)	3.40 (0.88)	3.66 (0.85)	3.40 (0.85)	3.64 (0.97)	3.96 (0.78)	3.63 (0.81)
Social Norms (5 items)	pre	3.81 (0.73)	3.45 (0.69)	3.69 (0.69)	3.33 (0.63)	3.61 (0.70)	3.73 (0.68)	3.98 (0.67)
	post	3.74 (0.82)	3.45 (0.72)	3.69 (0.69)	3.32 (0.70)	3.63 (0.77)	3.87 (0.71)	3.86 (0.72)
Attachment to GRSM (4 items)	pre	4.06 (0.76)	3.80 (0.81)	3.78 (0.82)	3.84 (0.86)	3.88 (0.80)	4.21 (0.82)	4.14 (0.76)
	post	3.98 (0.95)	3.78 (0.90)	3.79 (0.88)	3.78 (0.92)	4.06 (0.90)	4.27 (0.71)	4.04 (0.93)
Park/Community Behaviors (6 items)	pre	3.27 (1.00)	2.80 (0.88)	3.15 (0.90)	2.62 (0.89)	2.84 (0.98)	3.04 (0.84)	3.39 (0.89)
	post	3.29 (1.05)	2.93 (0.91)	3.21 (0.92)	2.81 (0.95)	3.01 (1.00)	3.20 (0.84)	3.34 (0.95)
Home Stewardship Behaviors (5 items)	pre	3.74 (0.89)	3.33 (0.93)	3.74 (0.86)	3.30 (0.86)	3.43 (0.88)	3.47 (0.78)	3.74 (0.90)
	post	3.85 (0.96)	3.45 (0.93)	3.83 (0.87)	3.50 (0.85)	3.65 (0.87)	3.70 (0.78)	3.76 (0.89)
Field Trips (5 items)	pre	4.25 (0.64)	3.86 (0.68)	4.08 (0.65)	3.96 (0.59)	3.87 (0.76)	3.97 (0.63)	4.04 (0.64)
	post	4.21 (0.71)	3.83 (0.75)	4.11 (0.67)	3.93 (0.67)	3.96 (0.78)	4.31 (0.59)	3.97 (0.79)

Shaded cells indicate a positive and statistically significant difference ($p \leq .05$) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program.

Table I. Student Outcomes: Percent change and positive significance*

OUTCOME	% Change						
	PAC SD	PAC ND	PAC PK	PIC	GSMIT	EH	PBP
Attitudes toward school (8 items)	-0.95	-1.77	0.00	-2.44	1.76	-1.67	-1.17
Stewardship (9 items)	0.24	0.00	2.72	-0.51	2.26	3.12	-0.94
Interest (6 items)	-2.00	-0.29	-0.27	0.00	0.28	2.86	-3.46
Social Norms (5 items)	-1.84	0.00	0.00	-0.30	0.55	3.75	-3.02
Attachment to GRSM (4 items)	-1.97	-0.53	0.29	-1.56	4.64	1.43	-2.42
Park/Community Behaviors (6 items)	0.61	4.64	1.90	7.25	5.99	5.26	-1.47
Home Behaviors (5 items)	2.94	3.60	2.41	6.06	6.41	6.63	0.53
Field Trips (5 items)	-0.86	-0.78	0.71	-0.93	2.33	8.56	-1.82

Shaded cells indicate a positive and statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program; % change = (post-visit mean minus pre-visit mean)/pre-visit mean

Student visitation and influence on outcomes

Students that visited the park more than 5 times with their schools had significantly higher pre-visitation scores on most items and reported significantly higher self-assessed learning outcomes than students that had not visited the park before with their school and students that had only visited the park between 1 and 5 times (Table J+K). In general, the results suggest that greater visitation is associated with significantly higher pre- and post-scores.

Students that had not visited before had larger "positive changes" in scores on attitudes toward school, attitudes toward stewardship, and attachment to GRSM scales (Table L). In other words, the students that visited for the first time appeared to receive greater positive impacts on these three outcomes.

Table J. Student Visitation and Student Pre Program Outcomes: ANOVA with post hoc analysis of difference*

# Visits with school in entire life (pre) and post program outcomes	(A) 0 prior visits	(B) 1 -5 prior visits	(C) More than 5 visits	Post Hoc Analysis
Attitudes toward school (8 items)	4.07	4.12	4.25	C*>A,B
Stewardship (9 items)	3.97	4.05	4.21	C*>A,B B*>A
Interest in Learning (6 items)	3.59	3.65	3.77	C*>A,B
Social Norms (5 items)	3.55	3.64	3.81	C*>A,B B*>A
Attachment to GRSM (4 items)	3.76	3.93	4.11	C*>A,B B*>A
Park/Community Behaviors (6 items)	2.91	3.04	3.23	C*>A,B B*>A
Home Behaviors (5 items)	3.52	3.57	3.63	
Attitudes toward Field Trips (5 items)	3.97	4.04	4.09	A*<B,C

* Statistically significant difference in scores on the outcome (p≤.05).

Table K. Student Visitation and Student Post Program Outcomes: ANOVA with post hoc analysis of difference*

# Visits with school in entire life (pre) and post program outcomes	(A) 0 prior visits	(B) 1 -5 prior visits	(C) More than 5 visits	Post Hoc Analysis
Attitudes toward school (8 items)	4.07	4.09	4.17	
Stewardship (9 items)	4.04	4.11	4.19	A*<B,C
Interest in Learning (6 items)	3.56	3.64	3.74	A*<B,C
Social Norms (5 items)	3.55	3.63	3.78	C*>A,B B*>A
Attachment to GRSM (4 items)	3.8	3.90	4.03	A*<B,C
Park/Community Behaviors (6 items)	3.01	3.15	3.27	
Home Behaviors (5 items)	3.65	3.71	3.74	
Attitudes toward Field Trips (5 items)	4.01	4.04	4.03	
Self Assessed Learning (5 items)	4.03	4.10	4.24	C*>A,B

* Statistically significant difference in scores on the outcome (p≤.05).

Table L. Student Visitation and Change in Student Outcomes: ANOVA with post hoc analysis of difference*

# Visits with school in entire life (pre) and change in program outcomes	(A) 0 prior visits	(B) 1 -5 prior visits	(C) More than 5 visits	Post Hoc Analysis
Attitudes toward school (8 items)	.0001	-.039	-.0811	A*>C
Stewardship (9 items)	.063	.049	-.023	C*<A,B
Interest in Learning (6 items)	-.035	-.013	-.034	
Social Norms (5 items)	-.004	-.012	-.057	
Attachment to GRSM (4 items)	.034	-.025	-.092	A*>C
Park/Community Behaviors (6 items)	.104	.099	.039	
Home Behaviors (5 items)	.128	.136	.108	
Attitudes toward Field Trips (5 items)	.037	-.003	-.033	

Statistically significant difference in scores on the outcome ($p \leq .05$).

Student visitation and awareness of GRSM

Eighty percent of all students who completed a post-visit survey indicated that they had visited GRSM with their school in the last year. Thus, one-fifth of students, who did visit GRSM with their school, did not indicate (on post-visit survey) that they had visited GRSM with their school in the last year. This was an unexpected response and suggests that all students may not be aware that they are visiting the GRSM or that they misinterpreted the question and assumed that they should not include their most recent experience. Students involved in the Pi Beta Phi program had the highest percent (96%) of students who recognized they had visited the GRSM with their school in the last year. Students attending the Parks As Classrooms (South District) program had the lowest percentage of students who recognized they had visited the GRSM with their school in the last year.

Management Implications and Recommendations

The GRSM programs appear to be of very high quality and produce very satisfied teachers. According to students and teachers, all of the programs had a positive influence on the primary content-related learning outcomes pertaining to the environment, science skills, ecological processes, appreciation for biodiversity, knowledge of the NPS, and environmental stewardship, among others. The programs appear to be successful at delivering outcomes that are directly related to the curricula, which are designed to help teachers of local schools meet state education standards and are focused on providing place-based and hands-on, inquiry-based education in GRSM settings. Most of these programs also influenced intentions to perform at-home and park/community stewardship behaviors.

While all programs had a positive influence on learning outcomes based directly on the curricula, not

all of the programs consistently improved students' attitudes toward school, interest in learning, and attitudes toward GRSM. If these outcomes are desired and become explicit goals of the GRSM curriculum-based programs, then programming should be developed to explicitly address these outcomes (e.g., Stern, Powell, and Ardoin, 2010).

The results also suggest that residential programs appear to have broader impacts on student's attitudes toward a range of topics including environmental literacy. Past research supports the idea that longer, more immersive programs may produce more powerful student outcomes pertaining to environmental literacy (e.g., Stern, Powell, and Ardoin, 2008).

After attending the programs, teachers indicated that they were more likely or much more likely to engage in integrating environmental curriculum and activities into their teaching. This suggests that involvement with the GRSM curriculum-based programs serves as an important form of professional development for teachers. For example, teachers visiting the GRSM with their school have the opportunity to observe GRSM staff and student activities in an outdoor setting and get ideas for integrating environmental themes and activities in their curriculum. Also, teachers involved in the Parks In Classrooms program have an opportunity to observe teaching that incorporates environmental stewardship themes and activities in the classroom setting.

Limitations

- Null or negative results, particularly those observed at Pi Beta Phi, may be due to:
  - A "ceiling effect," which describes the phenomenon when scores are very high on a pre-visit survey and provide little or no room to continue upward. Pi Beta Phi students had the highest pre visitation scores on the *Attitudes toward school, Stewardship attitudes, Social norms, Park and community stewardship behaviors*, and *Home stewardship behaviors* scales. In these cases, the survey items may not be sensitive enough to detect the influence of a program using a post-visit survey.
  - The treatment (an academic semester) encompasses much more than the GRSM experience.
  - The Pi Beta Phi program is a multi-year program, so our research design does not investigate the full "experience."
  - Student fatigue at the end of the semester.
- Self-reported behaviors and behavioral intentions may not reflect actual behaviors.
- Some of the outcomes selected for this study may not reflect the curriculum of particular programs
- Social desirability bias, or the desire of respondents to provide answers that are socially acceptable, may influence the results of this study, especially as it pertains to stewardship. This also has a tendency to inflate positive findings.

Chapter One
INTRODUCTION

Project Goals

Curriculum-based environmental education programs provide students with opportunities to develop knowledge, attitudes, and abilities through extended, active exposure to outdoor settings. These programs are offered in different formats, including experts visiting the classroom, day trips to outdoor centers or parks, residential programs at outdoor learning centers, and programs integrated with classroom curriculum. In general, these programs seek to increase academic performance, appreciation and interest in nature, and environmental stewardship as well as encourage stewardship behaviors that take place on site and continue once the students return to their home communities. Currently Great Smoky Mountains National Park (GRSM) provides, directly or through partnerships, a range of curriculum-based educational opportunities that serve thousands of students and hundreds of schools in Tennessee, North Carolina, and surrounding states each year. These GRSM programs and their curriculum are linked to state standards and focus on promoting environmental stewardship in association with the GRSM, personal attachment to GRSM and learning about the GRSM. These programs are thought to be of high quality, but to date no formal evaluation has been conducted to assess the performance of these programs.

This study investigated the immediate impacts of GRSM day and residential programs. This document reports the results from an evaluation of the the following day and residential programs offered in partnership or directly through the GRSM: 1) the GRSM day-use field programs (Parks As Classrooms) for grades 5-8 occuring in the North District and South District, 2) the GRSM in-class program (Parks In Classrooms) for grades 5-8 in the North District, 3) the programs at the GRSM Appalachian Highlands Science Learning Center at Purchase Knob that target grades 5-12, 4) the Great Smoky Mountains Institute at Tremont (GSMIT), 5) a partnership program with Sevier County Schools at the Eugene Huskey Environmental Education Center that serves grade 5. It also investigated the impacts of one semester of the longer-term program at Pi Beta Phi school (in Sevier County, Tennessee), which integrates the GRSM curricula, including repeat trips to GRSM, throughout the school year, and which involves students in grades 5, 6, 7, and 8.

Specifically this study sought to gauge the influence of these middle school and high school education programs on a wide range of potential outcomes. Prior to implementation, researchers from Clemson University and Virginia Tech conducted focus groups and interviews with GRSM, GSMIT, and Pi Beta Phi education staff to clearly define the desired outcomes of the programs.. Park staff indicated that self-assessed learning, attachment to GRSM, and stewardship associated with the Park best reflected the primary goals of their programs, with other goals (e.g., attitudes toward school and field trips and home stewardship behaviors) of secondary interest.

The researchers then developed a pre-visit and post-visit questionnaire for students to measure performance on the defined outcomes. An additional post-visit questionnaire was also developed to investigate teachers' perceptions regarding the value of these educational efforts especially as it pertained to improving students' academic performance.

The research was designed to provide input for further strengthening GRSM's curriculum-based educational programs by:

- Gauging the influence of each program
- Establishing a baseline for each program's performance and providing indicators for continued performance evaluations that support future adaptive management
- Comparing the influence of each program to investigate the relative benefits of certain programmatic characteristics

Methods

The objective of this research was to investigate the immediate influence of participation in curriculum-based education programs offered by GRSM and their partners on students' knowledge, attitudes toward school, attitudes toward stewardship, attitudes toward GRSM, and stewardship behaviors. The evaluation was developed through a participatory process following steps laid out in the Sustainable Evaluation Framework (Powell, Stern, & Ardoin, 2006). As an initial step, a focus group was held in December, 2007, with the intent of having park staff and their partners' clearly define the goals of the educational programs as well as reach consensus on the conceptualization of stewardship. This included identifying the components associated with park stewardship, and determining which specific behaviors should be classified as stewardship behaviors. In December, 2009, the research team conducted a follow-up focus group to refine and operationalize the educational outcomes of interest and to clarify the logistics and methods of the study.

The survey instruments were developed and then refined from January to March, 2010. Data collection occurred during Spring, 2010 and the 2010-2011 academic year. Four organizations (Great Smoky Mountains Institute at Tremont, Eugene Husky Environmental Education Center, Pi Beta Phi School in Gatlinburg, and the National Park Service) that provided curriculum-based education using GRSM resources participated in the study. Specifically, this evaluation focused on the following curriculum-based programs:

- **Day Programs**
  GRSM Parks As Classrooms, South District, North Carolina—The Parks As Classrooms program operating out of the South District focuses on GRSM sites within North Carolina. The curriculum for this program integrates North Carolina school curriculum standards. During this study, the Parks As Classrooms (South District) programs were conducted at one of the following sites: Oconaluftee Visitor Center, Newfound Gap, Deep Creek, and Clingmans Dome. Depending on the group, the lessons focused on one to three of the following topics: soils, weather, topography, ecology, water quality, or biodiversity, or human history and culture.

  GRSM Parks As Classrooms, North District, Tennessee— The Parks As Classrooms program operating out of the North District focuses on GRSM sites within Tennessee and is integrated with Tennessee school curriculum standards. During this study, Parks As Classrooms (North District) programs used one of the following sites: Sugarlands Visitor Center, Twin Creeks, Look Rock, Newfound Gap, Chimney Rocks, Clingmans Dome, Quiet Walkway on the West Prong of the Little Pigeon River, Laurel Falls, and Cosby Picnic Area. Depending on the group and location, the curriculum focused on environmental education topics including: soil

exploration, interdependence, geology and geography, archeology, water quality, biodiversity, and environmental data collection techniques.

GRSM Appalachian Highlands Science Learning Center at Purchase Knob, NC—The Parks As Classrooms program operating out of the Appalachian Highlands Science Learning Center at Purchase Knob is located on 235 acres on the NC side of the park that were donated to GRSM in 2001. The programs offered at AHSLC are all conducted at the Purchase Knob site and are aligned with the North Carolina Standard Course of Study and the National Science Education Standards. For the school groups participating in this study, the curriculum and activities focused on one or more of the following three topics: air quality (ozone, lichen, tardigrades), aquatic biology (water quality, salamander mark-recapture) and soil health (macro-invertebrates, snails). The lesson plans at this site integrate the scientific method (data collection, analysis and write-up), and all of the data collected by school groups are part of broader citizen science research projects and entered into online databases. Two of the school groups visiting Purchase Knob included overnight camping in the area as part of their trip. This was 8.6% of all respondents who attended a program at Purchase Knob.

GRSM Parks In Classrooms—The GRSM Parks In Classrooms program focuses on engaging students in GRSM related curriculum at local schools. GRSM Parks In Classrooms programs involve GRSM educators traveling to local schools and meeting with specific classes to introduce students to GRSM and topics related to the park. The GRSM Parks in Classrooms program services kindergarten through high school students, with the highest demand for K-4 programs. However, the school group participating in this study was all eighth graders, consistent with the study focus on middle school and high school students.

- **Residential Programs**
  Great Smoky Mountains Institute at Tremont—Great Smoky Mountains Institute at Tremont (GSMIT) is a non-profit residential environmental education center located on the Tennessee side of GRSM within the watershed of the Middle Prong of the Little River. More than 4,000 primarily fourth through seventh grade students from 14 states visit Tremont each year, with groups ranging in size from 10 to over 100 students. Programs at GSMIT are typically from 3-5 days and the activities and lessons are designed to support the science and social studies curricula of surrounding states for grades 5-8. Programs are often tailored to meet a group's needs and adapted based on the season. On all GSMIT programs, accompanying teachers are expected to co-teach programs alongside GSMIT educators. Students stay in a comfortable dormitory and eat family style meals in the dining hall. All programs stress experiential and place-based learning, using the national park as an outdoor classroom. Visiting teachers may plan their Tremont visits by selecting from over 40 curricular options, ranging from cooperative team-building to inquiry-based science and other creative or exploratory activities. Curricular topics typically include aquatic ecology, geology, human history, Appalachian culture, and biodiversity. Themes focus on sense of place, diversity, and stewardship. Lessons are typically 2-3 hours long.

  Eugene Huskey Environmental Education Center— The Eugene W. Huskey Environmental Education Center is located in Sevier County in Tennessee near the Great Smoky Mountains National Park and is supported by the county school district. The Eugene Huskey program is typically a 2-day residential program and is unique from the other "field trip" programs

evaluated in this report because it is not located within the GRSM. During the 2-day program, GRSM staff gave a half-day presentation at the center. The instructional program at Eugene Huskey is designed for easy integration with school curricula and emphasizes flora, fauna, and environment of the Great Smoky Mountains as well as the social and cultural heritage of mountain people in East Tennessee. Lesson topics typically include Early Pioneer Life, Indian History, Appalachian Culture (music, arts and crafts) and the environment of GRSM (stream ecology; plants and animals).

- **Semester Program**
  Pi Beta Phi—The Pi Beta Phi Parks As Classrooms program is a partnership between the GRSM and Pi Beta Phi Elementary School, which is a public school in Gatlinburg, Tennessee (Sevier County). The program was first implemented during the 1993-94 school year and differs from other Parks As Classrooms programs in the United States in that the curricula is fully integrated with the resources of GRSM. Students in grades K-8 participate in this program, which includes a minimum of three to over six GRSM park experiences a year. The GRSM educational "units" are interdisciplinary and have pre-site and post-site components. All visits are typically day trips to sections of the park that are accessible by a one-day bus trip. However, 7th and 8th graders also participate in an overnight backpacking trip as well as service projects within the park, and 8th grade graduates participate in a "reflections" campout. Curriculum units for grades 5 through 8 are somewhat different at each grade level, but collectively focus on geology, geography, stream ecology, Appalachian culture, wilderness navigation, microhabitats, weather/air quality, biodiversity, land management, wildflowers, archeology, and fly-fishing.

Questionnaire Development

Teacher Questionnaire—The post-visit teacher questionnaire focused primarily on assessing teachers' perceptions of the impact of the curriculum-based GRSM program on the academic achievement of their students. It also investigated the influence of attending the program on teachers' intentions to integrate environmental themes, outdoor activities, and hands-on inquiry based activities into their teaching (Table 1.2). Background and demographic questions included number of visits to the GRSM with school or family, friends or other groups (during the academic year or lifetime), number of times a GRSM ranger had visited class (during the academic year), whether the teacher had attended GRSM professional development, whether the teacher had used pre-visit and post-visit materials supplied by GRSM, the number of years the teacher had taught, the grades and subjects taught, and the teacher's ethnicity.

Table 1.2 Teacher outcomes, definition, and items.

Outcome: *Definition*	**Items**
General Academic Influence: *The perceptions of academic influence questions were designed to measure teachers' perceptions regarding the influence of participating in a GRSM curriculum-based education program on their students' academic performance. Teachers were asked: "do you agree or disagree with the following statements about your GRSM experience? Response categories included: strongly agree=5, agree=4, neutral=3, disagree=2, and strongly disagree=1.*	
	This program helped my class meet state curriculum standards
	The program content was academically appropriate for my students.
	My students became motivated to perform better academically.
	My students learned a lot about important topics.
	I would like to do another GSMNP program with my students.
	My students had fun.
	The program content was relevant to my students' lives.
Teaching Behaviors and Intentions: *These questions investigated teachers' pre trip behaviors and post experience intentions to incorporate environmental themes, outdoor activities, and inquiry-based, hands-on activities into their teaching. Teachers were asked: "Prior to participation in the GRSM program, how often have you done the following?" Response categories included: very often, often, sometimes, rarely, and never. Teachers were also asked: "As a result of participating in the GRSM program, are you more or less likely to participate in the following activities in the next year." Response categories included: much more likely=5, more likely=4, same as before=3, less likely=2, and much less likely=1.*	
	Volunteer to help the environment.
	Incorporate environmental themes in my teaching.
	Use environmental themes to better meet state standards.
	Incorporate inquiry-based, hands-on activities into the students' school experiences.
	Incorporate outdoor activities into your classes
Impact on Students: *These questions investigated teachers' perceptions regarding the influence of the GRSM programs on students' appreciation, stewardship, knowledge, understanding, and interest pertaining to a range of topics. Teachers were asked: "Indicate to what extent you think the GRSM experience has positively impacted your class overall in the following areas:" Response categories included: a great deal, a moderate amount, a little, almost none, and none. Teachers were also asked: "As a result of your recent GRSM educational program, what percentage of your students increased their:" Response categories for this question included: 0-20% 21-40%, 41-60%, 61-80%, and 81-100%.*	
	Academic performance
	Positive attitudes toward school.
	Appreciation for the natural environment.
	Environmental stewardship.
	Understanding of ecological processes.
	Knowledge of the history of GSMNP.
	Understanding of the mission of the National Park Service
	Knowledge of GSMNP natural history
	Appreciation for biological diversity.
	Concern about issues and threats facing GRSM.
	Interest in taking actions to conserve or improve the environment.
	Scientific inquiry skills

Student Questionnaires—In order to investigate the influence of the curriculum-based programs on participating students, we developed a series of survey questions to form a composite group of items to measure concepts such as "stewardship," in cooperation with GRSM, GSMIT, and Pi Beta Phi staff and significant stakeholders. To effectively measure the outcomes of interest, these composite measures were also based on prior peer-reviewed research and social psychological theory. We followed procedures outlined by DeVellis (2003) and Presser et al. (2004) to refine the survey items using exploratory factor analysis and cognitive testing. The outcomes of interest included: attitudes toward school, stewardship attitudes, interest in learning, perceptions of social acceptability (social

norms) of stewardship, place attachment to GRSM, attitudes toward field trips, perceived learning, and behaviors associated with stewardship (Table 1.1). Background and demographic questions included number of visits to the GRSM with school or family, friends or other groups (during the academic year or lifetime), number of times a GRSM ranger had visited class (during the academic year), and the students age, grade level and ethnicity.

Table 1.1 Student outcomes, reliability (α), definition, and items.

Outcome (α): Definition	Items
Attitudes toward School (α =.83: *The attitudes toward school composite reflects two explicit goals: (1) to inspire improved academic performance of program participants, and (2) to encourage a healthy and empowered culture in participant schools (Powell, et. al, 2011; Stern, et. al, 2010). Students were asked: "Do you agree or disagree with the following statements?" Response categories included: strongly agree=5, agree=4, neutral=3, disagree=2, and strongly disagree=1.*	
	*Going to school is a waste of time for me (*reverse coded)
	I enjoy school.
	I enjoy learning about new subjects in school.
	I believe I will go to college.
	My teachers really care about me.
	My teachers believe that I can succeed
	I pay attention to the teacher in class.
Stewardship Attitudes (α =.84): *The stewardship attitudes composite reflects the goal to inspire environmental responsibility and community respect in participants (Powell, Vezeau, & Stern, 2010). Students were asked: "Do you agree or disagree with the following statements?" Response categories included: strongly agree=5, agree=4, neutral=3, disagree=2, and strongly disagree=1.*	
	If I find an arrowhead in Great Smoky Mountains National Park, I should leave it alone.
	I can reduce the amount of electricity I use
	I can make a difference in my community.
	I feel it is important to take good care of the environment.
	I should not pick wildflowers in Great Smoky Mountains National Park.
	I have the power to help protect the environment.
	It is up to me to make sure I do not harm the environment when I am playing outside.
	My actions impact the health of the environment.
	When I'm outside, I like to look at plants and animals.
Interest in Learning (α =.86): *This composite reflects interest in learning about GRSM's natural and cultural resources and exploring the outdoors (Stern et. al, 2008; Powell, Vezeau, & Stern, 2010). Students were asked: "How interested are you in the following things?" Response categories included: extremely interested=5, very interested=4, somewhat interested=3, slightly interested2, and not at all interested=1.*	
	Learning about plants, animals, and the places they live.
	Learning about cultural and historic sites in Great Smoky Mountains National Park.
	Learning how to protect the environment
	Learning about threats to Great Smoky Mountains National Park, such as air pollution.
	Exploring the outdoors near my home.
	Making my community a better place.
Attachment to GRSM (α =.86): *This composite reflects the importance and emotional connection an individual places on the physical and social environment provided by GRSM (adapted from Kyle, et.al, 2005). Students were asked: "Do you agree or disagree with the following statements?" Response categories included: strongly agree=5, agree=4, neutral=3, disagree=2, and strongly disagree=1.*	
	I would like to visit Great Smoky Mountains National Park with my family and friends.
	Great Smoky Mountains National Park is one of my favorite places to visit.
	Great Smoky Mountains National Park is important to me.
	I love Great Smoky Mountains National Park

Outcome (α): Definition	Items
Social Norms (α =.83): *This composite reflects the social pressures a person feels to engage, or not to engage, in a potential stewardship behavior (Powell, Vezeau, & Stern, 2010). Students were asked: "Do you agree or disagree with the following statements? Response categories included: strongly agree=5, agree=4, neutral=3, disagree=2, and strongly disagree=1.*	
	My teachers encourage me to help protect the environment.
	My family likes me taking field trips to the park.
	My friends think cleaning up a park is cool.
	My family wants me to help protect the environment.
	My family would be proud of me if I volunteered at Great Smoky Mountains National Park.
Attitudes toward Field Trips (α =.80): *The attitudes toward field trips composite explores students' perceptions regarding the benefits of participating in extracurricular activities away from school. Students were asked: "Do you agree or disagree with the following statements? Response categories included: strongly agree=5, agree=4, neutral=3, disagree=2, and strongly disagree=1.*	
	I meet interesting people on field trips.
	What I learn on field trips is useful to me.
	I enjoy learning when I am outside.
	I have a lot of fun on field trips.
	Field trips help me understand what I am taught in class.
Park & Community Stewardship Behaviors (α =.88): *This composite reflects behaviors that seek to influence the use of natural resources or the actions of others through direct or indirect action. Students were asked how often they do (pre visit) or plan on doing (post-visit) the following things in the next three months. Response categories included: very often=5, often=4, sometimes=3, rarely=2, and never=1.*	
	Volunteer to help the environment.
	Pick up trash left by others.
	Help clean up a local park when asked.
	Work with others to clean up my community.
	Participate in activities to improve my school.
	Talk to my friends about the environment when I am not at school.
Home Stewardship Behaviors (α =.77): *This composite reflects personal behaviors intended to conserve natural resources. Students were asked how often they do (pre visit) or plan on doing (post-visit) the following things in the next three months. Response categories included: very often=5, often=4, sometimes=3, rarely=2, and never=1.*	
	Turn off the water when brushing my teeth.
	Collect aluminum cans for recycling
	Talk to my family about ways to protect the environment.
	Turn the lights out when I leave a room.
	Recycle paper products
Self-Assessed Increase in Knowledge (α =.87): *This composite is a subjective measure of the amount an individual perceives that he or she has learned from participating in one of the programs (See Powell, et. al, 2009). Students were asked after the program to report how much their knowledge increased in five thematic areas. Response categories included: a great deal=5, a moderate amount=4, a little=3, almost none=2, and none=1.*	
	The natural environment.
	Great Smoky Mountains National Park.
	Plants and animals and how they interact.
	The history of Great Smoky Mountains National Park.
	The purpose of the National Park Service

Sample and Data Collection

To investigate the immediate influence of these programs on primarily middle school students (90% of sample are from grades 5-8), all of the following programs were included in the study: Parks as Classrooms programs offered by GRSM in the North District and South District, during the Spring and Fall semesters of 2010 for grades 5-8; GRSM Appalachian Highlands Science Learning Center at

Purchase Knob during the Fall semester of 2010 for grades 5-12; all Parks In Classrooms programs offered by GRSM North District and South District during the winter 2011 that serviced grades 5-8; all schools and their students attending GSMIT during one randomly selected week in the Spring semester and one week in the Fall semester of 2010; all residential programs provided by Eugene Huskey Environmental Education Center during the spring, 2010; and Grades 5, 6, 7, and 8 of Pi Beta Phi school during the Fall semester, 2010.

A census of all students and accompanying teachers that attended the selected programs was attempted. All participating teachers were asked to complete a short post-visit survey 10 days after they returned from the GRSM educational program that they attended with their students. Each student completed a "pre-visit" survey in class 3-5 days prior to participating in one of the educational programs and completed a similar "post-visit" survey 2 days after attending the program (for Pi Beta Phi, students completed the survey at the start and end of the fall semester and teachers completed a survey at the end of the fall semester). Each survey took approximately 10-15 minutes to complete. The specific steps for data collection are outlined below:

1. Teachers of classes that were scheduled to attend the participating programs were contacted by phone and asked if they would participate in the study.
2. *A cover letter, Student pre-visit experience* surveys, and an introduction script were delivered in person or mailed to teachers with the pre-trip planning materials. A reminder was sent via e-mail to all teachers. Teachers were instructed to administer the surveys to students 3-5 days prior to the beginning of the program. Teachers brought the completed surveys to the program and gave them to the respective program staff.
3. After the last activity of the curriculum-based program, teachers were given a cover letter, *Student post-experience visit* surveys, and an introduction script. Teachers were instructed to administer the surveys to students 1-2 days after attending the respective program. Staff retrieved the completed surveys or teachers mailed the completed surveys back to the organization providing the curriculum-based educational program.
4. Approximately ten to fourteen days after the program, the teacher completed a *Teacher-post-visit survey*. Teachers then mailed the completed survey back to the respective program staff in a self-addressed stamped envelope.
5. *Student pre and post-visit surveys, and the teacher post-visit survey* were filed in one location. Clemson University retrieved all surveys, matched the pre and post-visit surveys for students based on responses to questions including student initials and demographic characteristics, and then entered data into a statistical database (SPSS) for analysis.

Document Organization

This document is organized into 10 chapters. Chapters 2-8 focus on reporting the influence of each of the selected GRSM curriculum-based programs on the participating students and teachers. Chapter 9 focuses on comparing the influence of each of the programs on student outcomes in an effort to identify programs and program characteristics that produce more positive outcomes. Chapter 10 provides a discussion of the results, limitations of the study, and management implications.

Chapter Two
PARKS AS CLASSROOMS
South District

Program Summary

The Parks As Classrooms program operating out of the South District focuses on GRSM sites within North Carolina. The curriculum for this program integrates North Carolina school curriculum standards. School groups that participated in the Parks As Classrooms (South District) program during this study visited one of the following sites: Oconaluftee Visitor Center, Newfound Gap, Deep Creek and Clingmans Dome. Depending on the group, the lessons focused on one to three of the following topics: soils, weather, topography, ecology, water quality, or biodiversity, or human history and culture.

Ten middle school groups from eight schools attended the Parks As Classrooms (South District) program and participated in the study. All respondents participated in day trips and the duration of programs (contact time with GRSM staff) ranged from one to eight hours (mean=4.53, SD=2.25). All schools arrived at the GRSM site in the morning. All school groups were from the Western North Carolina region. One school was a charter school and the rest were public schools. All but one school had a gender mix of 50:50, while one school group was all girls. Class size reported by GRSM staff ranged from 18 to 77 students (mean=47.17, SD=15.90). Each school group attended with a mean of 2.9 teachers and 2.6 chaperones. The mean number of GRSM staff working with each school group was 2.4 and the mean number of SCA interns was 1.0. The mean for the reported average experience level of staff was 11 years.

GRSM staff were asked to indicate for each group whether the educational program included certain desired outcomes, themes or topics (Table 2.1). "Increase Knowledge" was the most common desired outcome for these groups. "Diversity and Abundance" was the most common program theme. The most common program topic was "Natural History".

Table 2.1. Characteristics of Parks As Classrooms (South District) based on GRSM staff surveys. (N=9)

Desired Outcome	Yes	Unsure	No
Raise Awareness	1	1	7
Increase Knowledge	9	0	0
Influence Attitudes	5	0	4
Change Behaviors	4	0	5
Develop Skills	6	1	2
Practice Skills	5	0	4
Theme of program	Yes	Unsure	No
Diversity and Abundance	9	0	0
Continuum of Human Activity	4	0	5
Refuge of Scenic Beauty	5	1	3
Topic of program	Yes	Unsure	No
Natural History	8	1	0
Threats to GRSM	6	2	1
Human History of Area	0	2	7

Sample

Ten different groups from eight different schools (two schools sent two separate groups) attended the Parks As Classrooms (South District) program in either Spring or Fall of 2010 (Table 2.2). From the ten groups, there were 401 total student respondents with matched pre-visit and post-visit surveys. There were 161 unmatched surveys and seven matched sets that were incomplete and therefore discarded.

Table 2.2. Number of respondents by group and percentage of sample

Group*	N	%	Month	Incomplete	unmatched
1[a]	62	15.5	April 2010	5	18
2[b]	4	1.0	April 2010	0	45
3	46	11.5	May 2010	1	11
4[a]	33	8.2	Sept 2010	0	34
5	13	3.2	Sept 2010	0	8
6	68	17.0	Oct 2010	0	7
7	78	19.5	Oct 2010	0	18
8	38	9.5	Oct 2010	0	6
9[b]	43	10.7	Oct 2010	0	8
10	16	4.0	Nov 2010	1	6
Total	401	100.0		7	161

Groups with like superscripts are from the same school.

Demographics

Demographic information was summarized from post-visit survey responses (Table 2.3). Just over half of the respondents were female (54%). Respondents were enrolled in grades 5, 6, and 7, with the majority being 5th graders. The average age of respondents was 10.9 years (SD=1.0). The ethnicity of respondents was primarily White, not Hispanic (48%), Mixed (24%) or American Indian (17%). This program served the most diverse audience of any of the programs evaluated.

Table 2.3. Parks As Classrooms (South District) demographics (Post-visit data)

VARIABLE	CATEGORY	n	(%)
Gender			
	Female	184	46
	Male	213	54
Grade			
	5	291	73
	6	62	16
	7	47	11
Age			
	10	181	45
	11	116	29
	12	79	19

VARIABLE	CATEGORY	n	(%)
	13	21	5
	14	2	1
	18	1	1
Ethnicity			
	White, not Hispanic	184	48
	Black, not Hispanic	3	1
	Hispanic	15	4
	Asian	2	4
	Mixed	95	24
	Native Hawaiian	1	1
	American Indian	67	17
	Other	14	4

Visits to GRSM

Students were asked to estimate the number of times they had visited GRSM in the last year and in their entire life (Table 2.4). For the question asking about the frequency of previous visits in the last year with your school, 27% of students indicated "Never" on the post-visit survey (63% indicated "Never" on Pre-visit survey). Since the Parks As Classrooms (South District) program utilizes sites within the GRSM, the expectation was that all respondents would indicate on the post-visit survey that they had visited GRSM at least "Once" with their school. This post-visit response suggests that even though respondents participated in the Parks As Classrooms program, some were still not aware that they had visited the GRSM with their school. The majority of respondents had visited GRSM one or more times with their family, friends or other groups in the last year (61%) or at least once during their life (65%). However, for about one-third of the respondents, the Parks As Classrooms (South District) program may have been their first introduction to GRSM. Just over half (55%) of the respondents attending the Parks As Classrooms (South District) program have had a GRSM ranger visit their Classrooms in the last year.

Table 2.4. How many visits have Parks As Classrooms (South District) respondents taken to GRSM?

VISITATION	N	MEAN (SD)	MIN	MAX	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
					Never	Once	Twice	3-5 Times	More than 5 times
1. In the <u>last year</u>, how many times have you visited Great Smoky Mountains National Park with your school? (post-visit)	385	1.29[1] (1.58)	0	11	27	49	12	4	1
2. In the <u>last year</u>, how many times have you visited Great Smoky Mountains National Park with your family, friends, or other groups? (post-visit)	378	2.61[1] (6.03)	0	65	39	19	13	18	8
3. In the <u>last year</u>, how many times has a ranger from Great Smoky Mountains National Park visited your class? (post-visit)	376	0.94[1] (1.18)	0	10	45	31	15	5	1
4. In your <u>entire life</u>, how many times have you visited Great Smoky Mountains National Park with your school? (pre-visit)	388	2.39[2] (1.37)	1	5	39	19	16	9	7
5. In your <u>entire life</u>, how many times have you visited Great Smoky Mountains National Park with your family, friends, or other groups? (pre-visit)	389	2.86[2] (1.66)	1	5	35	13	11	13	25

[1]Respondents provided a number
[2]Response was on a 5-point scale (1=Never, 2=Once, 3=Twice, 4=3-5 times, 5=More than 5 times)

Influence of the Parks As Classrooms (South District) Program on Students: Pre-visit vs. Post-visit

Attitudes toward school

The composite mean score for the *Attitude towards school (AtS)* scale did not significantly change after participation (Table 2.5). Overall, Parks As Classrooms (South District) students had very positive attitudes about school with between 64% and 89% of respondents indicating strongly agree or agree to the items in the *AtS* scale, before and after attending the program.

However, there was a significant change for three items on this *AtS* scale. There was a significant increase (p≤.05) between the pre-visit and post-visit survey for "I enjoy school." The portion of respondents indicating agree or strongly agree with "I enjoy school," was 64% before the program and 67% after the program. The mean for this item changed increased 2.68%, and this item was the lowest rated item on the scale.

The other two significant items had a decrease in the mean score. There was a significant decrease (p≤.01) in the mean for "My teachers believe that I can succeed," and the portion of respondents indicating agree or strongly agree was 89% before the program and 86% after the program. There was also a significant decrease (p≤.01) in "Going to school is *not* waste of time for me." 76% of students indicated agree or strongly agree with this item before the program and 71% after the program. All other items in the scale did not demonstrate a significant change.

The item with the highest level of agreement (mean was 4.6 on the pre-visit and 4.5 on the post-visit survey) was "I believe I will go to college." Almost all (89% before the program and 86% after the program) of the respondents strongly agreed or agreed with this item.

Stewardship

The composite mean score for the *Stewardship* scale did not significantly change after participation in the Parks As Classrooms (South District) programs (Table 2.6). Overall, Parks As Classrooms (South District) students were very positive about *Stewardship* with between 66% and 89% of respondents indicating strongly agree or agree to the items in the scale, before and after attending the program.

However, five out of nine items had significant changes after the program. The three items with the lowest initial level of agreement both had a significant increase (p≤.05) in agreement. One of these was "I can reduce the amount of electricity I use." For this item, the portion of respondents indicating agree or strongly agree was 63% before the program and 78% after the program. The other was "If I find an arrowhead in GRSM, I should leave it alone." For this item, the portion of respondents who agreed or strongly agreed with this item was 66% before the program and 71% after the program. The item "I should not pick wildflowers in GRSM," also had a significantly positive change (3.18%).

The two items with the highest level of agreement had significant decreases. The question with the highest mean (mean was 4.5 on the pre-visit and 4.3 on the post-visit survey) was "I feel it is important to take good care of the environment." This item showed a significant decrease (p≤.001) in the mean score and the highest magnitude of change (-3.37%). The portion of respondents who strongly agreed or agreed with this item was 89% before the program and 84%

after the program. The item: "I have the power to help protect the environment," also had a significantly (p≤.05) negative change of 2.38%.

Interest

Students demonstrated a significant decrease (p≤.01) in the *Interest* scale composite mean score (mean was 4.0 for the pre-visit and 3.9 for the post-visit survey) (Table 2.7). Overall, Parks As Classrooms (South District) students were positive about learning and exploring with between 63% and 82% of respondents indicating they were extremely interested or very interested in the items on the *Interest* scale, before and after attending the program.

Two items on the scale showed a significant decrease (p≤.01). One of these items was "Learning about the cultural and historic sites in GRSM." This item had the highest magnitude of change (-4.99%), and the portion of respondents who indicated extremely or very interested was 71% before the program and 65% after the program. Given the initial high level of interest, the decline in mean score for this item may be due to post-visit fatigue (i.e. already did that). The other significant item was "Making my community a better place." This item had the next highest magnitude of change (-4.42%), and the portion of respondents who indicated extremely or very interested was 74% before the program and 67% after the program.

The item with the highest level of interest (mean = 4.4 on pre-visit and 4.3 on post-visit) was "Exploring the outdoors near my home" and the portion of respondents indicating extremely or very interested was 82% before the program and 81% after the program. The lowest rated items were "Learning how to protect the environment" and "Learning about environmental threats to GRSM, such as air pollution" (mean was 3.8 for both items before and after attending the program).

Social Norms

Students demonstrated a significant decrease (p≤.05) in the composite mean score for the *Social Norms* scale (mean was 3.8 for the pre-visit and 3.7 for the post-visit survey) (Table 2.8). Overall, Parks As Classrooms (South District) students were somewhat positive about *Social Norms* with between 59% and 78% of respondents indicating strongly agree or agree to all but one item ("My friends think cleaning up a park is cool") in the scale, before and after attending the program.

The only item on this scale with a significant change (p≤.01) was "My family would be proud of me if I volunteered at GRSM." Although this was the highest rated item, the mean decreased from 4.2 before the program to 4.0 after the program. The magnitude of this negative change was 3.58%. The item with the lowest level of agreement was "My friends think cleaning up a park is cool" (mean was 2.95 before the program and 3.03 after the program). This was the only item on the scale with a positive change, but the change was not significant.

Attachment to GRSM

There was a slight but significant decrease (p≤.05) for the *Attachment to GRSM* scale mean score (mean was 4.1 on the pre-visit and 4.0 on the post-visit survey) (Table 2.9). Overall, Parks As Classrooms (South District) students had positive attitudes about *GRSM,* with between 55% and 82% of respondents indicating strongly agree or agree to the items in the scale, before and after attending the program.

Only one item, "I would like to visit GRSM with my family or friends," showed a significant change (p≤.001) in agreement. This change was negative, and the magnitude was 6.24%. This item was also the highest rated on the pre-visit survey (mean was 4.3 before the program and 4.1 on the post-visit survey). The portion of respondents indicating strongly agree or agree on this item was 82% before the program and 72% after the program. The lowest rated item was "GRSM is one of my favorite places to visit" (mean was 3.71 before the program and 3.74 after the program); however, just over half (55-60%) of the respondents indicated strongly agree or agree for this item.

Park & Community Behaviors
There was no significant change in the mean score for the *Park and Community Behaviors* scale (Table 2.10). Overall, Parks As Classrooms (South District) students were only somewhat positive about performing or intending to perform *Park and Community Behaviors,* with between 27% and 64% of respondents indicating very often or often for the items in the scale, before and after attending the program. There was no significant change for any of the items on this scale. The highest rated item on this scale was "Participate in activities to improve my school" (mean was 3.8 on the pre-visit and 3.7 on the post-visit survey). The lowest rated item on this scale was "Talk to my friends about the environment when I am not at school" (mean was 2.6 on the pre-visit and 2.8 on the post-visit). This item showed the largest magnitude of change (4.55%) but was not significant.

Home Behaviors
Students intentions to perform *Home Behaviors* showed a significant increase (p≤.01) in the mean score (mean was 3.7 on the pre-visit and 3.9 on the post-visit survey) (Table 2.11). The mean for the scale increased by a magnitude of 2.88% on the post-visit survey. Overall, Parks As Classrooms (South District) students were somewhat positive about intending to perform *Home Behaviors,* with between 58% and 83% of respondents indicating very often or often for all but one item ("Talk to my family about ways to protect the environment") in the scale, before and after attending the program.

Three of the five home behavior items had a significantly positive change in the mean score. The item with the largest magnitude of change (9.32%) was "Talk to my family about ways to protect the environment." This item had a significant increase at p≤.001, and was also the lowest rated item (mean was 2.8 on the pre-visit and 3.1 on the post-visit survey). The portion of respondents indicating very often or often was only 31% before the program and 38% after the program.

The item with the next highest positive change (4.61%) was "Recycle paper products" which was significant at p≤.01. The other item with a significant increase (p≤.05) was "Collect aluminum cans for recycling." The item with the highest level of adoption was "Turn off the water when brushing my teeth" (mean was 4.37 before the program and 4.39 after the program), but the increase in mean score was not significant.

Self-assessed Learning
Respondents were asked on the post-visit survey to rate how much they learned about concepts related to GRSM and the natural environment during the Parks As Classrooms (South District) program (Table 2.12). The mean for the *Self-assessed Learning* scale was 4.2. Overall, the majority (67% or more) of Parks As Classrooms (South District) students believed they learned a great deal or moderate amount on all *Self-assessed Learning* items. The learning about GRSM item

received the highest rating (mean was 4.4), and 86% of respondents indicated learning a great deal or a moderate amount for this item. The item that received the lowest rating was "The history of the people in GRSM" (mean was 3.9); however, a majority of respondents (67%) indicated learning a great deal or a moderate amount.

Field Trips
The composite mean for students' attitudes toward *Field Trips* did not significantly change (Table 2.13). Overall, Parks As Classrooms (South District) students were very positive about *Field Trips* with between 74% and 90% of respondents indicating strongly agree or agree to all items in the scale, before and after attending the program. Only "I have a lot of fun on field trips" had a significant (p≤.001) change, which was negative (-3.50% change). This item was also the highest rated (mean was 4.6 before the program and 4.4 after the program) and the portion of respondents indicating strongly agree or agree for this statement was 90% before the program and 86% after the program. The lowest rated item was "I meet interesting people on field trips" (the mean was 4.06 on the pre-visit survey and 4.12 on the post-visit survey), but the increase in the mean score was not significant.

Table 2.5. Parks As Classrooms (South District) – Attitudes toward school (AtS)

ITEM		MEAN (SD)	t	df	SIG	% CHANGE **	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I enjoy school.	pre	3.73 (1.03)	-2.54	397	.012	2.68	23	41	26	5	5
	post	3.83 (1.03)					29	38	25	4	4
I pay attention to the teacher in class.	pre	4.11(0.83)	0.67	396	.51	-0.73	36	42	19	2	1
	post	4.08 (0.90)					36	42	18	2	2
My teachers really care about me.	pre	4.23 (1.00)	0.39	400	.70	-0.24	53	27	14	3	3
	post	4.22 (0.96)					50	29	16	3	2
I believe that I will go to college.	pre	4.55 (0.91)	1.45	396	.15	-1.32	73	16	6	2	3
	post	4.49 (0.88)					67	19	11	1	2
The time I spend in school will benefit me in the long run.	pre	4.24 (0.94)	0.49	396	.62	-0.47	50	32	13	3	2
	post	4.22 (1.01)					50	31	12	3	4
My teachers believe that I can succeed.	pre	4.48 (0.82)	3.06	397	.002	-2.68	63	26	8	1	2
	post	4.36 (0.87)					55	31	10	2	2
Going to school is *not* a waste of time for me.*	pre	4.18 (1.23)	2.61	385	.009	-3.83	60	16	12	5	7
	post	4.02 (1.28)					54	17	15	7	7
I enjoy learning about new subjects in school.	pre	4.06 (1.06)	-0.60	396	.55	0.74	44	30	18	5	3
	post	4.09 (0.95)					43	30	22	3	2
ATTITUDE Composite Mean	pre	4.21 (0.64)	1.67	373	.095	-0.95					
	post	4.17 (0.68)									

*Reverse coded for analysis (Original statement in survey was "Going to school is a waste of time for me"); **(post-visit mean minus pre-visit mean)/pre-visit mean [NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 2.6. Parks As Classrooms (South District) – Stewardship

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I can reduce the amount of electricity I use.	pre	3.93 (0.95)	-2.43	397	.015	3.31	30	43	21	4	2
	post	4.06 (0.90)					35	43	17	3	2
If I find an arrowhead in GRSM, I should leave it alone.	pre	3.87 (1.33)	-2.26	393	.024	3.10	47	19	16	10	8
	post	3.99 (1.34)					53	18	13	7	9
I can make a difference in my community.	pre	4.01 (1.02)	1.28	396	.20	-1.50	39	35	17	6	3
	post	3.95 (1.06)					36	35	20	4	5
I feel it is important to take good care of the environment.	pre	4.45 (0.76)	3.81	397	.00	-3.37	59	30	9	1	1
	post	4.30 (0.91)					52	32	12	2	2
I should not pick wildflowers in GRSM.	pre	4.09 (1.24)	-2.07	392	.039	3.18	53	24	10	5	8
	post	4.22 (1.17)					60	18	12	5	5
My actions can influence the health of the environment.	pre	4.12 (0.93)	0.65	391	.52	-0.73	41	38	15	4	2
	post	4.09 (1.00)					42	33	17	5	3
When I'm outside, I like to explore nature.	pre	4.34 (0.90)	0.33	395	.74	-0.23	56	28	12	2	2
	post	4.33 (0.94)					57	26	11	4	2
I have the power to help protect the environment.	pre	4.21 (0.98)	2.21	398	.028	-2.38	51	29	14	4	2
	post	4.11 (1.04)					46	30	15	7	2
It is up to me to make sure I do not harm the environment when I am playing outside.	pre	4.21(1.06)	0.48	393	.63	-0.48	54	24	15	4	3
	post	4.19 (0.99)					48	30	16	3	3
STEWARDSHIP Composite Mean	pre	4.16 (0.65)	-0.17	364	.87	0.24					
	post	4.17 (0.74)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

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Table 2.7. Parks As Classrooms (South District) – Interest

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Extremely Interested)	4 (Very Interested)	3 (Somewhat Interested)	2 (Slightly Interested)	1 (Not at all Interested)
Learning about plants, animals, and the places they live.	pre	3.86 (1.04)	-0.70	398	.48	1.04	34	29	28	6	3
	post	3.90 (1.06)					35	31	25	5	4
Learning about cultural and historic sites in GRSM.	pre	4.01 (0.92)	3.81	396	.00	-4.99	36	35	24	4	1
	post	3.81 (1.09)					33	32	23	9	3
Learning how to protect the environment.	pre	3.82 (1.11)	1.18	398	.24	-1.57	34	32	22	8	4
	post	3.76 (1.12)					31	32	25	7	5
Learning about environmental threats to GRSM, such as air pollution.	pre	3.82 (1.04)	-0.18	390	.85	0.26	32	32	25	7	4
	post	3.83 (1.12)					37	26	25	9	3
Exploring the outdoors near my home.	pre	4.36 (1.02)	1.60	396	.11	-1.83	64	18	12	3	3
	post	4.28 (1.00)					55	26	13	3	3
Making my community a better place.	pre	4.07 (1.04)	3.30	396	.001	-4.42	43	31	17	6	3
	post	3.89 (1.09)					35	32	23	5	5
INTEREST Composite Mean	pre	4.00 (0.73)	2.67	382	.008	-2.00					
	post	3.92 (0.83)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 2.8. Parks As Classrooms (South District) – Social Norms

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
My teachers encourage me to help protect the environment.	pre	4.02 (0.99)	1.51	395	.13	-1.99	38	34	22	4	2
	post	3.94 (1.00)					33	38	22	3	4
My family likes me taking field trips to the park.	pre	3.99 (1.04)	1.23	393	.22	-1.50	41	28	23	6	2
	post	3.93 (1.03)					36	31	26	4	3
My friends think cleaning up a park is cool.	pre	2.95 (1.28)	-1.23	394	.22	2.71	12	24	28	18	18
	post	3.03 (1.23)					13	22	35	14	16
My family would be proud of me if I volunteered at GRSM.	pre	4.19 (1.04)	2.86	389	.004	-3.58	51	27	15	3	4
	post	4.04 (1.06)					43	29	20	5	3
My family wants me to help protect the environment.	pre	3.80 (1.08)	1.30	396	.19	-1.84	32	30	28	6	4
	post	3.73 (1.14)					32	27	29	6	6
SOCIAL NORMS Composite Mean	pre	3.81 (0.73)	2.26	374	.024	-1.84					
	post	3.74 (0.82)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 2.9. Parks As Classrooms (South District) – Attachment to GRSM

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I would like to visit GRSM with my family or friends.	pre	4.33 (0.87)	4.52	397	.00	-6.24	55	27	13	4	1
	post	4.06 (1.10)					46	26	18	5	4
GRSM is one of my favorite places to visit.	pre	3.71 (1.03)	-0.53	383	.60	0.81	28	27	35	8	2
	post	3.74 (1.19)					34	26	26	8	6
GRSM is important to me.	pre	4.17 (0.93)	1.79	389	.075	-1.92	47	27	22	3	1
	post	4.09 (1.04)					45	30	18	4	3
I love GRSM.	pre	4.04 (1.00)	-0.53	392	.60	0.74	43	26	25	4	2
	post	4.07 (1.08)					46	26	20	4	4
ATTACHMENT TO GRSM Composite Mean	pre	4.06 (0.76)	2.16	369	.031	-1.97					
	post	3.98 (0.95)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

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Table 2.10. Parks As Classrooms (South District) – Park and Community Behaviors

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Very Often)	4 (Often)	3 (Sometimes)	2 (Rarely)	1 (Never)
Volunteer to help the environment.	pre	3.04 (1.18)	-0.37	394	.71	0.66	13	21	34	21	11
	post	3.06 (1.18)					12	25	33	17	13
Pick up trash left by others.	pre	3.58 (1.26)	0.82	391	.41	-1.12	30	28	23	11	8
	post	3.54 (1.20)					26	28	29	9	8
Help clean up a local park when asked.	pre	3.28 (1.36)	-1.13	392	.26	2.13	25	20	25	16	14
	post	3.35 (1.31)					24	25	24	15	12
Work with others to clean up my community.	pre	3.25 (1.29)	-0.33	390	.74	0.62	22	49	31	15	13
	post	3.27(1.32)					22	24	26	15	13
Participate in activities to improve my school*	pre	3.78 (1.23)	0.62	387	.54	-1.06	38	26	20	10	6
	post	3.74 (1.25)					37	23	22	11	7
Talk to my friends about the environment when I am not at school.	pre	2.64 (1.37)	-1.70	393	.09	4.55	14	13	24	21	28
	post	2.76 (1.35)					14	15	26	21	24
COMMUNITY Composite Mean	pre	3.27 (1.00)	-0.45	369	.65	0.61					
	post	3.29 (1.05)									

*Surveys distributed early in the study had "Work with my teachers and friends to improve my school" on the pre-visit version and "Participate in activities to improve my school" on post-visit version. Halfway through the study, this was corrected to "Participate in activities to improve my school" for both versions.

Table 2.11. Parks As Classrooms (South District) –Home Behaviors

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Very Often)	4 (Often)	3 (Sometimes)	2 (Rarely)	1 (Never)
Turn off the water when brushing my teeth.	pre	4.37 (1.04)	-0.39	397	.70	0.46	66	16	12	2	4
	post	4.39 (1.01)					65	18	11	3	3
Collect aluminum cans for recycling.	pre	3.61 (1.34)	-1.98	395	.048	3.32	36	22	20	12	10
	post	3.73 (1.30)					39	24	18	11	8
Talk to my family about ways to protect the environment.	pre	2.79 (1.32)	-4.13	395	.00	9.32	13	18	28	18	23
	post	3.05 (1.36)					20	18	27	17	18
Turn the lights out when I leave a room.	pre	4.17 (1.10)	-0.047	394	.96	0.00	52	26	11	7	4
	post	4.17 (1.14)					55	22	13	5	5
Recycle paper products.	pre	3.69 (1.37)	-2.76	396	.006	4.61	40	20	20	9	11
	post	3.86 (1.33)					46	22	14	10	8
HOME Composite Mean	pre	3.74 (0.89)	-3.04	387	.003	2.94					
	post	3.85 (0.96)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 2.12. Parks As Classrooms (South District) – Self-assessed learning (Post-visit survey only)

How much did you learn about...	MEAN (SD)	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
		5 (A great deal)	4 (A moderate amount)	3 (A little)	2 (Almost none)	1 (None)
The natural environment	4.38 (0.91)	59	27	10	1	3
GRSM	4.44 (0.94)	65	21	18	2	3
How plants and animals interact	4.25 (0.99)	53	27	14	3	3
The history of the people in GRSM	3.85 (1.20)	39	28	18	8	6
The purpose of the NPS	4.22 (1.23)	53	26	15	2	4
SELF-ASSESSED LEARNING Composite Mean (N=388)	4.24 (0.81)					

Table 2.13. Parks As Classrooms (South District) – Field Trip scale

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I meet interesting people on field trips.	pre	4.06 (0.95)	-1.03	391	.302	1.48	40	34	19	6	1
	post	4.12 (1.00)					44	32	17	4	3
What I learn on field trips is useful to me.	pre	4.13 (0.95)	.05	395	.958	0.00	43	34	17	4	2
	post	4.13 (0.95)					43	32	19	4	2
I enjoy learning when I am outside.	pre	4.2 (1.00)	1.59	388	.112	-1.91	50	29	14	4	3
	post	4.12 (1.04)					48	27	17	5	3
I have a lot of fun on field trips.	pre	4.57 (0.72)	4.09	389	.000	-3.50	68	22	8	1	1
	post	4.41 (0.82)					60	26	1	2	1
Field trips help me understand what I am taught in class.	pre	4.18 (0.93)	.62	390	.539	-0.72	47	32	16	4	1
	post	4.15 (0.95)					46	31	18	4	1
FIELD TRIP Composite Mean	pre	4.25 (0.64)	1.30	360	.194	-0.86					
	post	4.21 (0.71)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Teacher's responses regarding the Parks As Classrooms (South District) program

A total of twelve teachers responded to the teacher survey. These teachers included 5th through 8th grade teachers. Of the twelve who answered the question about grade level taught, ten taught 5th grade students, one taught 6th through 8th grade students, and one taught 7th grade students. The majority of respondents/teachers taught "all" subjects (58%) and the remaining taught science, science and math, or science, math and technology. The average number of years that teachers had taught was 12.67 (SD=10.25; minimum was 1 year, maximum was 37 years). The majority of respondents were female (75%) and most (83%) indicated they were "White, not of Hispanic descent."

Pre-Trip & Post-Trip Curriculum
Three-quarters of the respondents indicated they used pre-trip activities with their students prior to the Parks As Classrooms (South District) program. Pre-trip activities included one or more of the following:
- The downstream video
- Vocabulary
- Adopt a macroinvertebrate
- H20 cycle
- A National Parks project
- The internet movie about Clingman's Dome
- A landform unit
- A clouds unit and a use of the GRSM website
- A teacher developed website.

Also, 83% of respondents used post-trip activities. These post-trip activities included one or more of the following:
- Environmental education lesson (plants, ecology games)
- A "foldable" summary
- Review of topographic maps of Clingman's Dome and discussion about wildlife at different elevations
- Review on landforms
- More on H2O cycle
- Weather (clouds, pressure, fronts)
- Use of internet short movies on weather to review what was learned during the trip
- Reference back to the field trip lessons and discussion relative to science topics being studied
- Journaling or other writing assignments
- Review of the article about "alien invaders"

One teacher commented that "I get my best writing example from my students after Deep Creek" when using the post-visit writing as preparation for the 7th grade writing test.

Five respondents made suggestions for materials that would be useful to better prepare students for the GRSM experience. These suggestions were:

- A better quality DVD on air pollution in GRSM for pre-trip lessons
- A ranger Classrooms visit either pre or post trip
- A GRSM brochure that shows various ecosystems at different elevations
- A topics outline
- Information on the program location

Five of the respondents had participated in professional development training with GRSM.

Satisfaction

Teacher satisfaction was high. On a scale of 1 (Very dissatisfied) to 10 (Very satisfied), the mean rating was 9.00 (SD=1.21, minimum = 7, maximum = 10). The majority of respondents (50%, N=12) selected 10.

General Academic Impacts of the Program

Teachers reported positive attitudes regarding the influence of the Parks As Classrooms (South District) program (Table 2.14). Teachers indicated that the program helped them meet state standards (M=4.50), the curriculum was appropriate (M=4.42), students learned a lot (M=4.58), students had fun (M=4.83), and content was relevant to students' lives (M=4.50). Teachers also indicated they would like to do another GRSM program with their students (M=4.67).

Table 2.14. Teacher rating of the general impacts of the Parks As Classrooms
(South District) experience (N=12)

General Impacts	Mean	SD
This program helped my class meet state curriculum standards.	4.50	0.52
The program content was academically appropriate for my students.	4.42	0.51
My students became motivated to perform better academically.	3.58	0.90
My students learned a lot about important topics.	4.58	0.51
I would like to do another GRSM program with my students.	4.67	0.49
My students had fun.	4.83	0.39
The program content was relevant to my students' lives.	4.50	0.52

Scale: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree.

Impacts on Student Outcomes

These questions investigated teachers' perceptions regarding the influence of the GRSM programs on students' appreciation, stewardship, knowledge, understanding, and interest pertaining to a range of topics. Teachers were asked: "Indicate to what extent you think the GRSM experience has positively impacted your class overall in the following areas:" Response categories included: a great deal, a moderate amount, a little, almost none, and none. Teachers were also asked: "As a result of your recent GRSM educational program, what percentage of your students increased their:" Response categories for this question included: 0-20% 21-40%, 41-60%, 61-80%, and 81-100%. Teachers indicated that the impact of the program on their class as a whole was positive (Table 2.15). Both *Appreciation for the natural environment* (mean impact rating=4.25) and *Understanding of ecological processes* (mean impact rating=4.25) were the highest rated outcomes. However, when asked

to indicate the percentage of students that increased in a particular area, more modest gains are reported. Less than half of teachers indicated that at least 60% of students improved on *Appreciation for the natural environment* (34%; 4) and *Understanding of ecological processes* (42%; 5). "Academic performance*"* (mean impact rating=3.4) and "Positive attitudes toward school*"* (mean impact rating=3.6) were the lowest rated. The ratings on these items may be due to the difficulty of observing a perceivable difference in students overall performance and attitudes in the short time period between the field trip and the completion of the teacher survey. Only 24% of teachers (n=3) indicated that at least 60% of students improved on *Academic performance*, and only 16% (n=2) of teachers indicated at least 60% of students improved their *Positive attitudes toward school*.

Table 2.15. Teacher rating of student outcomes from participation in the
Parks As Classrooms (South District) program.

Outcomes	Impact rating* (N=12)		% Students increasing their…(N=12)				
	Mean	SD	0-20	21-40	41-60	61-80	81-100
Academic performance.	3.42	.79	42	8	16	16	8
Positive attitudes toward school	3.58	1.00	42	25	17	8	8
Appreciation for the natural environment.	4.25	.87	0	33	33	17	17
Environmental stewardship.	4.00	.60	0	50	25	52	0
Understanding of ecological processes.	4.25	.75	8	42	8	42	0
Knowledge of the history of GRSM.	3.75	.87	17	25	42	8	8
Understanding of the mission of the National Park Service.	3.92	.67	8	34	34	16	8
Knowledge of GRSM natural history.	4.00	.85	16	26	26	16	16
Appreciation for biological diversity.	4.08	.79	0	50	25	17	8
Concern about issues and threats facing GRSM.	3.83	.83	16	34	8	34	8
Interest in taking actions to conserve or improve the environment	3.83	.58	0	42	33	17	8
Scientific inquiry skills.	4.00	.60	0	33	33	25	8

Scale: 1=None, 2=Almost none, 3=A little, 4=A moderate amount, 5=A great deal

GRSM Staff
Teacher ratings of GRSM staff on all categories (Table 2.16) were very positive. Teachers rated the overall performance of the staff as between good and very good (4.5). Staff received the highest ratings for their knowledge (4.5) and enthusiasm (4.6). Staff received the lowest ratings for flexibility (4.33), organization (4.25) and communication of an explicit message (4.33).

Table 2.16. Teacher ratings of GRSM Staff working with Parks As Classrooms (South District) (N=12)

Staff Rating Category	Mean*	SD
Knowledgeable	4.50	0.80
Entertaining	4.42	0.79
Flexible	4.33	0.78
Organized	4.25	0.75
Enthusiastic	4.58	0.79
Patient	4.42	1.00
Charismatic-likeable	4.42	0.90
Explained things clearly	4.42	0.79
Communicated an explicit message	4.33	0.78
Interacted positively with students	4.42	0.79
Worked well with teachers	4.42	0.79
Overall performance	4.50	0.67

Scale: 1=Very poor, 2=Poor, 3=Average, 4=Good, 5=Very good

Teacher actions before and after the trip

These questions investigated teachers' intentions to incorporate environmental themes, outdoor activities, and inquiry-based, hands-on activities into their teaching. Teachers were asked: "Prior to participation in the GRSM program, how often have you done the following?" Response categories included: very often, often, sometimes, rarely, and never. Teachers were also asked: "As a result of participating in the GRSM program, are you more or less likely to participate in the following activities in the next year." Response categories included: much less likely, less likely, same as before, more likely, much more likely. "Incorporate inquiry based, hands on activities into the students' school experience" was the most common pre-visit action (M=4.08) (Table 2.17). "Volunteer to help the environment" was the least common pre-trip action (M=3.33). The least likely post-visit activity was "Use environmental themes to better meet state standards" (M=3.67). None of the actions received a rating of 4 (more likely) or more for post-visit likelihood. For the teaching specific actions, this may be a result of heavy reliance on the Parks As Classrooms trip for the outdoor, environmental themed, and hands on portion of the teachers' curriculum plans.

Table 2.17. Teachers' behaviors before and after the
Parks As Classrooms (South District) program (N=12)

Actions	Pre-visit frequency		Post-visit likelihood	
	Mean[1]	SD	Mean[2]	SD
Volunteer to help the environment.	3.33	0.98	3.75	0.75
Incorporate environmental themes in my teaching.	3.75	1.06	3.75	0.62
Use environmental themes to better meet state standards.	3.58	1.08	3.67	0.78
Incorporate inquiry based, hands on activities into the students' school experiences	4.08	0.79	3.75	0.75
Incorporate outdoor activities into your classes.	3.83	0.83	3.75	0.75

[1]Scale: 1=Never, 2=Rarely, 3=Sometimes, 4=Often, 5=Very often
[2]Scale: 1=Much less likely, 2=Less likely, 3=Same as before, 4=More likely, 5=Much more likely

Visitation
Since the teacher survey occurred after the Parks As Classrooms visit, all of the respondents had visited GRSM at least once in the current academic year. For 75% of the respondents, this was the only field trip they had taken in the current academic year. Of the remaining 25%, individuals had visited twice and one individual had visited 5 times. Only three respondents indicated that they planned at least one additional trip to the GRSM in the current academic year. Only one teacher had a GRSM ranger visit their class during this academic year. All respondents to the visitation questions had visited GRSM with their school at least once in total (Once: 17%, Twice: 25%, 3-5 times 17%, More than 5 times: 41%). All respondents (N=12) had visited GRSM with their family, friends, or other groups 2 or more times and 83% had visited more than 5 times.

Teacher comments
- Excellent program! The weather was cloudy and wet, but our students still had a wonderful learning experience due to the flexibility and expertise of Rangers Jay and Liz
- Great experience as usual
- Great teachers, great trip
- Our rangers were fantastic. Ranger Jay, Ranger Julie, and Ranger Liz were great teaching the students on the bus as well as when we stopped to do the on-site learning. They were patient, yet firm. They had good skills for controlling behavior. Great Job!
- Ranger Jay is awesome, he has a great way of explaining ideas in "kid friendly" language yet also with scientific terms. Very engaging!

Chapter Three
PARKS AS CLASSROOMS
(NORTH DISTRICT)

Program Summary

The Parks As Classrooms program operating out of the North District focuses on GRSM sites within Tennessee and is integrated with Tennessee school curriculum standards. School groups attending the Parks As Classrooms (North District) program during this study visited one of the following sites: Sugarlands Visitor Center, Twin Creeks, Look Rock, Newfound Gap, the Chimneys, Clingmans Dome, Quiet Walkway, Laurel Falls and Cosby Picnic Area. Depending on the group and location, the curriculum focused on environmental education topics including: soil exploration, interdependence, geology and geography, archeology, water quality, biodiversity, and environmental data collection techniques.

Twenty-one school groups participating in the Parks As Classrooms (North District) program received a pre-visit and post-visit survey. All respondents participated in day trips and the duration of programs (contact time with GRSM staff) ranged from three to five and a half hours (mean=3.910.55). All schools (N=20) arrived at the GRSM site in the morning. Almost all school groups (N=20) were from the East Tennessee region, but one group was from the mid-Tennessee region. All schools were public schools. Class size reported by GRSM staff ranged from 10 to 83 students (mean=34.0218.16). Each school group was led by a mean of 2.1 teachers and 1.1 chaperones. The mean number of GRSM staff working with each school group was 2.4 and the mean number of SCA interns was 0.28. The mean for the reported average experience level of staff was 5.9 years.

For these programs, "Increase Knowledge," "Practice Skills," and "Raise Awareness" were the most cited as desired outcomes (Table 3.1). "Diversity and Abundance" was the most prevalent program theme. "Natural History" was the most prevalent program topic.

Table 3.1. Characteristics of Parks As Classrooms (North District) based on instructor surveys (N=20).

Desired Outcome	Yes	Unsure	No
Raise Awareness	18	0	2
Increase Knowledge	20	0	0
Influence Attitudes	9	0	11
Change Behaviors	12	0	8
Develop Skills	15	1	4
Practice Skills	19	0	1
Theme of program	**Yes**	**Unsure**	**No**
Diversity and Abundance	19	0	1
Continuum of Human Activity	2	0	18
Refuge of Scenic Beauty	6	1	13
Topic of program	**Yes**	**Unsure**	**No**
Natural History	19	0	1
Threats to GRSM	10	0	10
Human History of Area	3	0	17

Sample

Twenty-one school groups (one group with no matched surveys was dropped from the data set) from 11 schools attended the Parks As Classrooms (North District) program during Spring or Fall of 2010 (Table 3.2). For those attending the Parks As Classrooms program through the Sugarlands Visitor Center in Tennessee, there were 637 total respondents with matched pre-visit and post-visit surveys. There were 393 unmatched surveys and 3 matched sets that were incomplete and not used in the analysis.

Table 3.2. Number of respondents by group and percentage of sample

Group*	N	%	Month	Incomplete	unmatched
1	20	3.1	April 2010	0	34
2	33	5.2	April 2010	0	39
3	54	8.5	May 2010	1	21
4[a]	60	9.4	May 2010	0	61
5[a]	52	8.2	May 2010	0	52
6[b]	50	7.8	May 2010	0	42
7[b]	37	5.8	May 2010	0	65
8[a]	42	6.6	Sept 2010	0	8
9	22	3.5	Dec 2010	0	6
10	32	5.0	Sept 2010	1	2
11[c]	10	1.6	Oct 2010	0	3
12[a]	38	6.0	Oct 2010	0	14
13[c]	17	2.7	Oct 2010	0	3
14[d]	19	3.0	Oct 2010	0	2
15[e]	23	3.6	Oct 2010	0	10
16[e]	17	2.7	Nov 2010	0	8
17	38	6.0	Oct 2010	0	0
18[c]	11	1.7	Oct 2010	1	6
19[d]	14	2.2	Oct 2010	0	1
20[a]	31	4.9	Oct 2010	0	13
21[d]	17	2.7	Nov 2010	0	3
TOTAL	637	100		3	393

Groups with like superscripts are from the same school.

Demographics

Demographic results are based on post-visit survey responses (Table 3.3). Approximately half of the respondents were male. Respondents represented grades 5 through 12, with the majority being 7th and 8th graders. The average age of respondents was 13.38 years (SD=1.57). The ethnicity of respondents was primarily "White, not Hispanic" (81%).

Table 3.3. Parks As Classrooms (North District) demographics (Post-visit data)

VARIABLE	CATEGORY	n	(%)
Gender			
	Female	317	50
	Male	316	50
Grade			
	5	20	3
	6	88	14
	7	179	28
	8	280	44
	10	2	1
	11	17	2
	12	51	8
Age			
	10	5	1
	11	49	8
	12	94	15
	13	267	42
	14	128	20
	15	23	3
	16	18	3
	17	43	7
	18	10	1
Ethnicity			
	White, not Hispanic	517	81
	Black, not Hispanic	11	2
	Hispanic	30	4
	Asian	5	1
	Mixed	56	8
	Native Hawaiian	2	1
	American Indian	11	2
	Other	2	1

Visits to GRSM

Respondents were asked to estimate the number of times they had visited GRSM in the last year and in their entire life (Table 3.4). For visits to GRSM in the last year with their school, 18% of students indicated "Never" on the post-visit survey (50% indicated "Never" on Pre-visit survey). Since the Parks As Classrooms (North District) program utilizes sites within the GRSM, the expectation was that all respondents would indicate on the post-visit survey that they had visited GRSM at least "Once" with their school. This post-visit response suggests that even though respondents participated in the Parks As Classrooms program, some were still not aware that they had visited the GRSM with their school. The majority of respondents had visited GRSM one or more times with their family, friends or other groups in the last year (66%) or at least once during their life (60%). However, for about one-quarter of the respondents, the Parks As Classrooms (North District) program was likely their first introduction to GRSM (at least as far as these kids were aware). A majority of respondents (60%) of the respondents attending the Parks As Classrooms (North District) program did not have a GRSM ranger visit their Classrooms in the last year.

Table 3.4. How many visits have Parks As Classrooms (North District) respondents taken to GRSM?

VISITATION	N	MEAN (SD)	MIN	MAX	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
					Never	Once	Twice	3-5 Times	More than 5 times
1. In the <u>last year</u>, how many times have you visited Great Smoky Mountains National Park with your school? (post-visit)	613	1.40[1] (1.44)	0	17	18	50	21	10	1
2. In the <u>last year</u>, how many times have you visited Great Smoky Mountains National Park with your family, friends, or other groups? (post-visit)	599	3.01[1] (6.77)	0	100	34	18	15	20	13
3. In the <u>last year</u>, how many times has a ranger from Great Smoky Mountains National Park visited your class? (post-visit)	593	0.72[1] (1.22)	0	10	60	21	12	6	1
4. In your <u>entire life</u>, how many times have you visited Great Smoky Mountains National Park with your school? (pre-visit)	624	2.89[2] (1.41)	1	5	24	17	17	27	15
5. In your <u>entire life</u>, how many times have you visited Great Smoky Mountains National Park with your family, friends, or other groups? (pre-visit)	620	3.43[2] (1.60)	1	5	40	16	11	12	21

[1]Respondents provided a number
[2]Response was on a 5-point scale (1=Never, 2=Once, 3=Twice, 4=3-5 times, 5=More than 5 times)

Influence of the Parks As Classrooms (North District) Program on Students: Pre-visit vs. Post-visit

Attitudes towards school

Students' *Attitude towards school (AtS)* showed a slight but significant decrease (p≤.001) in the composite mean score (mean was 4.0 for the pre-visit and 3.9 for the post-visit survey) (Table 3.5). Overall, Parks As Classrooms (North District) students had somewhat positive attitudes about school with between 45% and 88% of respondents indicating strongly agree or agree to the items in the *AtS* scale, before and after attending the program.

There was a significant change for all but two items on this *AtS* scale. There was a significant increase (p≤.05) between the pre-visit and post-visit survey for "I enjoy school." The portion of respondents indicating agree or strongly agree with "I enjoy school," was 45% before the program and 50% after the program. The mean for this item changed by a magnitude of 2.07%, and this item was the lowest rated item on the scale (mean was 3.4 on the pre-visit and 3.5 on the post-visit survey).

All other significant items had a decrease in the mean score. The highest rated item was "I believe that I will go to college" (mean was 4.5 on the pre-visit and 4.4 on the post-visit survey), and the decrease was significant at p≤.001. For this item, the portion of respondents indicating strongly agree or agree was 88% on the pre-visit survey and 83% on the post-visit survey. The remaining items that had a significant decrease were "I pay attention to the teacher in class" (p≤.05), "My teachers really care about me" (p≤.001), "My teachers believe that I can succeed" (p≤.001), and "Going to school is *not* a waste of time for me" (p≤.001), which had that largest magnitude of change (-3.74%).

Stewardship

There was no significant change in the composite mean score for the *Stewardship* scale (Table 3.6). Overall, Parks As Classrooms (North District) students were very positive about *Stewardship* with between 64% and 86% of respondents indicating strongly agree or agree to the items in the scale, before and after attending the program.

Five out of nine items on the scale had significant mean score changes. The two items with the lowest initial level of agreement were "I can reduce the amount of electricity I use" and "If I find an arrowhead in GRSM, I should leave it alone." Both of these had a significant increase (p≤.001) in agreement. For "I can reduce the amount of electricity I use" the portion of respondents indicating agree or strongly agree was 70% before the program and 75% after the program. For "If I find an arrowhead in GRSM, I should leave it alone," the portion of respondents who agreed or strongly agreed with this item was 64% before the program and 69% after the program. In addition, the item, "I should not pick wildflowers in GRSM," which had a positive change of 2.49%, was also a significant increase (p≤.05).

Two items had significant and negative changes in mean scores. The item with the highest level of agreement (mean was 4.3 on the pre-visit and 4.1 on the post-visit survey) was "I feel it is important to take good care of the environment." This item showed a significant decrease (p≤.001) in the mean score and the highest magnitude of change (-3.28%). The portion of respondents who strongly agreed or agreed with this item was 86% before the program and 82% after the program. "When I'm outside, I like to explore nature" also had a significantly (p≤.05) negative change of 2.00%.

Interest

The composite mean score for the *Interest* scale had no significant change (Table 3.7). Overall, Parks As Classrooms (North District) students were only somewhat positive about learning and exploring with between 39% and 67% of respondents indicating they were extremely interested or very interested in the items on the *Interest* scale, before and after attending the program. Two items on the scale had significant changes in scores ($p \leq .05$). One of these items was "Learning about plants, animals, and the places they live," which had a significant increase in the mean and an increase in the portion of respondents who indicated extremely or very interested (39% before the program and 40% after the program.) The other item was "Exploring the outdoors near my home" which had a significant decrease in the mean score. However, this item was the highest rated (mean was 3.84 on the pre-visit and 3.75 on the post-visit survey). The lowest rated item was "Learning about environmental threats to GRSM such as air pollution" (mean was 3.2).

Social Norms

The composite mean score for the *Social Norms* scale showed no significant change (Table 3.8). Overall, Parks As Classrooms (North District) students were somewhat positive about *Social Norms* with between 45% and 68% of respondents indicating strongly agree or agree to all but one item ("My friends think cleaning up a park is cool") in the scale, before and after attending the program. Two items on this scale had a significant change in the mean score. "My family would be proud of me if I volunteered at GRSM" showed a significant decrease ($p \leq .05$), but this item was the highest rated on the scale (mean was 3.9 on the pre-visit and 3.8 on the post-visit survey). The magnitude of this negative change after the program was 3.57%. The item with the lowest level of agreement was "My friends think cleaning up a park is cool" (mean was 2.5 on the pre-visit and 2.6 on the post-visit survey) showed a significant increase ($p \leq .05$). Fifteen percent of respondents indicated strongly agree or agree for this item before the program and 17% after the program.

Attachment to GRSM

The composite mean score for the *Attachment to GRSM* scale showed no significant change (Table 3.9). Overall, Parks As Classrooms (North District) students reported somewhat positive attitudes about *GRSM,* with between 45% and 77% of respondents indicating strongly agree or agree to the items in the scale, before and after attending the program. Two items had significant changes. "I would like to visit GRSM with my family or friends," showed a significant decrease ($p \leq .001$) in agreement. This was the highest rated item (mean was 4.1 on the pre-visit and 3.9 on the post-visit survey), and the magnitude of this negative change was 6.24%. The portion of respondents indicating strongly agree or agree on this item was 77% before the program and 67% after the program. "GRSM is one of my favorite places to visit" showed a significant increase but was also the lowest rated item (mean was 3.4 on the pre-visit and 3.5 on the post-visit survey). The portion of respondents indicating strongly agree or agree for this item was 45% before the program and 48% after the program.

Park and Community Behaviors

The composite mean score for the *Park and Community* behaviors scale increased significantly ($p \leq .001$) (mean was 2.8 for the pre-visit and 2.9 for the post-visit survey) (Table 3.10). Overall, Parks As Classrooms (North District) students were relatively positive about *Park and Community Behaviors,* with between 15% and 41% of respondents indicating that they perform or intend to perform these behaviors very often or often, before and after attending the program. All but one item showed a significant increase in the mean score. The item with the highest magnitude of

change (7.92%) was "Work with others to clean up my community." The portion of respondents indicating very often or often for this item was 24% before the program and 29% after the program. The lowest rated item on this scale was "Talk to my friends about the environment when I am not at school" (mean was 2.2 on the pre-visit and 2.4 on the post-visit). This item showed one of the largest changes in magnitude (6.76%), and the change was significant at p≤.001 after the program. The one item that was not significant was "Pick up trash left by others," but it was the highest rated item on the scale (mean was 3.3).

Home Behaviors
Students demonstrated a significant increase (p≤.001) from the pre-visit to the post-visit survey for the composite mean score (mean was 3.3 on the pre-visit and 3.5 on the post-visit survey) on the *Home Behaviors* scale (Table 3.11). The composite mean score increased by a magnitude of 4.22% on the post-visit survey. Overall, Parks As Classrooms (North District) students were relatively positive about *Home Behaviors,* with between 36% and 78% of respondents indicating that they perform or intend to perform these behaviors very often or often, before and after attending the program. All but one of the home behavior items had a positive significant change in the mean score. The item with the largest magnitude of change (11.7%) was "Talk to my family about ways to protect the environment." This item had a significant increase (p≤.001) and was also the lowest rated item (mean was 2.3 on the pre-visit and 2.5 on the post-visit survey). The portion of respondents indicating very often or often for this item was 17% before the program and 24% after the program. The highest rated item was "Turn off the water when brushing my teeth" (mean was 4.2), but this was the only item that did not show a significant change.

Self-assessed Learning
Respondents were asked to rate how much they learned about concepts related to GRSM and the natural environment during the Parks As Classrooms (North District) program (Table 3.12). The composite mean for *Self-assessed learning* was 3.9. Overall, the majority (70% or more) of Parks As Classrooms (North District) students believed they learned a great deal or moderate amount on all *Self-assessed learning* items except for "The history of the people in GRSM". The learning about GRSM item received the highest rating (mean was 4.3), and 83% of respondents indicated learning a great deal or a moderate amount. The item that received the lowest rating was "The history of the people in GRSM" (mean was 3.4). Although, a majority of respondents (59%) indicated they learned a great deal or a moderate amount about this topic.

Field Trips
There was no significant change in the composite mean score for the *Field Trips* scale (Table 3.13). Overall, Parks As Classrooms (North District) students were positive about *Field Trips* with between 56% and 86% of respondents indicating strongly agree or agree to all items in the scale, before and after attending the program. Two items were significant. "I meet interesting people on field trips" showed a significant increase (p≤.001) and was the lowest rated item (mean was 3.6 on the pre-visit and 3.7 on the post-visit survey). The portion of respondents indicating strongly agree or agree on this item was 56% before the program and 63% after the program. "I have a lot of fun on field trips" showed a significant decrease (p≤.001), but was the highest rated item on the scale (mean was 4.4 on the pre-visit and 4.2 on the post-visit survey). For this item, the portion of respondents indicating strongly agree or agree for this statement was 86% before the program and 77% after the program.

Table 3.5. Parks As Classrooms (North District) – Attitudes toward school (AtS)

ITEM		MEAN (SD)	t	df	SIG	% CHANGE **	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I enjoy school.	pre	3.38 (0.99)	-2.37	633	.018	2.07	12	33	42	7	6
	post	3.45 (1.03)					14	36	38	5	7
I pay attention to the teacher in class.	pre	3.97 (0.87)	1.98	629	.048	-1.51	28	46	21	3	2
	post	3.91 (0.84)					25	46	25	3	1
My teachers really care about me.	pre	3.80 (1.00)	3.28	629	.001	-2.89	27	37	28	4	4
	post	3.69 (1.02)					23	37	30	6	4
I believe that I will go to college.	pre	4.54 (0.85)	5.23	626	.00	-3.08	71	17	9	1	2
	post	4.40 (0.90)					61	22	13	2	2
The time I spend in school will benefit me in the long run.	pre	4.20 (0.97)	0.35	629	.73	-0.48	48	32	15	2	3
	post	4.18 (0.91)					45	33	18	2	2
My teachers believe that I can succeed.	pre	4.11 (0.95)	3.46	618	.001	-2.68	41	36	18	3	2
	post	4.00 (0.95)					35	38	22	3	2
Going to school is *not* a waste of time for me.*	pre	4.01 (1.15)	3.50	622	.001	-3.74	45	28	16	6	5
	post	3.86 (1.20)					39	28	19	8	6
I enjoy learning about new subjects in school.	pre	3.55 (1.11)	-1.12	625	.26	3.10	22	32	31	9	6
	post	3.66 (1.02)					20	35	34	6	5
ATTITUDE Composite Mean	pre	3.95 (0.64)	3.76	588	.00	-1.77					
	post	3.88 (0.66)									

*Reverse coded for analysis (Original statement in survey was "Going to school is a waste of time for me"); **(post-visit mean minus pre-visit mean)/pre-visit mean [NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 3.6. Parks As Classrooms (North District) – Stewardship

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I can reduce the amount of electricity I use.	pre	3.79 (0.86)	-3.76	624	.00	3.43	18	52	22	7	1
	post	3.92 (0.78)					21	54	21	3	1
If I find an arrowhead in GRSM, I should leave it alone.	pre	3.77 (1.25)	-3.20	627	.001	3.71	38	26	18	12	6
	post	3.91 (1.14)					40	29	19	7	5
I can make a difference in my community.	pre	3.82 (0.95)	0.93	626	.35	-0.79	25	43	23	7	2
	post	3.79 (0.91)					22	44	27	5	2
I feel it is important to take good care of the environment.	pre	4.27 (0.78)	4.75	630	.00	-3.28	43	43	11	2	1
	post	4.13 (0.83)					37	44	17	1	1
I should not pick wildflowers in GRSM.	pre	4.01 (1.07)	-2.29	625	.02	2.49	42	31	18	5	4
	post	4.11 (1.03)					45	30	17	5	3
My actions can influence the health of the environment.	pre	4.02 (0.88)	1.53	623	.13	-1.24	33	42	21	3	1
	post	3.97 (0.91)					31	42	21	4	2
When I'm outside, I like to explore nature.	pre	4.00 (1.04)	2.21	625	.028	-2.00	39	33	20	5	3
	post	3.92 (1.06)					35	34	22	5	4
I have the power to help protect the environment.	pre	3.90 (0.94)	-0.70	626	.48	0.51	29	42	22	4	3
	post	3.92 (0.94)					31	39	24	4	2
It is up to me to make sure I do not harm the environment when I am playing outside.	pre	3.87 (0.98)	0.17	628	.87	-0.26	30	39	23	6	2
	post	3.86 (0.98)					28	41	23	5	3
STEWARDSHIP Composite Mean	pre	3.96 (0.63)	-0.18	579	.86	0.00					
	post	3.96 (0.67)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 3.7. Parks As Classrooms (North District) – Interest

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Extremely Interested)	4 (Very Interested)	3 (Somewhat Interested)	2 (Slightly Interested)	1 (Not at all Interested)
Learning about plants, animals, and the places they live.	pre	3.31 (1.06)	-2.16	631	.031	2.11	17	22	41	15	5
	post	3.38 (1.05)					18	22	44	11	5
Learning about cultural and historic sites in GRSM.	pre	3.41 (1.13)	1.05	628	.30	-1.17	20	28	33	13	6
	post	3.37 (1.09)					17	26	38	13	6
Learning how to protect the environment.	pre	3.23 (1.13)	-0.41	628	.69	0.62	15	24	36	16	8
	post	3.25 (1.13)					15	25	37	15	8
Learning about environmental threats to GRSM, such as air pollution.	pre	3.19 (1.14)	0.69	625	.49	-0.94	14	25	37	15	9
	post	3.16 (1.16)					15	22	38	15	1
Exploring the outdoors near my home.	pre	3.84 (1.16)	2.17	627	.030	-2.34	36	31	20	8	5
	post	3.75 (1.17)					32	31	23	8	6
Making my community a better place.	pre	3.50 (1.10)	1.37	627	.17	-1.43	20	32	31	12	5
	post	3.45 (1.10)					20	28	37	9	6
INTEREST Composite Mean	pre	3.41 (0.82)	0.76	614	.45	-0.29					
	post	3.40 (0.88)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 3.8. Parks As Classrooms (North District) – Social Norms

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
My teachers encourage me to help protect the environment.	pre	3.59 (0.96)	-0.31	626	.78	0.56	18	38	33	9	2
	post	3.61 (0.94)					17	39	35	6	3
My family likes me taking field trips to the park.	pre	3.74 (0.93)	0.56	626	.57	-0.53	22	38	33	5	2
	post	3.72 (0.95)					22	39	31	6	2
My friends think cleaning up a park is cool.	pre	2.52 (1.09)	-2.16	629	.031	3.57	4	11	39	24	22
	post	2.61 (1.09)					5	12	41	22	20
My family would be proud of me if I volunteered at GRSM.	pre	3.92 (0.94)	3.75	616	.00	-3.57	31	37	27	3	2
	post	3.78 (0.99)					28	33	32	4	3
My family wants me to help protect the environment.	pre	3.48 (0.95)	-0.38	628	.71	0.57	16	29	45	7	3
	post	3.50 (1.00)					18	29	41	8	4
SOCIAL NORMS Composite Mean	pre	3.45 (0.69)	0.096	600	.92	0.00					
	post	3.45 (0.72)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 3.9. Parks As Classrooms (North District) – Attachment to GRSM

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I would like to visit GRSM with my family or friends.	pre	4.06 (0.96)	4.72	630	.00	-4.19	39	38	17	4	2
	post	3.89 (1.00)					33	34	24	7	2
GRSM is one of my favorite places to visit.	pre	3.37 (1.09)	-2.29	610	.022	2.67	17	28	35	14	6
	post	3.46 (1.12)					21	27	34	11	7
GRSM is important to me.	pre	3.96 (0.93)	1.19	618	.24	-1.01	33	37	25	4	1
	post	3.92 (1.01)					34	35	34	4	3
I love GRSM.	pre	3.85 (0.96)	0.49	624	.62	-0.26	30	34	30	4	2
	post	3.84 (1.02)					31	34	27	4	4
ATTACHMENT TO GRSM Composite Mean	pre	3.80 (0.81)	1.25	587	.21	-0.53					
	post	3.78 (0.90)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 3.10. Parks As Classrooms (North District) – Park and Community Behaviors

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Very Often)	4 (Often)	3 (Sometimes)	2 (Rarely)	1 (Never)
Volunteer to help the environment.	pre	2.64 (1.07)	-3.07	630	.002	4.92	5	15	36	27	17
	post	2.77 (1.12)					7	18	35	25	15
Pick up trash left by others.	pre	3.28 (1.11)	-1.23	624	.22	1.52	14	29	34	16	7
	post	3.33 (1.10)					16	30	33	15	6
Help clean up a local park when asked.	pre	2.89 (1.25)	-2.69	624	.007	3.81	12	21	30	19	18
	post	3.00 (1.20)					12	23	35	16	14
Work with others to clean up my community.	pre	2.65 (1.17)	-5.03	622	.00	7.92	8	16	28	30	18
	post	2.86 (1.15)					8	21	34	13	14
Participate in activities to improve my school*	pre	3.14 (1.22)	-2.09	614	.037	3.18	16	23	31	19	11
	post	3.24 (1.18)					17	24	33	17	9
Talk to my friends about the environment when I am not at school.	pre	2.22 (1.20)	-3.35	624	.001	6.76	6	9	22	27	36
	post	2.37 (1.18)					6	10	29	25	30
COMMUNITY Composite Mean	pre	2.80 (0.88)	-4.84	597	.00	4.64					
	post	2.93 (0.91)									

*Surveys distributed early in the study had "Work with my teachers and friends to improve my school" on the pre-visit version and "Participate in activities to improve my school" on post-visit version. Halfway through the study, this was corrected to "Participate in activities to improve my school" for both versions. [NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 3.11. Parks As Classrooms (North District) – Home Behaviors

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Very Often)	4 (Often)	3 (Sometimes)	2 (Rarely)	1 (Never)
Turn off the water when brushing my teeth.	pre	4.17 (1.21)	-1.02	626	.31	0.96	59	17	13	4	7
	post	4.21 (1.12)					57	21	12		4
Collect aluminum cans for recycling.	pre	3.04 (1.47)	-4.46	623	.00	6.25	24	18	19	18	21
	post	3.23 (1.40)					24	21	25	13	17
Talk to my family about ways to protect the environment.	pre	2.31 (1.24)	-5.93	619	.00	11.69	7	10	24	24	35
	post	2.58 (1.30)					11	13	27	22	27
Turn the lights out when I leave a room.	pre	4.13 (1.10)	-1.98	620	.048	1.94	52	22	17	6	3
	post	4.21 (1.02)					52	26	15	5	2
Recycle paper products.	pre	2.97 (1.48)	-3.29	618	.001	4.71	23	13	23	17	24
	post	3.11 (1.42)					23	18	25	16	18
HOME Composite Mean	pre	3.33 (0.93)	-5.21	609	.00	3.60					
	post	3.45 (0.93)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 3.12. Parks As Classrooms (North District) – Self-assessed learning (Post-visit survey only)

How much did you learn about...	MEAN (SD)	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
		5 (A great deal)	4 (A moderate amount)	3 (A little)	2 (Almost none)	1 (None)
The natural environment	4.12 (0.98)	42	38	15	1	4
GRSM	4.28 (0.96)	54	29	12	2	3
How plants and animal interact	3.92 (1.05)	34	36	22	3	5
The history of the people in GRSM	3.40 (1.30)	25	24	28	11	12
The purpose of the NPS	3.95 (1.11)	38	34	18	4	6
SELF-ASSESSED LEARNING Composite Mean	3.93 (0.88)					

Table 3.13. Parks As Classrooms (North District) – Field Trip scale

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I meet interesting people on field trips.	pre	3.56 (0.98)	-4.11	625	.000	4.49	17	39	30	11	3
	post	3.72 (0.94)					21	42	28	7	2
What I learn on field trips is useful to me.	pre	3.76 (0.87)	.00	630	1.000	0.00	20	44	31	4	1
	post	3.76 (0.88)					20	45	29	4	2
I enjoy learning when I am outside.	pre	3.73 (1.09)	1.22	617	.224	-1.34	29	33	26	8	4
	post	3.68 (1.10)					26	34	27	8	5
I have a lot of fun on field trips.	pre	4.37 (0.77)	6.54	626	.000	-4.58	53	33	12	1	1
	post	4.17 (0.89)					43	34	20	2	1
Field trips help me understand what I am taught in class.	pre	3.85 (0.96)	.37	621	.712	-0.26	29	37	27	5	2
	post	3.84 (1.00)					30	34	28	6	2
FIELD TRIP Composite Mean	pre	3.86 (0.68)	1.05	589	.294	-0.78					
	post	3.83 (0.75)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Teacher's responses regarding the Parks As Classrooms (North District) program

A total of 43 teachers responded to the teacher survey for the Parks As Classrooms (North District) program. These teachers included 5th through 12th grade teachers. The majority (85%, N=41) taught middle school (grade 5, 6, 7 and/or 8) and the remainder taught high school (grade 9,10, 11 and/or 12). Respondents taught a large range of subjects (science, math, social studies, history, and geography, language arts/English, reading, spelling). The majority of respondents focused on science and/or math (67%). Science subjects included Biology, AP Biology, Chemistry, Environmental Science, and Physics. The average number of years that teachers had taught was 17.71 (SD=10.08; minimum was 2 years, maximum was 37 years) and 79% had taught 10 years or more. The majority of respondents were female (75%, N=40), and most (95%, N=41) indicated they were "White, not of Hispanic decent".

Pre-Trip & Post-Trip Curriculum
Half of the respondents (N=40) indicated they used pre-trip activities with their students prior to the Parks As Classrooms (North District) program. Some teachers indicated that preparation activities occurred primarily in science classes. Pre-trip activities included the following:
* Curriculum-based
* Dichotomous Key, Classification Levels (3 respondents)
* Leaf collection on campus and ID (2 respondents)
* Preparation of a report on plants and animals found
* Identifying organisms
* Explaining the trip
* The Downstream Activity provided by GRSM
* Environment awareness, ecosystem, adaptation, and recycling
* Experimental design
* Concepts that are incorporated in state geography standards
* Microscope usage (3 respondents)
* Review of a few chapters on plants and plant processes and four chapters of earth science relating to rocks and minerals and plate techtonics.
* Worked on minerals and three types of rocks and how they are formed

Only 35% (N=40) of respondents reported using post-trip activities. Some indicated that post-trip activities were conducted through science class. The post-trip activities included the following:
* 6th grade Poster activity
* Dichotomous Key
* Discussion
* Environmental problems/recycling/reuse
* Looking at our students data
* More experimental design analysis
* Not for this teaching year but will carry themes over into next year
* Not yet
* Reflection on imprints

- Tie in the trip & info to environmental studies (2 respondents)
- Trip was at the end of the school year so no post-trip activities were possible
- Writing assignments

Eleven respondents made suggestions for materials that would be useful to better prepare students for the GRSM experience. These suggestions were:

- An outline of the skills and plans for the day
- Dichotomous key identification guide
- Information on human geography (settlement and Cherokee)
- Incorporate some math skills/studies (2 respondents)
- A visit by a ranger to schools about the purpose of the park and its programs
- Pre-site activities and post-site activities
- Suggested activities that could be performed at a local park
- Questions of study, prompts for writing on GRSM issues (dilemmas or concerns faced each year)
- Pre-trip activities for teachers to use to introduce GRSM activities
- Worksheet to fill in facts

Four teachers indicated that additional pre-trip materials were not necessary.

Twenty-nine percent of the respondents (N=42) had participated in professional development training with GRSM.

Satisfaction

Teacher satisfaction was very high. On a scale of 1 (Very dissatisfied) to 10 (Very satisfied), the mean rating was 9.13 (SD=1.07, minimum = 6, maximum = 10). The majority of respondents (77%) selected 9 or 10.

General Impacts of the Program

Teachers reported very positive attitudes regarding the influence of the Parks As Classrooms (North District) program (Table 3.14). Teachers indicated that the program helped them meet state standards (M=4.47), the curriculum was appropriate (M=4.76), students learned a lot (M=4.42), students had fun (M=4.86), and content was relevant to students' lives (M=4.56). Teachers also indicated they would like to do another GRSM program with their students (M=4.77). Teachers gave a lower rating (M=4.0) for "My students became motivated to perform better academically." One explanation for this lower rating may be that the teacher survey occurred 10 days after the field trip, making it hard for teachers to observe a noticeable change in motivations to perform. Some teachers (especially those visiting GRSM in May) indicated this was the case.

Table 3.14. Teacher rating of the general impacts of the
Parks As Classrooms (North District) experience (N=43)

General Impacts	Mean	SD
This program helped my class meet state curriculum standards.	4.47	0.74
The program content was academically appropriate for my students.	4.76	0.43
My students became motivated to perform better academically.	4.00	0.76
My students learned a lot about important topics.	4.42	0.54
I would like to do another GRSM program with my students.	4.77	0.43
My students had fun.	4.86	0.35
The program content was relevant to my students' lives.	4.56	0.59

Scale: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree.

Impacts on Student Outcomes

These questions investigated teachers' perceptions regarding the influence of the GRSM programs on students' appreciation, stewardship, knowledge, understanding, and interest pertaining to a range of topics. Teachers were asked: "Indicate to what extent you think the GRSM experience has positively impacted your class overall in the following areas:" Response categories included: a great deal, a moderate amount, a little, almost none, and none. Teachers were also asked: "As a result of your recent GRSM educational program, what percentage of your students increased their:" Response categories for this question included: 0-20% 21-40%, 41-60%, 61-80%, and 81-100%. Teachers were very positive about the impact of the program on their students (Table 3.15). "Appreciation for the natural environment" (M=4.49), "Appreciation for biological diversity" (M=4.42) and "Scientific inquiry skills" (M=4.35) were the outcomes with the highest impact ratings. Over half of teachers indicated that at least 60% of students improved on "Appreciation for the natural environment" (59%), "Appreciation for biological diversity" (66%) and "Scientific inquiry skills" (66%). Academic performance (M=3.90) and "Positive attitudes toward school" (M=3.88) were the outcomes with the lowest impact ratings. The ratings on these outcomes may be due to the difficulty of observing a perceivable difference in students overall performance and attitudes in the short time period between the field trip and the completion of the teacher survey. Only 28% of teachers indicated that at least 60% of students improved on "Academic performance." However, despite the lower impact rating for "Positive attitudes toward school," 41% of teachers indicated at least 60% of students improved on this outcome.

Table 3.15. Teacher rating of student outcomes from participation
in the Parks As Classrooms (North District) program.

Outcomes	Impact rating* (N=43)		% Students increasing their…(N=39)				
	Mean	SD	0-20	21-40	41-60	61-80	81-100
Academic performance	3.90	0.80	15	26	31	20	8
Positive attitudes toward school	3.88	0.79	3	33	23	28	13
Appreciation for the natural environment	4.49	0.70	0	5	36	28	31
Environmental stewardship	4.23	0.75	0	10	46	10	33
Understanding of ecological processes	4.19	0.66	0	3	41	28	28
Knowledge of the history of GRSM	3.93	0.78	5	21	26	33	15

Outcomes	Impact rating* (N=43)		% Students increasing their…(N=39)				
	Mean	SD	0-20	21-40	41-60	61-80	81-100
Understanding of the mission of the National Park Service	4.07	0.70	0	23	26	26	26
Knowledge of GRSM natural history	4.00	0.72	3	23	23	36	15
Appreciation for biological diversity	4.42	0.63	3	3	28	28	38
Concern about issues and threats facing GRSM	4.05	0.84	5	8	31	25	31
Interest in taking actions to conserve or improve the environment	3.95	0.85	0	18	29	26	26
Scientific inquiry skills	4.35	0.57	0	8	26	32	34

Scale: 1=None, 2=Almost none, 3=A little, 4=A moderate amount, 5=A great deal

GRSM Staff

Teacher ratings of GRSM staff on all categories (Table 3.16) were very positive. Teachers rated the overall performance of the staff as very good (4.7). Staff received the highest ratings for their organization (4.81), patience (4.79), positive interaction with students (4.79) and working well with teachers (4.79). Staff received the lowest rating for entertaining (4.33).

Table 2.16. Teacher ratings of GRSM Staff working with Parks As Classrooms (North District) (N=43)

Staff Rating Category	Mean*	SD
Knowledgeable	4.67	0.47
Entertaining	4.33	0.68
Flexible	4.67	0.64
Organized	4.81	0.45
Enthusiastic	4.65	0.57
Patient	4.79	0.47
Charismatic-likeable	4.60	0.62
Explained things clearly	4.70	0.64
Communicated an explicit message	0.6	0.62
Interacted positively with students	4.79	0.41
Worked well with teachers	4.79	0.41
Overall performance	4.72	0.50

Scale: 1=Very poor, 2=Poor, 3=Average, 4=Good, 5=Very good

Teacher actions before and after the trip

These questions investigated teachers' intentions to incorporate environmental themes, outdoor activities, and inquiry-based, hands-on activities into their teaching. Teachers were asked: "Prior to participation in the GRSM program, how often have you done the following?" Response categories included: very often, often, sometimes, rarely, and never. Teachers were also asked: "As a result of participating in the GRSM program, are you more or less likely to participate in the following activities in the next year." Response categories included: much less likely, less likely, same as

before, more likely, much more likely. "Incorporate inquiry based, hands on activities into the students' school experience" was the most common pre-visit action (M=4.14) (Table 3.17). "Volunteer to help the environment" was the least common pre-trip action (M=3.16), and this was also the least likely post-visit activity (M=3.65). None of the actions received a rating of 4 (more likely) or more for post-visit likelihood. For the teaching specific actions, this may be a result of heavy reliance on the Parks As Classrooms trip for the outdoor, environmental themed, and hands on portion of the teachers' curriculum plans.

Table 3.17. Teacher action behaviors before and after the Parks As Classrooms (North District) program (N=42)

Actions	Pre-visit frequency		Post-visit likelihood	
	Mean[1]	SD	Mean[2]	SD
Volunteer to help the environment.	3.16	1.31	3.65	0.78
Incorporate environmental themes in my teaching.	3.81	0.92	3.88	0.71
Use environmental themes to better meet state standards.	3.83	1.08	3.86	0.81
Incorporate inquiry based, hands on activities into the students' school experiences	4.14	0.78	3.98	0.68
Incorporate outdoor activities into your classes.	3.40	1.13	3.90	0.69

[1]*Scale: 1=Never, 2=Rarely, 3=Sometimes, 4=Often, 5=Very often*
[2]*Scale: 1=Much less likely, 2=Less likely, 3=Same as before, 4=More likely, 5=Much more likely*

Visitation

Since the teacher survey occurred after the Parks As Classrooms visit, all of the respondents had visited GRSM at least once in the current academic year. For 64% of the respondents, this was the only field trip they had taken in the current academic year. Of the remaining individuals, 24% had visited twice and 10% had visited 3 times. One teacher indicated they had not visited. Only one quarter of the teachers (N=40) indicated that they planned one or two additional trips to the GRSM in the current academic year (all others indicated no trips were planned). Only 17% (N=41) had a GRSM ranger visit their class during this academic year. All but one of the respondents (N=41) had visited GRSM with their family, friends, or other groups 2 or more times and 81% had visited more than 5 times.

Teacher comments

- From Section C (see Table 3.15) of the survey – not in school long enough after trip to answer these; They were awesome

- Great program!

- Great program, it goes well with our curriculum. Thanks!

- I always enjoy the parks programs. they do an excellent job and my students always love them too! They especially enjoyed using the compass and being a car! Great Work!

- I appreciate the fact that the Rangers are always trying to improve the Parks as Classrooms programs "Kudos"

- I think that the program is a great asset to any school that is willing to take advantage of the opportunities set forth by the GSMNP

- I would love a ranger to come to my class and spend the day

- It was better than I imagined. Look forward to it next year!! Great job!!

- Outstanding trip!

- Park rangers always do their best to present well-informed and well presented programs. My students and I always return learning something new

- Really enjoyed the program - offered an amazing opportunity for students to experience hands-on science in a real world application

- Thank you for an exciting time! the views were spectacular

- The lessons for 6th grade do not fit with new state standards implemented this school year in science. They were old state standards for 6th grade

- The water/stream ecology activity was great. We were hoping to have more human geography with the hike. Comparing the two programs: one had a pre-talk, activity and post evaluation whereas the other began and ended with little introduction or conclusion

- Very enjoyable trip. The activities complimented and aligned with the state curriculum perfectly! The rangers were knowledgeable and good with the students. One student commented "I didn't know rangers knew about all that stuff!"

- We enjoyed the Classrooms and the activities. we are grateful for the grant that provided transportation

- We enjoyed the outdoor Classrooms and being able to participate

Chapter Four
PARKS AS CLASSROOMS
PURCHASE KNOB

Program Summary

The Parks As Classrooms program operating out of the Appalachian Highlands Science Learning Center at Purchase Knob is located on 235 acres on the NC side of the park that were donated to GRSM in 2001. The programs offered at AHSLC are all conducted at the Purchase Knob site and are aligned with the North Carolina Standard Course of Study and the National Science Education Standards. For the school groups participating in this study, the curriculum and activities focused on one or more of the following three topics: air quality (ozone, lichen, tardigrades), aquatic biology (water quality, salamander mark-recapture) and soil health (macro-invertebrates, snails). The lesson plans at this site integrate the scientific method (data collection, analysis and write-up), and all of the data collected by school groups are part of broader citizen science research projects and entered into online databases.

Twenty-four school groups participating in the Purchase Knob program received a pre-visit and post-visit survey. The surveys from five of the groups were discarded due to lack of matching pre-visit and post-visit surveys (3 groups) or participating in the survey through a GRSM program at another site on an earlier date (2 groups).

All groups participated in the day program. However, one group spent two and a half days at PK and camped in the area and another group camped the night before their day program (these two groups combined represent 8.6% of the Purchase Knob participants included in this study). The duration of programs (contact time with GRSM staff) ranged from 1.5 to 37[3] hours (mean=5.637.95). Three schools arrived at the Purchase Knob site in the afternoon, and the remaining 16 all arrived in the morning. All school groups were from the local surrounding area, and all of these were from Western North Carolina, except for one group from the East Tennessee region. Of the 19 school groups, 15 were from public schools, 2 were from private schools, one was a religious school and one was a charter school. Class size reported by GRSM staff ranged from 8 to 60 students (mean=36.5016.95). School groups attended with a mean of 1.58 (0.71) teachers and 2.37 (2.83) chaperones. The mean number of GRSM staff working with each school group was 1.66 (SD=0.67) and the mean number of SCA interns was 0.82 (SD=0.38). The mean for the reported average experience level of staff was 7.39 years.

Programs sought to influence awareness, knowledge, attitudes, skills, and behaviors (Table 4.1). Most programs focused on all three GRSM themes; however instructors indicated that three groups did not receive programs with the "Diversity and Abundance" theme. Instructors indicated that program topics for all groups focused primarily on "Threats to GRSM." No groups included "Human History of the Area," and most groups did not include "Natural History."

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[3] Duration was converted to hours as the metric. For overnight programs, one full day was counted as 16 hours (we assume that spending the night, meals, other non-instructional activities count as part of the educational experience and that there are 8 hours of sleep per day). A half-day was counted as 5 hours (example: for a morning half-day, we assume they leave the site after lunch, and 5 hours reflects 8am to 1 pm).

Table 4.1. Characteristics of Parks As Classrooms (Purchase Knob) based on instructor surveys (N=19).

Desired Outcome	Yes	Unsure	No
Raise Awareness	19	0	0
Increase Knowledge	19	0	0
Influence Attitudes	19	0	0
Change Behaviors	17	1	1
Develop Skills	19	0	0
Practice Skills	19	0	1
Theme of program	Yes	Unsure	No
Diversity and Abundance	16	0	3
Continuum of Human Activity	19	0	0
Refuge of Scenic Beauty	19	0	0
Topic of program	Yes	Unsure	No
Natural History	1	1	17
Threats to GRSM	19	0	0
Human History of Area	0	0	19

Sample

Nineteen different school groups from 14 different schools participated in the Parks As Classrooms (Purchase Knob) program in either Spring or Fall of 2010. From the 19 groups, there were 801 total respondents with matched pre-visit and post-visit surveys, and there was also 167 unmatched surveys and 2 matched sets that were incomplete (Table 4.2). All unmatched and incomplete surveys were dropped from analysis.

Table 4.2. Number of respondents by group and percentage of sample

Group*	N	%	Month	Incomplete	Unmatched
1	12	1.5	Sept 2010	0	3
2[a]	9	1.1	Sept 2010	0	1
3	60	7.5	Sept 2010	1	11
4	40	5.0	Oct 2010	0	11
5	15	1.9	Sept 2010	0	10
6	48	6.0	Sept 2010	0	23
7[a]	7	.9	Sept 2010	0	1
8	29	3.6	Oct2010	0	5
9	54	6.7	Oct 2010	0	11
10	12	1.5	Oct 2010	0	10
11	21	2.6	Oct 2010	0	4
12	29	3.6	Oct 2010	0	1
13[b]	79	9.9	Oct 2010	0	17
14	29	3.6	Oct 2010	0	3
15[b]	87	10.9	Oct 2010	0	7
16[b]	92	11.5	Oct 2010	0	9

Group*	N	%	Month	Incomplete	Unmatched
17[b]	46	5.7	Oct 2010	1	8
18[b]	87	10.9	Nov 2010	0	22
19	45	5.6	Oct 2010	0	10
TOTAL	801	100		2	167

Groups with like superscripts are from the same school.

Demographics

Demographic results are based on post-visit survey responses (Table 4.3). There was an almost equal number of males and females. Respondents represented grades 6 through 12, with almost half being 6th graders. The average age of respondents was 13.13 years (SD=2.17). The ethnicity of respondents was primarily "White, not Hispanic" (76%).

Table 4.3. Parks As Classrooms (Purchase Knob) demographics (Post-visit data)

VARIABLE	CATEGORY	n	(%)
Gender			
	Female	399	50
	Male	398	50
Grade			
	6	358	45
	7	72	9
	8	135	17
	9	53	7
	10	33	4
	11	51	6
	12	ÙÜ	12
Age			
	10	3	1
	11	248	31
	12	149	18
	13	123	15
	14	85	11
	15	41	5
	16	42	5
	17	90	11
	18	17	2
	19	3	1
Ethnicity			
	White, not Hispanic	600	76
	Black, not Hispanic	11	1
	Hispanic	30	4
	Asian	15	2
	Mixed	102	13
	Native Hawaiian	4	1
	American Indian	20	2
	Other	13	1

Visits to GRSM

Respondents were asked to estimate the number of times they had visited GRSM in the last year and in their entire life (Table 4.4). When reporting the number of visits in the last year with their school, 19% of students indicated "Never" on the post-visit survey (73.2% indicated "Never" on Pre-visit survey). Since the Parks As Classrooms (Purchase Knob) program utilizes sites within the GRSM, the expectation was that all respondents would indicate on the post-visit survey that they had visited GRSM at least "Once" with their school. This post-visit response suggests that even though respondents participated in the Parks As Classrooms program, some were still not aware that they had visited the GRSM with their school.

The majority of respondents had visited GRSM one or more times with their family, friends or other groups in the last year (57%) or once during their life (73%). For about one-quarter of the respondents, the Parks As Classrooms (Purchase Knob) program may have been their first introduction to GRSM (at least as far as these kids were aware). A majority of respondents (60%) of the respondents attending the Parks As Classrooms (Purchase Knob) program did not have a GRSM ranger visit their Classrooms in the last year.

Table 4.4. How many visits have Parks As Classrooms (Purchase Knob) respondents taken to GRSM?

VISITATION	N	MEAN (SD)	MIN	MAX	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
					Never	Once	Twice	3-5 Times	More than 5 times
1. In the <u>last year</u>, how many times have you visited Great Smoky Mountains National Park with your school? (post-visit)	785	1.24[1] (1.25)	0	15	19	58	15	7	1
2. In the <u>last year</u>, how many times have you visited Great Smoky Mountains National Park with your family, friends, or other groups? (post-visit)	765	2.04[1] (5.17)	0	101	43	22	10	16	9
3. In the <u>last year</u>, how many times has a ranger from Great Smoky Mountains National Park visited your class? (post-visit)	764	0.73[1] (1.17)	0	10	60	20	12	7	1
4. In your <u>entire life</u>, how many times have you visited Great Smoky Mountains National Park with your school? (pre-visit)	792	2.12[2] (1.34)	1	5	50	16	13	14	7
5. In your <u>entire life</u>, how many times have you visited Great Smoky Mountains National Park with your family, friends, or other groups? (pre-visit)	786	2.85[2] (1.64)	1	5	27	15	10	14	34

[1]*Respondents provided a number*
[2]*Response was on a 5-point scale (1=Never, 2=Once, 3=Twice, 4=3-5 times, 5=More than 5 times)*

Influence of the Parks As Classrooms (Purchase Knob) Program on Students: Pre-visit vs. Post-visit

Attitudes towards school
There was no significant change in the composite mean score for the *Attitudes towards school (AtS)* scale (Table 4.5). Overall, Parks As Classrooms (Purchase Knob) students had very positive attitudes about school with between 66% and 93% of respondents indicating strongly agree or agree to the items in the *AtS* scale, before and after attending the program.
Two items were significant on the *AtS* scale. There was a significant increase ($p \leq .001$) between the pre-visit and post-visit survey for "I enjoy school." The portion of respondents indicating agree or strongly agree with "I enjoy school," was 66% before the program and 69% after the program. The mean for this item changed by a magnitude of 2.67%, and this item was the lowest rated item on the scale (mean was 3.8 on the pre-visit and 3.9 on the post-visit survey).

The highest rated item was "I believe that I will go to college" (mean was 4.7 on the pre-visit and 4.6 on the post-visit survey), and the decrease was significant at $p \leq .05$. For this item, the portion of respondents indicating strongly agree or agree was 93% on the pre-visit survey and 91% on the post-visit survey. The remaining items did not have a significant change.

Stewardship
There was a significant increase ($p \leq .001$) in the composite mean score (mean was 4.0 for the pre-visit and 4.2 for the post-visit survey) for the *Stewardship* scale (Table 4.6). Overall, Parks As Classrooms (Purchase Knob) students were very positive about *Stewardship* with between 73% and 90% of respondents indicating strongly agree or agree to the items in the scale, before and after attending the program. Four out of nine items had a significant change in mean score.

The two items with the lowest initial level of agreement were "I can reduce the amount of electricity I use" and "If I find an arrowhead in GRSM, I should leave it alone." Both had a significant increase ($p \leq .001$) in agreement. For "I can reduce the amount of electricity I use" the portion of respondents indicating agree or strongly agree was 73% before the program and 82% after the program. For "If I find an arrowhead in GRSM, I should leave it alone," the portion of respondents who agreed or strongly agreed with this item was 51% before the program and 71% after the program. This item also had the largest magnitude of change (15.56%). "I should not pick wildflowers in GRSM" also had a significantly positive change ($p \leq .001$) in the mean score. For this item, the mean increased from 3.9 on the pre-visit survey to 4.1 on the post-visit survey, and the portion of respondents indicating strongly agree or agree was 69% before the program and 75% after the program.

The item with the highest level of agreement (mean was 4.5 on the pre-visit and 4.4 on the post-visit survey) was "I feel it is important to take good care of the environment." This item also showed a significant decrease ($p \leq .01$) in the mean score. The portion of respondents who strongly agreed or agreed with this item was 90% before the program and 89% after the program.

Interest
There was no significant change in the composite mean score for the *Interest* scale (Table 4.7). Overall, Parks As Classrooms (Purchase Knob) students were somewhat positive about learning and exploring with between 49% and 72% of respondents indicating they were extremely

interested or very interested in the items on the *Interest* scale, before and after attending the program. None of the items on the scale showed a significant change. The highest rated item was "Exploring the outdoors near my home" (mean was 4.0), and the portion of respondents indicating extremely or very interested was 71% before the program and 72% after the program. The lowest rated items were "Learning about environmental threats to GRSM such as air pollution" (mean was 3.5) and "Learning about cultural and historic sites in GRSM" (mean was 3.5).

Social Norms
There was no significant change in the composite mean score for the *Social Norms* scale (Table 4.8). Overall, Parks As Classrooms (Purchase Knob) students were somewhat positive about *Social Norms* with between 60% and 72% of respondents indicating strongly agree or agree to all but one item ("My friends think cleaning up a park is cool") in the scale, before and after attending the program. One item on this scale had a significant decrease in the mean score (p≤.01). This was "My family would be proud of me if I volunteered at GRSM" and was also the highest rated item on the scale (mean was 4.0 on the pre-visit and 3.9 on the post-visit survey). The magnitude of this negative change was 2.23%. The item with the lowest level of agreement was "My friends think cleaning up a park is cool" (mean was 2.9 on the pre-visit and post-visit survey). The portion of respondents indicating strongly agree or agree for this item was 28% before the program and 25% after the program.

Attachment to GRSM
There was no significant change in the composite mean score for the *Attachment to GRSM* scale (Table 4.9). Overall, Parks As Classrooms (Purchase Knob) students held somewhat positive attitudes about GRSM, with between 39% and 77% of respondents indicating strongly agree or agree to the items in the scale, before and after attending the program. Two items on the scale showed significant change. "I would like to visit GRSM with my family or friends," showed a significant decrease (p≤.001) in agreement. This was the highest rated item (mean was 4.1 on the pre-visit and 4.0 on the post-visit survey) and the magnitude of this decrease was 3.15%. The portion of respondents indicating strongly agree or agree on this item was 77% before the program and 71% after the program. "GRSM is one of my favorite places to visit" showed a significant increase, but was also the lowest rated item (mean was 3.3 on the pre-visit and 3.4 on the post-visit survey). The portion of respondents indicating strongly agree or agree on this item was 39% before the program and 48% after the program.

Park and Community Behaviors
The composite mean score for the *Park and Community Behaviors* scale demonstrated a significant increase (p≤.01) (mean was 3.2 for the pre-visit and 3.2 for the post-visit survey) (Table 4.10). Overall, Parks As Classrooms (Purchase Knob) students intended to participate in *Park and Community Behaviors* occasionally, with between 33% and 55% of respondents indicating they participate or intended to participate in the activities very often or often for the items in the scale, before and after attending the program. Two items showed a significant increase in the mean score. "Help clean up a local park when asked" showed a significant increase (p≤.001) in the mean score (mean was 3.1 on the pre-visit and 3.3 on the post-visit survey). This item also had the highest magnitude of change (5.14%). "Talk to my friends about the environment when I am not at school" also showed a significant increase (p≤.05) and was the lowest rated item on this scale (mean was 2.6 on the pre-visit and 2.7 on the post-visit survey). The highest rated item was

"Participate in activities to improve my school" (mean was 3.6 on the pre-visit and post-visit surveys).

Home Behaviors

The composite mean score (mean was 3.7 on the pre-visit and 3.8 on the post-visit survey) on the *Behaviors Home* scale demonstrated a significant increase ($p \leq .001$) from the pre-visit to the post-visit survey (Table 4.11). The composite mean increased by a magnitude of 2.41% on the post-visit survey. Overall, Parks As Classrooms (Purchase Knob) students intended to participate in *Home Behaviors,* with between 56% and 85% of respondents indicating very often or often, before and after attending the program. Three of the five items had a positive significant change in the mean score. The item with the largest magnitude of change (5.02%) was "Talk to my family about ways to protect the environment." This item had a significant increase ($p \leq .001$) and was also the lowest rated item (mean was 2.8 on the pre-visit and 2.9 on the post-visit survey). The portion of respondents indicating very often or often for this item was 30% before the program and 33% after the program. "Collect aluminum cans for recycling" showed a significant increase ($p \leq .01$), and "Turn the lights out when I leave the room also showed a significant increase ($p \leq .05$).

The highest rated item was "Turn off the water when brushing my teeth" (mean was 4.3 on the pre-visit and 4.4 on the post-visit survey). Although this item did not show a significant change, the portion of respondents indicating they would perform the behavior very often or often was 78% before the program and 82% after the program.

Self-assessed Learning

After the program respondents were asked to rate how much they learned about GRSM specific concepts during the Parks As Classrooms (Purchase Knob) program (Table 4.12). The *Self-assessed Learning* composite mean was 4.0. Overall, the majority (77% or more) of Parks As Classrooms (Purchase Knob) students believed they learned a great deal or moderate amount on all *Self-assessed learning* items except for "The history of the people in GRSM". Learning about GRSM received the highest rating (mean was 4.3), and 85% of respondents indicated they learned a great deal or a moderate amount about this topic. The item that received the lowest rating was "The history of the people in GRSM" (mean was 3.3), and less than half of respondents (45%) indicated they learned a great deal or a moderate amount about this subject, which is no surprise based on the focus of the programs at Purchase Knob.

Field Trips

There was no significant change in the composite mean score for the *Field Trips* scale (Table 4.13). Overall, Parks As Classrooms (Purchase Knob) students were positive about *Field Trips* with between 64% and 85% of respondents indicating strongly agree or agree to all items in the scale, before and after attending the program. Two items had a significant change in mean score. "I meet interesting people on field trips" showed a significant increase ($p \leq .001$) and was the lowest rated item (mean was 3.8 on the pre-visit and 4.0 on the post-visit survey). The portion of respondents indicating strongly agree or agree on this item was 64% before the program and 71% after the program. "I have a lot of fun on field trips" showed a significant decrease ($p \leq .001$), but was the highest rated item on the scale (mean was 4.4 on the pre-visit and 4.3 on the post-visit survey). For this item the portion of respondents indicating strongly agree or agree for this statement was 85% on the pre-visit survey and 83% on the post-visit survey.

Table 4.5. Parks As Classrooms (Purchase Knob) – Attitudes toward school

ITEM		MEAN (SD)	t	df	SIG	% CHANGE **	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I enjoy school.	pre	3.75 (0.90)	-4.24	798	.00	2.67	19	47	27	4	3
	post	3.85 (0.93)					25	44	24	4	3
I pay attention to the teacher in class.	pre	4.21 (0.74)	0.57	794	.57	-0.48	40	44	14	1	1
	post	4.19 (0.74)					36	48	14	1	1
My teachers really care about me.	pre	4.12 (0.84)	-0.093	799	.93	0.00	38	40	19	2	1
	post	4.12 (0.87)					39	38	20	2	1
I believe that I will go to college.	pre	4.69 (0.71)	2.39	796	.017	-1.20	80	13	5	1	1
	post	4.63 (0.76)					76	15	6	2	1
The time I spend in school will benefit me in the long run.	pre	4.41 (0.78)	-1.06	795	.29	0.45	56	30	12	1	1
	post	4.43 (0.77)					58	29	22	1	1
My teachers believe that I can succeed.	pre	4.39 (0.77)	1.71	788	.088	-1.14	53	36	9	1	1
	post	4.34 (0.76)					48	39	11	1	1
Going to school is *not* a waste of time for me.*	pre	4.17 (1.11)	0.00	789	1.00	0.00	53	24	14	5	4
	post	4.17 (1.09)					52	27	12	5	4
I enjoy learning about new subjects in school.	pre	4.01 (0.91)	-0.21	793	.83	0.00	35	36	25	3	1
	post	4.01 (0.88)					32	41	23	2	2
ATTITUDE Composite Mean	pre	4.23 (0.56)	-0.06	766	.95	0.00					
	post	4.23 (0.59)									

*Reverse coded for analysis (Original statement in survey was "Going to school is a waste of time for me"); **(post-visit mean minus pre-visit mean)/pre-visit mean [NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 4.6. Parks As Classrooms (Purchase Knob) – Stewardship

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I can reduce the amount of electricity I use.	pre	3.90 (0.86)	-6.90	792	.00	5.38	24	49	21	5	1
	post	4.11 (0.80)					33	49	15	2	1
If I find an arrowhead in GRSM, I should leave it alone.	pre	3.47 (1.28)	-12.61	795	.00	15.56	29	22	26	15	8
	post	4.01 (1.22)					48	23	16	7	6
I can make a difference in my community.	pre	4.05 (0.84)	-0.69	793	.49	0.49	33	45	18	3	1
	post	4.07 (0.85)					34	44	18	3	1
I feel it is important to take good care of the environment.	pre	4.48 (0.71)	2.72	797	.007	-1.56	59	31	8	1	1
	post	4.41 (0.70)					52	37	9	1	1
I should not pick wildflowers in GRSM.	pre	3.92 (1.13)	-5.63	789	.00	5.34	39	30	20	6	5
	post	4.13 (1.03)					48	27	18	4	3
My actions can influence the health of the environment.	pre	4.20 (0.83)	0.78	791	.43	-0.48	41	42	15	1	1
	post	4.18 (0.83)					40	41	17	1	1
When I'm outside, I like to explore nature.	pre	4.18 (0.96)	0.17	791	.86	0.00	48	30	17	3	2
	post	4.18 (0.92)					45	33	18	3	1
I have the power to help protect the environment.	pre	4.12 (0.87)	-0.75	795	.46	0.49	38	42	16	3	1
	post	4.14 (0.88)					39	41	15	3	2
It is up to me to make sure I do not harm the environment when I am playing outside.	pre	4.04 (0.92)	-0.70	791	.48	0.50	35	40	19	4	2
	post	4.06 (0.92)					38	37	20	4	1
STEWARDSHIP Composite Mean	pre	4.04 (0.59)	-6.75	753	.00	0.072					
	post	4.15 (0.61)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 4.7. Parks As Classrooms (Purchase Knob) – Interest

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Extremely Interested)	4 (Very Interested)	3 (Somewhat Interested)	2 (Slightly Interested)	1 (Not at all Interested)
Learning about plants, animals, and the places they live.	pre	3.63 (1.05)	-0.12	797	.91	0.28	24	30	33	9	4
	post	3.64 (1.03)					24	21	34	8	3
Learning about cultural and historic sites in GRSM.	pre	3.50 (1.08)	-0.33	796	.74	0.29	21	28	34	13	4
	post	3.51 (1.10)					22	28	34	11	5
Learning how to protect the environment.	pre	3.58 (1.08)	0.50	793	.62	-0.56	23	31	31	11	4
	post	3.56 (1.07)					23	29	34	10	4
Learning about environmental threats to GRSM, such as air pollution.	pre	3.50 (1.11)	1.47	797	.14	-1.43	21	29	34	10	6
	post	3.45 (1.11)					20	27	34	13	6
Exploring the outdoors near my home.	pre	4.02 (1.12)	-0.31	795	.78	0.25	44	27	18	7	4
	post	4.03 (1.09)					44	28	17	7	4
Making my community a better place.	pre	3.78 (1.00)	1.01	789	.31	-0.79	27	36	27	7	3
	post	3.75 (1.06)					28	34	27	7	4
INTEREST Composite Mean	pre	3.67 (0.80)	0.70	776	.49	-0.27					
	post	3.66 (0.85)									

Table 4.8. Parks As Classrooms (Purchase Knob) – Social Norms

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
My teachers encourage me to help protect the environment.	pre	3.97 (0.88)	0.32	789	.75	-0.25	30	42	23	4	1
	post	3.96 (0.89)					28	46	21	3	2
My family likes me taking field trips to the park.	pre	3.86 (0.97)	-1.06	788	.29	1.04	30	34	30	3	3
	post	3.90 (0.92)					29	40	26	3	2
My friends think cleaning up a park is cool.	pre	2.86 (1.13)	-0.07	794	.94	0.00	8	20	39	18	15
	post	2.86 (1.10)					7	18	42	18	15
My family would be proud of me if I volunteered at GRSM.	pre	4.03 (0.93)	2.86	784	.004	-2.23	36	38	21	4	1
	post	3.94 (0.96)					34	33	27	4	2
My family wants me to help protect the environment.	pre	3.74 (0.96)	-0.68	789	.50	0.53	25	35	32	6	2
	post	3.76 (0.94)					24	37	32	5	2
SOCIAL NORMS Composite Mean	pre	3.69 (0.69)	0.32	756	.75	0.00					
	post	3.69 (0.69)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 4.9. Parks As Classrooms (Purchase Knob) – Attachment to GRSM

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I would like to visit GRSM with my family or friends.	pre	4.13 (0.93)	3.86	796	.00	-3.15	42	35	18	4	1
	post	4.00 (0.99)					37	34	22	5	2
GRSM is one of my favorite places to visit.	pre	3.30 (1.08)	-2.55	778	.011	2.73	16	23	43	12	6
	post	3.39 (1.11)					18	30	33	13	6
GRSM is important to me.	pre	3.90 (0.98)	-1.57	788	.12	1.28	32	35	26	5	2
	post	3.95 (0.96)					33	36	24	5	2
I love GRSM.	pre	3.77 (1.00)	-1.64	791	.10	1.33	28	30	34	5	3
	post	3.82 (1.04)					31	32	28	6	3
ATTACHMENT TO GRSM Composite Mean	pre	3.78 (0.82)	-0.66	760	.51	0.29					
	post	3.79 (0.88)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 4.10. Parks As Classrooms (Purchase Knob) –Park and Community Behaviors

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Very Often)	4 (Often)	3 (Sometimes)	2 (Rarely)	1 (Never)
Volunteer to help the environment.	pre	3.03 (1.09)	-1.00	790	.32	1.32	10	23	37	21	9
	post	3.07 (1.09)					10	23	39	19	9
Pick up trash left by others.	pre	3.50 (1.04)	-0.52	792	.60	0.28	18	33	33	12	4
	post	3.51 (1.05)					19	34	32	11	4
Help clean up a local park when asked.	pre	3.11 (1.24)	-3.83	791	.00	5.14	1	21	32	18	13
	post	3.27 (1.20)					18	24	33	16	9
Work with others to clean up my community.	pre	3.08 (1.16)	-1.68	790	.096	1.95	13	23	32	22	10
	post	3.14 (1.14)					13	24	35	1	9
Participate in activities to improve my school*	pre	3.57 (1.17)	-0.034	784	.97	0.00	26	29	28	11	6
	post	3.57 (1.12)					23	32	29	11	5
Talk to my friends about the environment when I am not at school.	pre	2.57 (1.22)	-2.24	792	.025	3.11	9	13	27	29	22
	post	2.65 (1.24)					11	12	31	25	21
COMMUNITY Composite Mean	pre	3.15 (0.90)	-2.57	765	.01	1.90					
	post	3.21 (0.92)									

*Surveys distributed early in the study had "Work with my teachers and friends to improve my school" on the pre-visit version and "Participate in activities to improve my school" on post-visit version. Halfway through the study, this was corrected to "Participate in activities to improve my school" for both versions. [NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 4.11. Parks As Classrooms (Purchase Knob) – Home Behaviors

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Very Often)	4 (Often)	3 (Sometimes)	2 (Rarely)	1 (Never)
Turn off the water when brushing my teeth.	pre	4.34 (1.08)	-1.08	789	.28	0.92	65	17	10	4	4
	post	4.38 (1.01)					65	18	10	4	3
Collect aluminum cans for recycling.	pre	3.61 (1.31)	-2.80	787	.005	3.05	35	21	23	12	9
	post	3.72 (1.31)					39	21	21	10	9
Talk to my family about ways to protect the environment.	pre	2.79 (1.31)	-3.72	787	.00	5.02	13	17	26	24	20
	post	2.93 (1.29)					15	18	30	20	17
Turn the lights out when I leave a room.	pre	4.17 (1.07)	-3.88	785	.00	2.88	51	27	13	5	4
	post	4.29 (1.00)					57	25	11	4	3
Recycle paper products.	pre	3.78 (1.28)	-1.43	790	.15	1.32	40	22	21	9	8
	post	3.83 (1.28)					43	22	18	10	7
HOME Composite Mean	pre	3.74 (0.86)	-4.19	775	.00	2.41					
	post	3.83 (0.87)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 4.12. Parks As Classrooms (Purchase Knob) – Self-assessed learning
(Post-visit survey only)

How much did you learn about...	MEAN (SD)	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
		5 (A great deal)	4 (A moderate amount)	3 (A little)	2 (Almost none)	1 (None)
The natural environment	4.28 (0.81)	45	41	12	1	1
GRSM	4.30 (0.84)	49	36	12	1	2
How plants and animal interact	4.09 (0.96)	40	37	17	4	2
The history of the people in GRSM	3.34 (1.20)	20	25	32	14	9
The purpose of the NPS	4.08 (1.00)	42	34	17	4	3
SELF-ASSESSED LEARNING Composite Mean	4.02 (0.75)					

Table 4.13. Parks As Classrooms (Purchase Knob) – Field Trip scale

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I meet interesting people on field trips.	pre	3.81 (0.95)	-4.03	785	.000	3.94	27	37	29	5	2
	post	3.96 (0.91)					32	39	24	4	1
What I learn on field trips is useful to me.	pre	3.97 (0.85)	-1.03	795	.302	0.76	29	43	24	3	1
	post	4.00 (0.86)					31	43	23	2	1
I enjoy learning when I am outside.	pre	4.13 (0.96)	.21	778	.837	-0.24	43	35	17	3	2
	post	4.12 (0.96)					43	34	17	4	2
I have a lot of fun on field trips.	pre	4.40 (0.78)	3.33	792	.001	-2.05	56	29	13	1	1
	post	4.31 (0.81)					50	33	14	2	1
Field trips help me understand what I am taught in class.	pre	4.07 (0.88)	-1.43	787	.153	1.23	37	38	21	3	1
	post	4.12 (0.87)					38	40	18	3	1
FIELD TRIP Composite Mean	pre	4.08 (0.65)	-1.58	742	.113	0.71					
	post	4.11 (0.67)									

[NOTE: *Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]*

Teacher's responses regarding the Parks As Classrooms (Purchase Knob) program

A total of 17 teachers responded to the teacher survey for the Parks As Classrooms (Purchase Knob) program. These teachers included 6th through 12th grade teachers. The majority (59%) taught high school (grade 9, 10, 11 and/or 12) and the remainder taught middle school (grade 6, 7 and/or 8). The majority (88%) of respondents taught a science or science and math. Two respondents taught science and history. Science subjects taught included Biology, Biology Honors, Biology AP, Environmental Science, and Chemistry. The average number of years that teachers had taught was 13.06 (SD=6.44; minimum was 4 years, maximum was 29 years), and 76% had taught 10 years or more. The majority of respondents were female (65%) and all indicated they were White, not of Hispanic descent. Fifty-nine percent of the respondents had participated in professional development training with GRSM.

Pre-Trip & Post-Trip Curriculum
The majority (88%) of respondents indicated they used the pre-trip activities with their students prior to the Parks As Classrooms (Purchase Knob) program. Input regarding pre-trip activities included the following:
- Camping skills, phylogeny of animals
- Reviewed the concepts we would be studying
- Discussed terms and explained importance
- Used the lesson plan that was sent to me
- Used their own textbook
- Ozone garden webquest (includes research and leaf game), salamander related terms and readings provided by GRSM (including video)
- Ozone introduction
- Snail classification, showed videos
- Students read information about salamanders and snails
- Reviewed terms, map skills, video, Purchase Knob camera [webcam?], ozone reports on website
- Testing of soil types, testing PH levels
- We used them all
- Webcam, lichen ID

The majority (65%) of respondents also used the post-trip activities. The responses regarding post-trip activities included the following:
- Continued with environmental issues
- Debrief on relevant topics and issues (3 respondents)
- Further testing of soils
- Used data collected to compare to class labs; students used data in lab reports
- Graphing ozone data, comparing ozone levels in lower and higher elevations, assessing students on salamanders
- School yard lichen monitoring, ozone graphing
- Incorporating this trip into research planning and also ecology unit
- Only reviewed trip by discussion

- Completed the post-visit survey, referred to trip info (apply)
- Quiz

Nine respondents replied to the question regarding the need for any additional materials. Five of these indicated there was no need for additional materials from the GRSM. Four made suggestions for materials that would be useful to better prepare students for the GRSM experience. These suggestions were:
- It would be good to maybe give a list of possible bugs and insets that could be found so that if they did see some, they would know what they were and then look more closely under the big microscope.
- More historical information about GSMNP & Purchase Knob
- I feel like they have it down, but my webquest on ozone may include a more in depth pre-visit activity
- I would like a lichen card and data circles to do at school trees

Satisfaction
Teacher satisfaction was extremely positive. On a scale of 1 (Very dissatisfied) to 10 (Very satisfied), the mean rating was 9.71 (SD=0.69, minimum = 8, maximum = 10). The majority of respondents (82%) selected 10.

General Impacts of the Program
Teachers reported extremely positive attitudes regarding the general influence of the Parks As Classrooms (Purchase Knob) program (Table 4.14). Teachers indicated that the program helped them meet state standards (M=4.47), the curriculum was appropriate (M=4.71), students learned a lot (M=4.65), students had fun (M=4.88), and the content was relevant to students' lives (M=4.65). Teachers also indicated they would like to do another GRSM program with their students (M=4.88). Teachers gave a lower rating (M=4.0) for "My students became motivated to perform better academically." One explanation for this lower rating may be that the teacher survey occurred 10 days after the field trip, making it hard for teachers to observe a noticeable change in motivation to perform.

Table 4.14. Teacher rating of the general impacts of the Parks As Classrooms (Purchase Knob) experience (N=17)

General Impacts	Mean	SD
This program helped my class meet state curriculum standards.	4.47	0.51
The program content was academically appropriate for my students.	4.71	0.47
My students became motivated to perform better academically.	4.06	0.68
My students learned a lot about important topics.	4.65	0.61
I would like to do another GRSM program with my students.	4.88	0.33
My students had fun.	4.88	0.33
The program content was relevant to my students' lives.	4.65	0.70

Scale: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree.

Impacts on Student Outcomes
These questions investigated teachers' perceptions regarding the influence of the GRSM programs on students' appreciation, stewardship, knowledge, understanding, and interest pertaining to a range

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of topics. Teachers were asked: "Indicate to what extent you think the GRSM experience has positively impacted your class overall in the following areas:" Response categories included: a great deal, a moderate amount, a little, almost none, and none. Teachers were also asked: "As a result of your recent GRSM educational program, what percentage of your students increased their:" Response categories for this question included: 0-20% 21-40%, 41-60%, 61-80%, and 81-100%.

Teachers were very positive about the impact of the program on their students (Table 4.15). "Appreciation for the natural environment" (M=4.71), "Environmental stewardship" (M=4.53), "Understanding of ecological processes" (M=4.53), and "Appreciation for biological diversity" (M=4.29) were the outcomes with the highest impact ratings. Over half of teachers indicated that at least 60% of students improved on "Appreciation for the natural environment" (69%), "Environmental stewardship" (M=70%), "Understanding of ecological processes" (60%), and "Appreciation for biological diversity" (80%). "Knowledge of the history of GRSM" (M=3.88) and "Knowledge of GRSM natural history" (M=3.94) were the outcomes with the lowest impact ratings. Despite these lower impact ratings, 56% of respondents indicated that at least 60% of students improved on both of these outcomes. In addition, only 20% of teachers indicated that at least 60% of students improved on "Academic performance" (M=4.0).

Table 4.15. Teacher rating of student outcomes from participation in the Parks As Classrooms (Purchase Knob) program.

Outcomes	Impact rating* (N=17)		% Students increasing their…(N=16)				
	Mean	SD	0-20	21-40	41-60	61-80	81-100
Academic performance	4.00	0.71	7	13	60	13	7
Positive attitudes toward school	4.24	0.75	7	13	27	40	13
Appreciation for the natural environment	4.71	0.59	6	6	19	50	19
Environmental stewardship	4.53	0.62	12	6	12	47	23
Understanding of ecological processes	4.53	0.72	0	11.8	29.4	29.4	29.4
Knowledge of the history of GRSM	3.88	1.05	12	13	19	37	19
Understanding of the mission of the National Park Service	4.00	1.12	6	13	25	25	31
Knowledge of GRSM natural history	3.94	1.14	6	13	25	31	25
Appreciation for biological diversity	4.29	0.85	0	12	18	47	23
Concern about issues and threats facing GRSM	4.24	0.83	0	11.8	29.4	29.4	29.4
Interest in taking actions to conserve or improve the environment	4.24	1.03	6	0	38	50	6
Scientific inquiry skills	4.25	0.93	6	12	38	25	19

*Scale: 1=None, 2=Almost none, 3=A little, 4=A moderate amount, 5=A great deal

GRSM Staff
Teacher ratings of GRSM staff on all categories (Table 4.16) were extremely positive. Teachers rated the overall performance of the staff as very good (M=4.9). Staff received the highest ratings for their

flexibility (4.94), organization (4.94), and working well with teachers (4.94). Staff received the lowest rating for "entertaining" (4.53).

Table 4.16. Teacher ratings of GRSM Staff working with Parks As Classrooms (Purchase Knob) (N=17)

Staff Rating Category	Mean*	SD
Knowledgeable	4.88	0.49
Entertaining	4.53	0.62
Flexible	4.94	0.24
Organized	4.94	0.24
Enthusiastic	4.76	0.66
Patient	4.88	0.49
Charismatic-likeable	4.82	0.53
Explained things clearly	4.88	0.49
Communicated an explicit message	4.88	0.49
Interacted positively with students	4.88	0.49
Worked well with teachers	4.94	0.24
Overall performance	4.88	0.49

Scale: 1=Very poor, 2=Poor, 3=Average, 4=Good, 5=Very good

Teacher actions before and after the trip

These questions investigated teachers' intentions to incorporate environmental themes, outdoor activities, and inquiry-based, hands-on activities into their teaching. Teachers were asked: "Prior to participation in the GRSM program, how often have you done the following?" Response categories included: very often, often, sometimes, rarely, and never. Teachers were also asked: "As a result of participating in the GRSM program, are you more or less likely to participate in the following activities in the next year." Response categories included: much less likely, less likely, same as before, more likely, much more likely.

"Incorporate inquiry based, hands on activities into the students' school experience" was the most common pre-visit action (M=4.71) (Table 4.17). "Volunteer to help the environment" was the least common pre-trip action (M=3.65) and this was also the least likely post-visit activity (M=3.76). "Incorporate inquiry based, hands on activities into the students' school experience" was the only action that received a rating of 4 (more likely) or more for post-visit likelihood.

Table 4.17. Teacher action behaviors before and after the Parks As Classrooms
(Purchase Knob) program (N=17)

Actions	Pre-visit frequency		Post-visit likelihood	
	Mean[1]	SD	Mean[2]	SD
Volunteer to help the environment.	3.65	0.79	3.76	0.75
Incorporate environmental themes in my teaching.	4.59	0.62	3.82	0.88
Use environmental themes to better meet state standards.	4.53	0.62	3.88	0.86
Incorporate inquiry based, hands on activities into the students' school experiences	4.71	0.59	4.06	0.75
Incorporate outdoor activities into your classes.	4.35	0.79	3.94	0.83

[1]Scale: 1=Never, 2=Rarely, 3=Sometimes, 4=Often, 5=Very often
[2]Scale: 1=Much less likely, 2=Less likely, 3=Same as before, 4=More likely, 5=Much more likely

Visitation

Since the teacher survey occurred after the Parks As Classrooms visit, all of the respondents had visited GRSM at least once in the current academic year. For 65% of the respondents, this was the only field trip they had taken in the current academic year. Of the remaining individuals, 24% had made 2 to 5 field trips to the GRSM and 11% indicated they had taken no field trips to the GRSM. Almost half (44%) indicated that they planned one or two additional trips to the GRSM in the current academic year. Only 16% had a GRSM ranger visit their class during this academic year. All of the respondents had visited GRSM with their school at least once in total (Once: 24%, Twice: 24%, More than 5 times: 52%). All but one of the respondents had visited GRSM with their family, friends, or other groups, with the majority (82%) having visited more than 5 times.

Teacher comments

- Great experience with inquiry activities and being able to camp overnight. can't wait to bring another group! Invert/shaker box investigation might be enhanced by allowing students to have/use their own dissection scopes to classify organisms rather than just view smart board, more hands-on.

- I am always impressed with the GSMNP's Parks as Classrooms at least at PK, the programs are rigorous & developmentally appropriate.

- I cannot say enough good things about our experience @ Purchase Knob. It was cold and rainy, but the students and park rangers held steadfast and worked diligently and completed the experiments. The experiments were completely relevant to my teaching.

- It definitely would like to make this a yearly field trip for my students.

- Ranger Emily was fantastic! When a ranger was sick and they were short she was flexible and enthusiastic! You can tell she loves her children and her job! Verbal usage, technique of teaching vocabulary! Very patient! Love, Love, Loved her!

- The ranger needed to tell the students a little about the bugs and insects they found, not move the smart board microscope so fast that we couldn't see. It seemed that for the first time we were finished in record time with all 4 groups. I have been coming to Purchase Knob for 10 years. My students have searched for bugs/insects in the same area for those years. Not only my students but all the others too from our school. It seems that the area needs to be changed after that period of time. I was very disappointed in the amount and different insects we found this year. Also, doing this for 12 min is really not enough time. I looked back and we used to do it longer. WE really enjoyed it and the students learned a lot but it just was a little disappointing this year. We were just finished too soon. I think the lessons were reduced but need to add some things back.

- The trip we take is a highlight every year. I wish we could go more often!

- We left so lucky to be there, and the kids are still talking about it.

- We were particularly appreciative of Benny Glasgow who took time from his research to work with students on Platyhelminthes studies

- Wish we had more time.

- Wonderful, great weather is always a plus!, lets plan some Classrooms visits (tardigrades, bugs, leaf litter, aquatic survey across from CCS, job corps, elk trunk) Thanks for all you do.

Chapter Five
PARKS IN CLASSROOMS

Program Summary

The GRSM Parks In Classrooms program focuses on engaging students in GRSM related curriculum at local schools. GRSM Parks In Classrooms programs involve GRSM educators traveling to local schools and meeting with specific classes to introduce students to GRSM and topics related to the park. The GRSM Parks in Classrooms program services kindergarten through high school students, with the highest demand for K-4 programs. However, the school groups participating in this study were all eighth graders, consistent with the study focus on middle school and high school students.

One Parks In Classrooms program was evaluated and occurred during the Fall 2010 at a Public middle school in the Eastern Tennessee region. Three rangers visited the school and divided 270 students into 13 one hour sessions. The mean group size per session was 21 students. Two rangers presented to four different groups of students and one ranger presented to five different groups of students. The reported average experience level of the staff was 6.5 years. The program occurred during the school day. All thirteen groups participating in the Parks In Classrooms program received a pre-visit and post-visit survey; no teacher surveys were returned to the research team.

Each Parks In Classrooms session involved a one-hour presentation focused on biodiversity. The program included an introduction to the GRSM, a review of biomes and biodiversity, a review of ATBI (All Taxa Biodiversity Inventory) research in the park (unknowns, process of study, how the students can be involved) and students practiced classifying invertebrates with a key. Instructors were asked to indicate for each group whether the educational program included certain desired outcomes, themes or topics and this information is summarized in Table 5.1.

Table 5.1. Characteristics of Parks In Classrooms based on instructor survey

Desired Outcome	Yes	No
Raise Awareness	✓	
Increase Knowledge	✓	
Influence Attitudes	✓	
Change Behaviors	✓	
Develop Skills	✓	
Practice Skills	✓	
Theme of program	**Yes**	**No**
Diversity and Abundance	✓	
Continuum of Human Activity		✓
Refuge of Scenic Beauty		✓
Topic of program	**Yes**	**No**
Natural History	✓	
Threats to GRSM		✓
Human History of Area		✓

Sample

One Parks In Classrooms program was evaluated and there were 202 total respondents with matched pre-visit and post-visit surveys, and there were 88 unmatched surveys and 1 matched set that was incomplete. The unmatched and incomplete surveys were not used in the analysis.

Demographics

Demographic results are based on post-visit survey responses (Table 5.2). Respondents were all in eighth grade. This group had more females (57%) than males. The average age of respondents was 13.66 years (SD=0.55). The ethnicity of respondents was primarily "White, not of Hispanic descent" (79%).

Table 5.2. Parks In Classrooms demographics (Post-visit survey data)

VARIABLE	CATEGORY	n	(%)
Gender			
	Female	114	57
	Male	85	43
Grade			
	8	202	100
Age			
	12	2	1
	13	71	35
	14	123	61
Ethnicity			
	White, not Hispanic	159	79
	Black, not Hispanic	17	8
	Hispanic	3	2
	Mixed	17	8
	Native Hawaiian	1	1
	Other	5	2

Visits to GRSM

Respondents were asked to estimate the number of times they had visited GRSM in the last year and in their entire life (Table 5.3). For the question asking about visits in the last year with your school, 93% of students indicated "Never" on the post-visit survey (93% also indicated "Never" on Pre-visit survey). Also, a majority (72%) of students had never visited the GRSM with their school in their entire life. However, the majority of respondents had visited GRSM one or more times with their family, friends or other groups in the last year (51%) or at least once during their life (73%). Consequently, for many of the respondents, the Parks In Classrooms program was not their first introduction to the GRSM. A majority of respondents (76%) participating in the Parks In Classrooms program indicated they had a GRSM ranger visit their Classrooms in the last year. However, since this is a "post-visit" survey response after a GRSM ranger visited the school, this is an unexpected finding. Either students did not identify the GRSM staff member as a representative of the GRSM or did not identify that visitor as a "ranger".

Table 5.3. How many visits have Parks In Classrooms respondents taken to GRSM?

VISITATION	N	MEAN (SD)	MIN	MAX	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
					Never	Once	Twice	3-5 Times	More than 5 times
1. In the <u>last year</u>, how many times have you visited Great Smoky Mountains National Park with your school? (post-visit)	192	0.14[1] (0.62)	0	6	93	3	2	1	1
2. In the <u>last year</u>, how many times have you visited Great Smoky Mountains National Park with your family, friends, or other groups? (post-visit)	188	1.93[1] (3.12)	0	21	49	12	13	18	8
3. In the <u>last year</u>, how many times has a ranger from Great Smoky Mountains National Park visited your class? (post-visit)	194	0.86[1] (0.80)	0	8	24	72	1	2	1
4. In your <u>entire life</u>, how many times have you visited Great Smoky Mountains National Park with your school? (pre-visit)	199	1.44[1,2] (0.81)	1	5	72	17	7	3	1
5. In your <u>entire life</u>, how many times have you visited Great Smoky Mountains National Park with your family, friends, or other groups? (pre-visit)	201	3.17[1,2] (1.62)	1	5	27	13	10	19	31

[1]*Respondents provided a number*
[2]*Response was on a 5-point scale (1=Never, 2=Once, 3=Twice, 4=3-5 times, 5=More than 5 times)*

Influence of the Parks In Classrooms Program on Students: Pre-visit vs. Post-visit

Attitudes towards school

There was a significant decrease (p≤.01) on the composite mean (mean was 4.1 for the pre-visit and 4.0 for the post-visit survey) for the *Attitudes towards school (AtS)* scale (Table 5.4). Overall, Parks In Classrooms students had positive attitudes about school with between 51% and 91% of respondents indicating strongly agree or agree to the items in the *AtS* scale, before and after attending the program.

Five of the eight *AtS* items were significant, with four of these five showing a significant decrease in the mean score. "I enjoy school" was the only item that showed a significant increase (p≤.05), and it was also the lowest rated item (mean was 3.4 on the pre-visit and 3.6 on the post visit survey). The portion of respondents indicating strongly agree or agree for this item was 51% before the program and 58% after the program. In comparison, "Going to school is *not* a waste of time for me" showed a significant decrease (p≤.05). The portion of respondents indicating strongly agree or agree for this item was 79% before the program and 72% after the program. The highest rated item was "I believe that I will go to college" (mean was 4.7 on the pre-visit and 4.5 on the post-visit survey), but this item showed a significant decrease (p≤.001). For this item, the portion of respondents indicating strongly agree or agree was 91% before the program and 88% after the program.

Stewardship

The change in the composite mean for the *Stewardship* scale was not significant (Table 5.5). Overall, Parks In Classrooms students were positive about *Stewardship* with between 54% and 87% of respondents indicating strongly agree or agree to the items in the scale, before and after attending the program. Three out of nine items had a significant change. The item with the lowest rating was "If I find an arrowhead in GRSM, I should leave it alone" (3.5 on the pre-visit and 3.7 on the post-visit survey). This item showed a significant increase (p≤.01) in the mean score and the portion of respondents indicating strongly agree or agree with this item was 54% on the pre-visit and 63% on the post-visit survey.

The item with the highest level of agreement (mean was 4.3 on the pre-visit and 4.2 on the post-visit survey) was "I feel it is important to take good care of the environment." This item showed a significant decrease (p≤.05) in the mean score. The portion of respondents who strongly agreed or agreed with this item was 87% before the program and 80% after the program. "When I'm outside I like to explore nature" also had a significant decrease (p≤.001) in the mean score (mean was 4.2 on the pre-visit and 3.9 on the post-visit survey) and the portion of respondents indicating strongly agree or agree was 74% before the program and 68% after the program.

Interest

The composite mean for the *Interest* scale did not change significantly (Table 5.6). Parks In Classrooms students were only somewhat positive about learning and exploring with between 35% and 64% of respondents indicating they were extremely interested or very interested in the items on the *Interest* scale, before and after attending the program.

None of the mean scores for the items on the scale changed significantly. The highest rated item was "Exploring the outdoors near my home" (mean was 3.78 on the pre-visit and 3.76 on the post-visit survey), and the portion of respondents indicating extremely or very interested was 64% before the program and 63% after the program. The lowest rated item was "Learning about environmental threats to GRSM such as air pollution" (mean was 3.2 on the pre-visit and 3.1 on the post-visit survey). For this item, the portion of respondents indicating extremely or very interested was 41% before the program and 35% after the program.

Social Norms

The composite mean for the *Social Norms* scale did not change significantly (Table 5.7). Overall, Parks In Classrooms students were only somewhat positive about *Social Norms* with between 9% and 57% of respondents indicating strongly agree or agree to items in the scale before and after attending the program.

Three items on the *Social Norms* scale showed a significant change. The only item with a significant increase (p≤.01), was "My friends think cleaning up a park is cool," and this item had the lowest level of agreement (mean was 2.3 on the pre-visit and 2.6 on the post-visit survey). The portion of respondents indicating strongly agree or agree for this item was 9% on the pre-visit and 14% on the post-visit survey. The two items that had a significant decrease in the mean score (p≤.01) included "My family would be proud of me if I volunteered at GRSM," which was also highest rated item on the scale (mean was 3.9 on the pre-visit and 3.8 on the post-visit survey). The portion of respondents indicating slightly agree or agree on this item was 72% before the program and 59% after the program. The second item with a significant decrease was "My family likes me taking field trips to the park." The portion of respondents indicating slightly agree or agree on this item was 57% before the program and 50% after the program.

Attachment to GRSM

The change in the composite mean for the *Attachment to GRSM* scale was not significant (Table 5.8). Overall, Parks In Classrooms students held relatively positive attitudes about GRSM, with between 44% and 87% of respondents indicating strongly agree or agree to the items in the scale, before and after attending the program.

One item on the scale showed a significant decrease in agreement (p≤.001). "I would like to visit GRSM with my family or friends," was the highest rated item (mean was 4.4 on the pre-visit and 4.1 on the post-visit survey), and the magnitude of this decrease was 7.52%. The portion of respondents indicating strongly agree or agree on this item was 87% before the program and 77% after the program. "GRSM is one of my favorite places to visit" was the lowest rated item (mean was 3.36 on the pre-visit and 3.41 on the post-visit survey). 44% of respondents indicated strongly agree or agree for this item before the program and 49% after the program.

Park and Community Behaviors

The composite mean (mean was 2.6 for the pre-visit and 2.8 for the post-visit survey) for the *Behaviors Park and Community* scale showed a significant increase (p≤.01) (Table 5.9). Overall, Parks In Classrooms students did not perform or intend to perform *Park and Community Behaviors often,* with between 13% and 43% of respondents indicating very often or often for the items in the scale, before and after attending the program

Four out of six items showed a significant increase in the mean score. "Volunteer to help the environment" showed a significant increase (p≤.01) in the mean score (mean was 2.5 on the pre-visit and 2.7 on the post-visit survey). "Help clean up a local park when asked" showed a significant increase (p≤.001) in the mean score (mean was 2.6 on the pre-visit and 2.9 on the post-visit survey). "Work with others to clean up my community" also had a significant increase (p≤.05) in the mean score (mean was 2.56 on the pre-visit and 2.74 on the post-visit survey. The lowest rated significant item was "Talk to my friends about the environment when I am not at school" (mean was 2.1 on the pre-visit and 2.4 on the post-visit survey). This item also showed a significant increase (p≤.001) and had the largest magnitude of change (16.23%). The portion of respondents indicating very often or often on this item was 13% before the program and 33% after the program. For all but the highest rated item, the portion of respondents indicating very often or often on either the pre-visit or post-visit survey was between 13% and 33%. The highest rated item was "Pick up trash left by others" (mean was 3.1 on the pre-visit and 3.2 on the post-visit survey), but this item did not show a significant change. 34% of respondents indicated very often or often on this item before the program and 44% after the program.

Home Behaviors

The composite mean (mean was 3.3 on the pre-visit and 3.5 on the post-visit survey) on the *Home Behaviors* scale showed a significant increase (p≤.001) (Table 5.10). Overall, Parks In Classrooms students performed or intended to perform *Home Behaviors,* with between 35% and 81% of respondents indicating very often or often for items in the scale, before and after attending the program.

Three of the five items had a significant increase in the mean score. The item with the largest magnitude of change (16.77%) was "Talk to my family about ways to protect the environment." This item had a significant increase at p≤.001 and was also the lowest rated item (mean was 2.2 on the pre-visit and 2.5 on the post-visit survey). 15% of respondents indicated they would perform the behavior very often or often before the program and 22% after the program.

Also, "Collect aluminum cans for recycling" (p≤.01), and "Recycle paper products" (p≤.05) showed a significant increase. The portion of respondents indicating very often or often for "Collect aluminum cans for recycling" was 35% before the program and 43% after the program. The portion of respondents indicating very often or often for "Recycle paper products" was 43% before the program and 48% after the program.

The highest rated item was "Turn off the water when brushing my teeth" (mean was 4.2 on the pre-visit and 4.3 on the post-visit survey. Although this item did not show a significant change, the portion of respondents indicating they would perform the behavior very often or often was 76% before the program and 81% after the program.

Self-assessed Learning

Respondents were asked to indicate how much they learned about GRSM specific concepts during the Parks In Classrooms program (Table 5.11). The composite mean for *Self-assessed Learning* was 3.9. Overall, the majority (67% or more) of Parks In Classrooms students believed they learned a great deal or moderate amount on all *Self-assessed learning* items except for "The history of the people in GRSM". "The history of the people in GRSM" received the lowest rating (mean was 3.4) and less than half of respondents (40%) indicated they learned a great deal or a

moderate amount about this topic. Learning about the GRSM received the highest rating (mean was 4.3) with 81% of respondents indicating they learned a great deal or a moderate amount.

Field Trips

The change in the composite mean for the *Field Trips* scale was not significant (Table 5.12). Overall, Parks In Classrooms students held positive attitudes about *Field Trips* with between 59% and 94% of respondents indicating strongly agree or agree to all items in the scale, before and after attending the program. Only "I have a lot of fun on fieldtrips" showed a significant change in mean score (p≤.001), and that change was negative (-5.43%). However this item was also the highest rated (mean was 4.6 on the pre-visit and 4.4 on the post-visit survey). 94% of respondents indicated strongly agree or agree for this item before the program and 86% after the program. "I meet interesting people on field trips" was the lowest rated item (mean was 3.6 on the pre-visit and the post-visit surveys). It is important to keep in mind that this was the only program among all of the GRSM programs that students did not go on a field trip during the time period between the pre-visit and post-visit surveys.

Table 5.4. Parks In Classrooms – Attitudes toward school

ITEM		MEAN (SD)	t	df	SIG	% CHANGE **	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I enjoy school.	pre	3.43 (0.99)	-2.17	201	.031	3.76	11	40	37	6	6
	post	3.55 (0.96)					13	45	30	8	4
I pay attention to the teacher in class.	pre	4.02 (0.78)	1.96	201	.051	-2.39	27	52	19	1	1
	post	3.93 (0.80)					22	54	21	2	1
My teachers really care about me.	pre	3.97 (0.91)	2.62	200	.009	-4.13	31	41	22	4	2
	post	3.80 (0.94)					25	39	27	8	1
I believe that I will go to college.	pre	4.66 (0.73)	4.09	199	.00	-3.78	77	14	7	1	1
	post	4.49 (0.88)					67	21	8	2	2
The time I spend in school will benefit me in the long run.	pre	4.35 (0.84)	1.50	198	.14	-2.18	53	32	11	3	1
	post	4.25 (0.89)					48	34	14	2	2
My teachers believe that I can succeed.	pre	4.25 (0.83)	2.55	196	.011	-3.22	44	39	14	2	1
	post	4.12 (0.85)					37	42	18	2	1
Going to school is *not* a waste of time for me.*	pre	4.26 (1.00)	2.18	198	.031	-4.13	56	23	14	5	2
	post	4.08 (1.16)					51	21	18	5	5
I enjoy learning about new subjects in school.	pre	3.71 (0.96)	0.86	198	.39	-1.48	21	42	28	6	3
	post	3.65 (1.03)					23	34	35	3	5
ATTITUDE Composite Mean	pre	4.09 (0.54)	3.09	192	.002	-2.44					
	post	3.99 (0.58)									

*Reverse coded for analysis (Original statement in survey was "Going to school is a waste of time for me"); **(post-visit mean minus pre-visit mean)/pre-visit mean [NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 5.5. Parks In Classrooms – Stewardship

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I can reduce the amount of electricity I use.	pre	3.71 (0.83)	-1.30	200	.19	2.02	12	55	25	6	2
	post	3.78 (0.89)					18	54	21	4	3
If I find an arrowhead in GRSM, I should leave it alone.	pre	3.49 (1.17)	-2.98	200	.003	6.13	21	33	26	12	8
	post	3.70 (1.20)					31	32	21	9	7
I can make a difference in my community.	pre	3.84 (0.93)	0.24	198	.81	-0.39	27	38	29	4	2
	post	3.83 (0.93)					25	42	26	5	2
I feel it is important to take good care of the environment.	pre	4.30 (0.72)	2.29	199	.023	-3.02	45	42	12	1	0
	post	4.17 (0.89)					42	38	17	1	2
I should not pick wildflowers in GRSM.	pre	3.85 (1.08)	-0.70	199	.48	1.69	32	36	20	8	4
	post	3.92 (1.09)					38	29	22	8	3
My actions can influence the health of the environment.	pre	4.03 (0.87)	0.30	195	.77	-0.50	31	47	18	2	2
	post	4.01 (0.93)					34	40	22	2	2
When I'm outside, I like to explore nature.	pre	4.15 (0.97)	3.56	197	.00	-5.47	48	26	20	4	2
	post	3.92 (1.05)					36	32	25	3	4
I have the power to help protect the environment.	pre	3.89 (0.87)	-0.077	198	.94	0.13	24	48	22	1	2
	post	3.90 (0.93)					28	42	23	5	2
It is up to me to make sure I do not harm the environment when I am playing outside.	pre	4.03 (0.86)	1.96	197	.052	-3.37	33	43	20	3	1
	post	3.89 (0.97)					29	40	25	3	3
STEWARDSHIP Composite Mean	pre	3.94 (0.54)	0.68	186	.49	-0.51					
	post	3.92 (0.66)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 5.6. Parks In Classrooms – Interest

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Extremely Interested)	4 (Very Interested)	3 (Somewhat Interested)	2 (Slightly Interested)	1 (Not at all Interested)
Learning about plants, animals, and the places they live.	pre	3.42 (1.00)	-0.64	199	.52	1.17	16	28	41	12	3
	post	3.46 (0.98)					15	32	41	8	4
Learning about cultural and historic sites in GRSM.	pre	3.29 (1.19)	-0.99	198	.32	2.13	16	31	28	15	10
	post	3.36 (1.10)					17	29	35	13	6
Learning how to protect the environment.	pre	3.25 (1.12)	0.15	198	.88	-0.31	14	30	32	17	7
	post	3.24 (1.07)					14	26	37	18	5
Learning about environmental threats to GRSM, such as air pollution.	pre	3.15 (1.14)	0.57	198	.57	-1.43	12	29	30	21	8
	post	3.11 (1.11)					12	23	38	19	8
Exploring the outdoors near my home.	pre	3.78 (1.18)	0.34	198	.73	-0.66	36	28	22	9	5
	post	3.76 (1.17)					33	30	22	9	6
Making my community a better place.	pre	3.52 (1.10)	0.84	199	.40	-1.42	23	30	29	14	4
	post	3.51 (1.07)					20	32	32	12	4
INTEREST Composite Mean	pre	3.40 (0.82)	0.14	195	.89	0.00					
	post	3.40 (0.85)									

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Table 5.7. Parks In Classrooms – Social Norms

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
My teachers encourage me to help protect the environment.	pre	3.32 (0.93)	-0.31	198	.76	0.60	7	40	36	13	4
	post	3.34 (0.91)					7	41	35	14	3
My family likes me taking field trips to the park.	pre	3.67 (0.92)	2.66	198	.009	-4.80	20	37	38	2	3
	post	3.50 (1.00)					16	34	39	6	5
My friends think cleaning up a park is cool.	pre	2.33 (0.96)	-2.71	197	.007	9.10	1	8	36	33	22
	post	2.55 (1.06)					5	9	41	26	19
My family would be proud of me if I volunteered at GRSM.	pre	3.94 (0.98)	2.68	196	.008	-4.39	32	40	22	3	3
	post	3.77 (1.02)					27	32	34	2	5
My family wants me to help protect the environment.	pre	3.37 (0.90)	-0.47	197	.64	1.04	11	30	44	6	4
	post	3.41 (1.00)					15	30	42	9	4
SOCIAL NORMS Composite Mean	pre	3.33 (0.63)	0.30	189	.76	-0.38					
	post	3.32 (0.70)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 5.8. Parks In Classrooms – Attachment to GRSM

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I would like to visit GRSM with my family or friends.	pre	4.39 (0.91)	5.30	199	.00	-7.52	59	28	10	1	2
	post	4.06 (0.96)					38	39	17	4	2
GRSM is one of my favorite places to visit.	pre	3.36 (1.14)	-0.81	197	.42	1.67	19	25	35	13	8
	post	3.41 (1.10)					17	32	34	10	7
GRSM is important to me.	pre	3.76 (1.06)	-0.80	197	.42	1.49	28	36	24	9	3
	post	3.82 (1.06)					31	34	27	4	4
I love GRSM.	pre	3.79 (1.10)	0.34	198	.74	-0.66	33	29	26	8	4
	post	3.76 (1.10)					29	35	26	4	6
ATTACHMENT TO GRSM Composite Mean	pre	3.84 (0.86)	1.27	192	.20	-1.56					
	post	3.78 (0.92)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 5.9. Parks In Classrooms – Park and Community Behaviors

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Very Often)	4 (Often)	3 (Sometimes)	2 (Rarely)	1 (Never)
Volunteer to help the environment.	pre	2.46 (1.07)	-2.86	197	.005	8.41	4	12	33	29	22
	post	2.67 (1.11)					5	18	31	30	16
Pick up trash left by others.	pre	3.05 (1.13)	-1.62	197	.11	4.13	11	23	39	16	11
	post	3.18 (1.14)					12	31	30	18	9
Help clean up a local park when asked.	pre	2.59 (1.23)	-3.29	197	.001	10.93	9	14	30	22	25
	post	2.87 (1.28)					12	21	29	19	19
Work with others to clean up my community.	pre	2.56 (1.25)	-2.14	195	.034	7.19	10	14	21	33	22
	post	2.74 (1.23)					10	18	28	26	18
Participate in activities to improve my school*	pre	2.89 (1.20)	-0.71	193	.48	2.14	8	25	31	20	16
	post	2.95 (1.22)					11	22	35	15	17
Talk to my friends about the environment when I am not at school.	pre	2.10 (1.16)	-4.22	198	.00	16.23	6	7	20	27	40
	post	2.44 (1.26)					8	13	26	22	31
COMMUNITY Composite Mean	pre	2.62 (0.89)	-3.55	190	.00	7.25					
	post	2.81 (0.95)									

*Surveys distributed early in the study had "Work with my teachers and friends to improve my school" on the pre-visit version and "Participate in activities to improve my school" on post-visit version. Halfway through the study, this was corrected to "Participate in activities to improve my school" for both versions. [NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 5.10. Parks In Classrooms – Home Behaviors

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Very Often)	4 (Often)	3 (Sometimes)	2 (Rarely)	1 (Never)
Turn off the water when brushing my teeth.	pre	4.20 (1.18)	-1.80	198	.073	2.76	60	16	12	8	4
	post	4.32 (1.02)					60	21	12	4	3
Collect aluminum cans for recycling.	pre	2.89 (1.45)	-2.99	198	.003	8.86	20	15	24	17	24
	post	3.15 (1.39)					22	21	24	16	17
Talk to my family about ways to protect the environment.	pre	2.17 (1.17)	-4.08	197	.00	16.77	4	11	21	26	38
	post	2.54 (1.30)					10	12	27	22	29
Turn the lights out when I leave a room.	pre	4.07 (1.07)	-0.90	196	.37	1.50	45	29	16	8	2
	post	4.13 (1.06)					49	25	18	4	4
Recycle paper products.	pre	3.16 (1.34)	-2.47	195	.014	6.77	20	23	29	11	17
	post	3.37 (1.30)					25	23	30	10	12
HOME Composite Mean	pre	3.30 (0.86)	-4.14	194	.00	6.06					
	post	3.50 (0.85)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 5.11. Parks In Classrooms – Self-assessed learning (Post-visit survey only)

How much did you learn about...	MEAN (SD)	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
		5 (A great deal)	4 (A moderate amount)	3 (A little)	2 (Almost none)	1 (None)
The natural environment	4.06 (0.99)	40	36	17	4	3
GRSM	4.29 (1.02)	58	23	13	3	3
How plants and animal interact	3.87 (1.12)	36	31	21	7	5
The history of the people in GRSM	3.37 (1.25)	20	20	34	12	10
The purpose of the NPS	4.03 (1.16)	46	27	16	6	5
SELF-ASSESSED LEARNING Composite Mean	3.92 (0.92)					

Table 5.12. Parks In Classrooms – Field Trips

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I meet interesting people on field trips.	pre	3.63 (1.05)	-.06	197	.950	0.00	21	38	25	13	3
	post	3.63 (0.94)					18	42	28	11	1
What I learn on field trips is useful to me.	pre	3.75 (0.82)	.17	199	.869	-0.27	16	50	28	5	1
	post	3.74 (0.89)					22	37	35	5	1
I enjoy learning when I am outside.	pre	3.94 (0.98)	.20	199	.841	-0.25	33	37	22	5	3
	post	3.93 (1.05)					35	35	22	4	4
I have a lot of fun on field trips.	pre	4.60 (0.63)	4.60	198	.000	-5.43	66	28	5	1	0
	post	4.35 (0.87)					54	32	11	1	2
Field trips help me understand what I am taught in class.	pre	3.84 (0.94)	-.29	196	.776	0.52	26	41	26	6	1
	post	3.86 (1.04)					32	34	25	5	4
FIELD TRIP Composite Mean	pre	3.96 (0.59)	.86	189	.391	-0.93					
	post	3.93 (0.67)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Chapter Six
GREAT SMOKY MOUNTAINS INSTITUTE AT TREMONT

Program Summary

Great Smoky Mountains Institute at Tremont (GSMIT) is a non-profit residential environmental education center located on the Tennessee side of GRSM. More than 4,000 primarily fourth through seventh grade students from 14 states visit Tremont each year, with groups ranging in size from 10 to over 100 students. Programs at GSMIT are typically from 3-5 days and the activities and lessons are designed to support the science and social studies curricula of surrounding states for grades 5-8. Programs are often tailored to meet a group's needs and adapted based on the season. On all GSMIT programs, accompanying teachers are expected to co-teach programs alongside GSMIT educators. Students stay in a comfortable dormitory and eat family style meals in the dining hall. All programs stress experiential and place-based learning, using GRSM as an outdoor classroom. Visiting teachers may customize their program by selecting from over 40 curricular options, ranging from cooperative team-building to inquiry-based science and other creative or exploratory activities. Curricular topics typically include aquatic ecology, geology, human history, Appalachian culture, and biodiversity. Themes focus on sense of place, diversity, and stewardship. Lessons are typically 2-3 hours long.

Sample

Four different schools that attended Tremont in either May, 2010 or September, 2010 participated in the study (Table 6.1). All respondents attended a three day residential program and there were 222 total respondents with matched pre-visit and post-visit surveys. There were 91 unmatched surveys and one matched set with one incomplete survey. These unmatched and incomplete surveys were excluded from analysis.

Table 6.1. Number of respondents by group and percentage of sample

Group	N	%	Month	Incomplete	Unmatched
1	66	29.7	May 2010	0	69
2	73	32.9	May 2010	0	9
3	49	22.1	Sept 2010	1	4
4	34	15.3	Sept 2010	0	9
Total	222	100.0		1	91

Demographics

Demographic results are based on post-visit survey responses (Table 6.2). Just over half of the respondents were female (54%). Respondents represented grades 5, 6, and 7, with about 1/3 from each grade level. The average age of respondents was 11.6 years (SD=1.2). The majority of respondents (78%) indicated they were "White, not of Hispanic descent".

Table 6.2. Tremont demographics (Post-test data)

VARIABLE	CATEGORY	n	(%)
Gender			
	Female	121	54
	Male	101	46
Grade			
	5	83	37
	6	73	33
	7	66	30
Age			
	10	65	29
	11	32	14
	12	67	30
	13	54	24
	14	4	2
Ethnicity			
	White, not Hispanic	174	78
	Black, not Hispanic	11	5
	Hispanic	7	3
	Asian	7	3
	Mixed	21	10
	Native Hawaiian	1	1

Visits to GRSM

Respondents were asked to estimate the number of times they had visited GRSM in the last year and in their entire life (Table 6.3). For the question asking about visits in the last year with your school, 20% of students indicated "Never" on the post-visit survey (87% indicated "Never" on Pre-visit survey). Since the Tremont program is located within the GRSM, the expectation was that all respondents would indicate on the post-visit survey that they had visited GRSM at least "Once" with their school. This post-visit response suggests that even though respondents attended the Tremont program, some were still not aware that they had visited the GRSM with their school.

The majority of respondents had visited GRSM one or more times with their family, friends or other groups in the last year (55%) or at least once during their life (56%). However, this suggests that for almost half of the respondents, the school visit to GSMIT was their first introduction to GRSM (at least as far as these kids were aware). Only one-fourth (23%) of the respondents attending the Tremont program have had a GRSM ranger visit their Classrooms in the last year.

Table 6.3. How many visits have Tremont respondents taken to GRSM?

VISITATION	N	MEAN (SD)	MIN	MAX	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
					Never	Once	Twice	3-5 Times	More than 5 times
1. In the <u>last year</u>, how many times have you visited Great Smoky Mountains National Park with your school? (post-visit)	221	1.18[1] (2.47)	0	35	20	68	7	4	1
2. In the <u>last year</u>, how many times have you visited Great Smoky Mountains National Park with your family, friends, or other groups? (post-visit)	215	2.01[1] (3.35)	0	20	45	21	8	18	8
3. In the <u>last year</u>, how many times has a ranger from Great Smoky Mountains National Park visited your class? (post-visit)	217	0.47[1] (1.18)	0	10	77	13	5	5	1
4. In your <u>entire life</u>, how many times have you visited Great Smoky Mountains National Park with your school? (pre-visit)	214	1.80[2] (1.31)	1	5	67	10	7	9	7
5. In your <u>entire life</u>, how many times have you visited Great Smoky Mountains National Park with your family, friends, or other groups? (pre-visit)	217	2.65[2] (1.70)	1	5	44	10	8	13	25

[1]*Respondents provided a number*
[2]*Response was on a 5-point scale (1=Never, 2=Once, 3=Twice, 4=3-5 times, 5=More than 5 times)*

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Influence of the GSMIT Program on Students: Pre-visit vs. Post-visit

Attitudes towards school

The composite mean (mean was 3.97 on the pre-visit and 4.04 on the post-visit) for the *Attitude towards school (AtS)* scale significantly increased (p ≤.05) composite (Table 6.4). Overall, GSMIT students held positive attitudes about school with between 49% and 91% of respondents indicating strongly agree or agree to the items in the *AtS* scale, both before and after attending the program.

There was also a significant increase in mean scores for two items on the *AtS* scale. There was a significant increase (p≤.001) between the pre-visit and post-visit survey for "I enjoy school." 49% of respondents indicated agree or strongly agree with "I enjoy school," before the program and 56% after the program. There was also a significant increase (p ≤.05) for "I pay attention to the teacher in class." 69% of respondents agreed or strongly agreed with this statement before the program and 74% after the program. All other items in the scale did not demonstrate a significant change.

The item with the highest level of agreement (mean=4.6 on both the pre-visit and post-visit surveys) was "I believe I will go to college." 91% strongly agreed or agreed with this item before the program and 90% after the program. "My teachers believe that I can succeed" was the item with the next highest level of agreement (mean was 4.3 on both the pre-visit and post-visit surveys). 86% of respondents strongly agreed or agreed before and after the program.

Stewardship

There was a significant increase (p ≤.01) on the composite mean for the *Stewardship* scale (mean was 4.0 on pre-visit and 4.1 on post-visit) (Table 6.5). Overall, GSMIT students were positive about *Stewardship* with between 59% and 89% of respondents indicating strongly agree or agree to the items in the scale, before and after attending the program.

The two items with the lowest initial level of agreement both had a significant increase (p≤.001) in agreement. One of these was "I can reduce the amount of electricity I use," for which 66% of respondents agreed or strongly agreed before the program and 75% after the program. The other item was "If I find an arrowhead in GRSM, I should leave it alone," and the shift in agreement for this item was the highest percent change (12.3%) among all of the items on the survey. 59% of respondents agreed or strongly agreed with this item before the program and 79% after the program.

The item with the highest level of agreement (mean = 4.3 on the pre-visit and 4.2 on the post-visit survey) was "I feel it is important to take good care of the environment." However, there was also a significant decrease (p≤.01) in the agreement on this item, with 89% of respondents agreeing or strongly agreeing with the statement before the program and 80% after the program. A decline like this might be expected when the rating is already high. In addition, this decline could be caused by weariness with this concept after being immersed in an environmental curriculum for three days. All other items showed slight, but insignificant changes.

Interest

There was no change in the composite mean for the *Interest* scale (Table 6.6). Overall, GSMIT students were somewhat positive about learning and exploring with between 47% and 75% of respondents indicating they were extremely interested or very interested in the items on the *Interest* scale, before and after attending the program.

Three of the items on the scale had a significant change. Two of the significant items showed an increase in mean score. Respondents demonstrated a significant increase ($p \leq .05$) in interest for "Learning about plants, animals, and the places they live" (mean was 3.5 on the pre-visit and 3.6 on the post-visit survey) and "Learning about cultural and historic sites in GRSM" (mean was 3.5 on the pre-visit and 3.7 on the post-visit survey). 47% of respondents were extremely interested or very interested in "Learning about plants, animals, and the places they live" before the program and 57% after the program. The portion of respondents extremely interested or very interested in "Learning about cultural and historic sites in GRSM" increased from 54% before the program to 62% after the program, and the percent change (4.6%) on this item was the highest among all of the items on the *Interest* scale.

The third significant item was "Exploring the outdoors near my home," which showed a decrease ($p \leq .05$) in the mean score (mean = 4.1 on pre-visit and 3.2 on post-visit) 7% of respondents indicated they were extremely interested or very interested before the program and 70% after the program. This negative shift in interest may suggest that after the GSMIT experience, the outdoors near home were perceived as less interesting relative to the outdoors at the GRSM. The decline in interest could also be an outcome of saturation after three days of outdoor experiences.

Social Norms

There was no significant change in the composite mean score for the *Social Norms* scale (Table 6.7). Overall, GSMIT students were somewhat positive about *Social Norms* with between 55% and 73% of respondents strongly agreeing or agreeing to all but one item ("My friends think cleaning up a park is cool") in the scale, before and after attending the program. There was no significant change in responses from the pre-visit to the post-visit survey for any items in the *Social Norms* scale. The item with the highest level of agreement on this scale was "My family would be proud of me if I volunteered at GRSM" (mean was 4.1 on the pre-visit and 4.0 on the post-visit survey). 73% strongly agreed or agreed before the program and 71% after the program. The item with the lowest level of agreement was "My friends think cleaning up a park is cool" (mean was 2.6 on the pre-visit and 2.7 on the post-visit survey). 20% of respondents strongly agreed or agreed with this item before the program and 25% after the program.

Attachment to GRSM

There was a significant increase ($p \leq .001$) on the composite mean (mean was 3.9 on the pre-visit and 4.1 on the post-visit survey) for the *Attachment to GRSM* scale (Table 6.8). Overall, GSMIT students held positive attitudes about GRSM, with between 42% and 85% of respondents strongly agreeing or agreeing to the items in the scale, before and after attending the program.

All individual items on the *Attachment to GRSM* scale showed a significant change in agreement, and all but one item had a positive change from pre-visit to post-visit. The items with the highest magnitude of positive change were "I love GRSM" (9.5% change, $p \leq .001$) and "GRSM is one of my favorite places to visit" (8.8% change, $p \leq .001$). Both of these items were the lowest rated. For

"I love GRSM," the mean was 3.8 on the pre-visit and 4.1 on the post-visit survey with 56% of respondents strongly agreeing or agreeing before the program and 74% after the program. For "GRSM is one of my favorite places to visit," the mean was 3.5 on the pre-visit and 3.8 on the post-visit survey with 42% of respondents strongly agreeing or agreeing before the program and 65% after the program.

The only item with a negative change (2.7% change, $p \leq .05$) was "I would like to visit GRSM with my family or friends," and this was also the item with the highest level of agreement (mean was 4.4 for pre-visit and 4.3 for post-visit). For this item, 85% strongly agreed or agreed before the program and 79% after the program. In general, negative change when a score is already high can be a result of a ceiling effect. However, the fact that the change was significant ($p \leq .05$) suggests there may be a post-visit (I have just visited GRSM) effect.

Park and Community Behaviors

There was a significant increase ($p \leq .001$) from the pre-visit to the post-visit survey for the composite mean (mean was 2.8 on the pre-visit and 3.0 on the post-visit survey) on the *Park and Community Behaviors* scale (Table 6.9). Overall, GSMIT students were somewhat positive about performing *Park and Community Behaviors,* with between 16% and 51% of respondents indicating very often or often for the items in the scale, before and after attending the program. While all *Park and Community* behavior items had a positive change in frequency (plan on doing in the next three months), only two of the items were significant ($p \leq .001$). These items were "Participate in activities to improve my school" and "Talk to my friends about the environment when I am not at school."

"Participate in activities to improve my school" had a mean of 3.1 before the program and a 3.5 after the program with 44% of respondents indicating they intend to perform the behavior very often or often before the program and 51% after the program. "Talk to my friends about the environment when I am not at school" had the highest magnitude of increase (11.36%) from pre-visit to post-visit., but was the lowest rated item on the scale (mean was 2.1 on pre-visit survey and 2.4 on post-visit survey). For this item, the majority of respondents indicated rarely or never (68% before the program and 58% after the program). "Pick up trash left by others" was the highest rated item on the pre-visit survey (mean was 3.2) however, there was not a significant change on the post-visit score (mean was 3.4).

Home Behaviors

There was a significant increase ($p \leq .001$) in the composite mean (mean was 3.4 on the pre-visit and 3.7 on the post-visit survey) on the *Home Behaviors* scale (Table 6.10). The mean composite increased by a magnitude of 6.53% on the post-visit survey. Overall, GSMIT students were somewhat positive about performing *Home Behaviors,* with between 39% and 82% of respondents indicating very often or often for all but one item ("Talk to my family about ways to protect the environment") in the scale, before and after attending the program. All home behaviors items had a positive change in frequency (plan on doing in the next three months), and all items but "Recycle paper products" had a significant change in the mean score.

"Turn off the water when brushing my teeth" was the highest rated item (mean was 4.2 on pre-visit and 4.3 on post-visit survey) and the increase in the mean was significant at $p \leq .05$. For this item, 75% of respondents indicated very often or often before the program and 82% after the program. The second highest scoring item was "Turn the lights out when I leave a room" (mean

was 4.1 on pre-visit and 4.3 on post-visit survey). The increase in the mean for this item was significant (p≤.01), with 74% of respondents indicating very often or often before the program and 81% after the program. The other two significant items "Collect aluminum cans for recycling" (p≤.001) and "talk to my family about ways to protect the environment" (p≤.001) were the lowest rated items in the scale. In particular, for "Talk to my family about ways to protect the environment," the portion of respondents indicating very often or often was only 15% before the program and 23% after the program. However, this item had the greatest magnitude of change in score (15.2%), which suggests that students were feeling more comfortable with this home behavior after participating in the GSMIT program.

Self-assessed learning
Respondents were asked to rate how much they learned about GRSM specific concepts during the GSMIT program (Table 6.11). The composite mean for this scale was 4.3 (SD=0.66). Overall, the majority (69% or more) of GSMIT students believed they learned a great deal or moderate amount on all *Self-assessed learning* items. Learning about the GRSM received the highest rating (mean was 4.6), and 92% of respondents indicated they learned a great deal or a moderate amount. The item that received the lowest rating was "The history of the people in GRSM" (mean was 3.9); however, a majority of respondents (69%) indicated they learned a great deal or a moderate amount on this topic.

Field Trips
There was a significant increase (p ≤.05) on the composite mean (mean was 3.9 on the pre-visit and 4.0 on the post-visit survey) for the *Field Trips* scale (Table 6.12). Overall, GSMIT students held positive attitudes about *Field Trips* with between 49% and 89% of respondents indicating strongly agree or agree to all items in the scale, before and after attending the program. Three of the five items on the scale had significant positive changes in mean scores. There was a significant increase (p≤.001) for "I meet interesting people on field trips," and this item was also the lowest rated item (mean was 3.5 on the pre-visit and 3.8 on the post-visit survey with 49% of respondents strongly agreeing or agreeing before the program and 62% after the program. The other significant items were "What I learn on field trips is useful to me" (p≤.01) and "I enjoy learning when I am outside (p≤.05).

Table 6.4. GSMIT – Attitudes toward school (AtS)

ITEM		MEAN (SD)	t	df	SIG	% CHANGE **	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I enjoy school.	pre	3.33 (1.08)	-3.37	220	0.001	5.58	11	38	33	9	9
	post	3.52 (1.04)					15	41	32	5	7
I pay attention to the teacher in class.	pre	3.81 (1.01)	-2.42	219	0.016	3.23	26	43	20	8	3
	post	3.93 (0.90)					27	47	20	4	2
My teachers really care about me.	pre	4.19 (0.97)	0.15	220	0.88	-0.21	49	29	15	6	1
	post	4.18 (0.97)					46	33	15	3	3
I believe that I will go to college.	pre	4.62 (0.81)	-0.40	218	0.69	0.39	76	15	7	0	2
	post	4.63 (0.69)					75	15	9	0	1
The time I spend in school will benefit me in the long run.	pre	4.04 (1.14)	-1.83	219	0.069	2.92	48	24	16	8	4
	post	4.15 (0.99)					46	32	15	5	2
My teachers believe that I can succeed.	pre	4.32 (0.85)	0.22	216	0.82	-0.32	51	35	12	0	2
	post	4.32 (0.88)					53	33	10	3	1
Going to school is *not* a waste of time for me.*	pre	3.81 (1.29)	-1.72	212	0.087	3.44	41	24	19	7	9
	post	3.93 (1.22)					45	23	20	5	7
I enjoy learning about new subjects in school.	pre	3.60 (1.19)	-0.71	216	0.48	1.42	29	25	30	10	6
	post	3.67 (1.10)					28	28	32	8	4
ATTITUDE Composite Mean	pre	3.97 (0.73)	-2.18	203	0.03	1.76					
	post	4.04 (0.70)									

*Reverse coded for analysis (Original statement in survey was "Going to school is a waste of time for me"); **(post-visit mean minus pre-visit mean)/pre-visit mean [NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 6.5. GSMIT – Stewardship

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I can reduce the amount of electricity I use.	pre	3.76 (.92)	-3.62	219	.000	5.93	21	45	26	6	2
	post	3.98 (.87)					29	46	21	2	2
If I find an arrowhead in GRSM, I should leave it alone.	pre	3.67 (1.35)	-5.68	216	.000	12.32	39	20	20	12	9
	post	4.13 (1.12)					50	29	11	5	5
I can make a difference in my community.	pre	3.83 (1.05)	-1.72	220	.087	2.72	28	41	20	7	4
	post	3.94 (1.00)					34	36	22	6	2
I feel it is important to take good care of the environment.	pre	4.34 (.72)	2.88	220	.004	-2.81	47	42	9	2	0
	post	4.22 (.81)					44	36	18	2	0
I should not pick wildflowers in GRSM.	pre	4.07 (1.16)	-1.06	215	.29	1.94	50	23	16	6	5
	post	4.15 (1.20)					53	26	9	4	8
My actions can influence the health of the environment.	pre	4.01 (.94)	-1.13	214	.26	1.62	35	39	21	3	2
	post	4.07 (.93)					39	37	19	4	1
When I'm outside, I like to explore nature.	pre	4.12 (.98)	.72	214	.47	-1.24	44	33	15	7	1
	post	4.03 (1.09)					44	28	17	7	3
I have the power to help protect the environment.	pre	3.99 (.99)	-1.69	218	.093	2.76	36	37	18	7	2
	post	4.10 (.98)					43	32	19	4	2
It is up to me to make sure I do not harm the environment when I am playing outside.	pre	4.03 (1.00)	-.28	215	.78	0.47	41	31	21	5	2
	post	4.04 (.93)					37	36	21	5	1
STEWARDSHIP Composite Mean	pre	3.98 (0.68)	-2.82	197	.005	2.26					
	post	4.07 (0.69)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 6.6. GSMIT – Interest

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Extremely Interested)	4 (Very Interested)	3 (Somewhat Interested)	2 (Slightly Interested)	1 (Not at all Interested)
Learning about plants, animals, and the places they live.	pre	3.48 (1.12)	-2.09	221	.038	3.76	23	24	36	12	5
	post	3.61 (1.13)					25	32	27	10	6
Learning about cultural and historic sites in GRSM.	pre	3.51 (1.20)	-2.48	220	.014	4.64	25	29	23	17	6
	post	3.68 (1.18)					29	33	22	9	7
Learning how to protect the environment.	pre	3.46 (1.15)	.64	221	.52	-1.18	23	26	31	15	5
	post	3.42 (1.19)					20	31	28	12	9
Learning about environmental threats to GRSM, such as air pollution.	pre	3.43 (1.20)	-.69	215	.45	1.63	23	25	30	14	8
	post	3.48 (1.22)					24	29	25	14	8
Exploring the outdoors near my home.	pre	4.09 (1.09)	2.29	217	.023	-4.25	46	29	15	6	4
	post	3.91 (1.23)					42	28	16	6	8
Making my community a better place.	pre	3.66 (1.13)	-.94	218	.35	1.50	29	27	28	12	4
	post	3.72 (1.12)					29	31	27	7	6
INTEREST Composite Mean	pre	3.63 (0.84)	-.34	210	.74	0.28					
	post	3.64 (0.97)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 6.7. GSMIT – Social Norms

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
My teachers encourage me to help protect the environment.	pre	3.92 (1.02)	.65	218	.52	-1.04	35	33	22	9	1
	post	3.89 (1.00)					31	39	21	6	3
My family likes me taking field trips to the park.	pre	3.68 (1.01)	-1.66	215	.097	3.26	25	30	36	6	3
	post	3.83 (1.06)					31	33	28	3	5
My friends think cleaning up a park is cool.	pre	2.64 (1.08)	-1.62	219	.11	4.47	5	15	37	26	17
	post	2.77 (1.22)					10	15	38	17	20
My family would be proud of me if I volunteered at GRSM.	pre	4.11 (.96)	1.23	217	.22	-1.78	44	29	22	3	2
	post	4.04 (1.00)					40	31	22	5	2
My family wants me to help protect the environment.	pre	3.70 (1.05)	.93	218	.35	-1.59	28	28	34	7	3
	post	3.63 (1.04)					23	32	34	7	4
SOCIAL NORMS Composite Mean	pre	3.61 (0.70)	-.35	210	.72	0.55					
	post	3.63 (0.77)									

Table 6.8. GSMIT – Attachment to GRSM

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I would like to visit GRSM with my family or friends.	pre	4.38 (.85)	1.97	217	.050	-2.72	57	28	12	2	1
	post	4.25 (1.01)					55	24	14	4	3
GRSM is one of my favorite places to visit.	pre	3.50 (1.00)	-3.75	214	.000	8.77	22	20	47	8	3
	post	3.82 (1.16)					36	29	22	8	5
GRSM is important to me.	pre	3.89 (1.02)	-2.23	213	.027	4.09	35	29	30	3	3
	post	4.07 (1.00)					42	32	20	4	2
I love GRSM.	pre	3.78 (1.04)	-4.79	217	.000	9.47	32	24	36	5	3
	post	4.14 (1.00)					48	27	20	3	2
ATTACHMENT TO GRSM Composite Mean	pre	3.88 (0.80)	-3.34	203	.001	4.64					
	post	4.06 (0.90)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 6.9. GSMIT – Park and Community Behaviors

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Very Often)	4 (Often)	3 (Sometimes)	2 (Rarely)	1 (Never)
Volunteer to help the environment.	pre	2.69 (1.19)	-1.23	217	.22	3.42	7	19	31	23	20
	post	2.80 (1.18)					9	18	34	22	17
Pick up trash left by others.	pre	3.22 (1.18)	-1.78	215	.076	4.16	18	21	35	17	9
	post	3.38 (1.16)					18	30	30	14	8
Help clean up a local park when asked.	pre	3.07 (1.30)	-1.35	216	.18	3.62	15	25	28	15	17
	post	3.17 (1.34)					21	21	27	16	15
Work with others to clean up my community.	pre	2.83 (1.30)	-1.22	215	.22	3.60	13	17	28	23	19
	post	2.94 (1.32)					14	22	26	19	19
Work with my teachers and friends to improve my school./Participate in activities to improve my school	pre	3.13 (1.36)	-3.64	215	.000	9.78	20	24	23	17	16
	post	3.46 (1.20)					23	28	29	12	8
Talk to my friends about the environment when I am not at school.	pre	2.13 (1.21)	-3.27	218	.001	11.36	6	10	16	27	41
	post	2.38 (1.32)					10	10	22	24	34
COMMUNITY Composite Mean	pre	2.84 (0.98)	-3.23	207	.001	5.99					
	post	3.01 (1.00)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 6.10. GSMIT –Home Behaviors

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Very Often)	4 (Often)	3 (Sometimes)	2 (Rarely)	1 (Never)
Turn off the water when brushing my teeth.	pre	4.18 (1.23)	-2.14	218	.034	3.16	61	14	14	4	7
	post	4.32 (1.04)					61	21	11	4	3
Collect aluminum cans for recycling.	pre	3.05 (1.43)	-4.40	218	.000	10.33	24	15	23	19	19
	post	3.38 (1.40)					30	20	23	12	15
Talk to my family about ways to protect the environment.	pre	2.28 (1.20)	-4.72	218	.000	15.22	6	9	24	28	33
	post	2.64 (1.29)					13	10	28	25	24
Turn the lights out when I leave a room.	pre	4.11 (1.15)	-3.18	217	.002	5.01	52	22	14	8	4
	post	4.30 (.94)					55	26	14	3	2
Recycle paper products.	pre	3.53 (1.43)	-1.62	217	.11	3.63	36	19	21	10	14
	post	3.66 (1.34)					36	27	17	9	11
HOME Composite Mean	pre	3.43 (0.88)	-6.12	217	.000	6.41					
	post	3.65 (0.87)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 6.11. GSMIT – Self -assessed learning (Post-visit survey only)

How much did you learn about...	MEAN (SD)	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
		5 (A great deal)	4 (A moderate amount)	3 (A little)	2 (Almost none)	1 (None)
The natural environment	4.50 (0.80)	67	19	13	0.10	0.90
GRSM	4.62 (0.73)	72	20	5	2	1
How plants and animals interact	4.28 (0.80)	47	35	16	1.50	0.50
The history of the people in GRSM	3.95 (0.97)	35	34	24	6	1
The purpose of the NPS	4.29 (0.66)	46	32	14	3	5

Table 6.12. GSMIT – Field Trips

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I meet interesting people on field trips.	pre	3.49 (1.06)	-4.12	218	.000	8.88	20	29	33	15	3
	post	3.80 (1.00)					28	34	30	5	3
What I learn on field trips is useful to me.	pre	3.71 (1.03)	-2.64	221	.009	4.58	26	33	32	6	3
	post	3.88 (0.97)					31	35	28	3	3
I enjoy learning when I am outside.	pre	3.80 (1.19)	-2.01	219	.046	3.68	35	30	20	9	6
	post	3.94 (1.11)					39	32	16	9	4
I have a lot of fun on field trips.	pre	4.42 (0.79)	1.82	218	.070	-2.26	57	32	9	1	1
	post	4.32 (0.83)					52	31	14	2	1
Field trips help me understand what I am taught in class.	pre	3.94 (1.00)	.41	215	.683	-0.51	34	35	23	6	2
	post	3.92 (1.02)					34	35	22	6	3
FIELD TRIP Composite Mean	pre	3.87 (0.76)	-2.04	209	.043	2.33					
	post	3.96 (0.78)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Teacher's responses regarding the GSMIT program

A total of 18 teachers responded to the teacher survey for the GSMIT program. These teachers represented four school groups. The number of teacher surveys per school group varied. Two of the groups each had three responses, one group had four responses and one group had eight responses.

Respondents included Kindergarten ("K-6") through 7th grade teachers. At least one third of the teachers indicated they taught 5th grade, and another third taught 6th or 7th grade. One-third of respondents indicated they taught "all" subjects. The other respondents indicated they taught language arts, math, language, writing, math, social studies, physical education, after school program, or self-contained 5th grade. One respondent was a guidance counselor. Fifty percent of the respondents had participated in professional development training with GRSM.

The average number of years that teachers had taught was 9.72 (SD=6.61; minimum was 2 years, maximum was 24 years), and 50% had taught 10 years or more. The majority of respondents were female (61%) and 89% indicated they were "White, not of Hispanic decent" (11% indicated "Black, not of Hispanic decent").

Pre-Trip & Post-Trip Curriculum

Almost one-third (31%) of respondents indicated they used the pre-trip activities with their students prior to attending the GSMIT program. Pre-trip activities included the following:

- Downloaded lessons from Life in the GRSM, Smokies yukky book, literature lesson with Night of the Black Bear Mystery
- DVD, CO2/O2 cycle, pollution solutions, pre-visit survey
- Ecosystems, environments, visit to heritage center
- Environmental studies, interdependence as related to the natural world, inquiry-based learning
- Completed a unit on ecosystems

The majority (60%) of respondents used the post-trip activities. Post-trip activities included the following:

- Creation of Tremont Memories Book
- Key to trees of the Smokies
- Tree identification
- Post-visit survey, class discussions, journaling, letters of experience
- Present Tremont Trip highlights to the 4th grade class
- We discussed our favorite parts, things we knew before, wanted to know, and learned(KWL). As a group, we discussed ways we could help the GRSM.
- We will continuously refer back to our experience throughout the year (2 respondents)

Four respondents replied to the question regarding any additional materials from GRSM. These suggestions were:

- Maybe a pre-visit speaker, one of the naturalists, since we are local

- Maybe look at SPIs for each grade before arrival quick list and seeing how to work these into presentations, instead of the long history PowerPoint; Some of these things on hand- bioengineering (crops), reusable resources, pollution solutions
- Pre-trip introduction lessons might be helpful for teachers with limited experience in the Park (Tremont)
- Preview of what we will be doing on our trip

Satisfaction

Teacher satisfaction with the GSMIT program was extremely positive. On a scale of 1 (Very dissatisfied) to 10 (Very satisfied), the mean rating was 9.50 (SD=0.79, minimum = 7, maximum = 10). All but one respondent selected either 9 (33%) or 10 (61%).

General Impacts of the Program

Teachers reported very positive attitudes regarding the influence of the GSMIT program (Table 6.13). Teachers indicated that the program helped them meet state standards (M=4.39), that the curriculum was appropriate (M=4.76), that students learned a lot (M=4.67), that students had fun (M=4.83), and that content was relevant to students' lives (M=4.61). Teachers also indicated they would like to do another GRSM programs with their students (M=4.67). Teachers gave a lower rating (M=3.78) for "My students became motivated to perform better academically." One explanation for this lower rating may be that the teacher surveys occurred 10 days after the field trip, making it hard for teachers to observe a noticeable change in motivation to perform.

Table 6.13. Teacher rating of the general impacts of the GSMIT experience (N=18)

General Impacts	Mean	SD
This program helped my class meet state curriculum standards.	4.39	0.98
The program content was academically appropriate for my students.	4.76	0.44
My students became motivated to perform better academically.	3.78	0.81
My students learned a lot about important topics.	4.67	0.59
I would like to do another GRSM program with my students.	4.67	0.59
My students had fun.	4.83	0.38
The program content was relevant to my students' lives.	4.61	0.61

Scale: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree.

Impacts on Student Outcomes

These questions investigated teachers' perceptions regarding the influence of the GRSM programs on students' appreciation, stewardship, knowledge, understanding, and interest pertaining to a range of topics. Teachers were asked: "Indicate to what extent you think the GRSM experience has positively impacted your class overall in the following areas:" Response categories included: a great deal, a moderate amount, a little, almost none, and none. Teachers were also asked: "As a result of your recent GRSM educational program, what percentage of your students increased their:" Response categories for this question included: 0-20% 21-40%, 41-60%, 61-80%, and 81-100%.

Teachers were very positive about the impact of the program on their students (Table 6.14). "Appreciation for the natural environment" (M=4.72), "Environmental stewardship" (M=4.61), and "Understanding of ecological processes" (M=4.44) were the outcomes with the highest

ratings. Also, 76% of teachers indicated that at least 60% of students improved on all three of these outcomes. The outcome with the lowest rating was "Academic performance" (M=3.67). Only 35% of teachers indicated that at least 60% of students improved on this outcome.

Table 6.14. Teacher rating of student outcomes from participation in the GSMIT program.

Outcomes	Impact rating* (N=18)		% Students increasing their…(N=17)				
	Mean	SD	0-20	21-40	41-60	61-80	81-100
Academic performance	3.67	0.59	18	12	35	29	6
Positive attitudes toward school	3.89	0.76	12	6	18	41	23
Appreciation for the natural environment	4.72	0.57	0	12	12	29	47
Environmental stewardship	4.61	0.61	0	12	12	17	59
Understanding of ecological processes	4.44	0.70	6	6	12	59	17
Knowledge of the history of GRSM	4.00	0.69	13	6	25	31	25
Understanding of the mission of the National Park Service	3.89	0.90	12	6	41	12	29
Knowledge of GRSM natural history	3.89	0.76	12	5	35	24	24
Appreciation for biological diversity	4.17	0.86	6	6	6	53	29
Concern about issues and threats facing GRSM	4.28	0.89	6	6	19	19	50
Interest in taking actions to conserve or improve the environment	4.39	0.78	6	11	18	6	59
Scientific inquiry skills	4.22	0.55	6	6	24	47	17

Scale: 1=None, 2=Almost none, 3=A little, 4=A moderate amount, 5=A great deal

GSMIT Staff

Teacher ratings of GSMIT staff on all categories (Table 6.15) were extremely positive. Teachers rated the overall performance of the staff as very good (4.8). Staff received the highest ratings for their positive interaction with students (4.89) and working well with teachers (4.89).

Table 6.15. Teacher ratings of GSMIT Staff

Staff Rating Category	Mean*	SD
Knowledgeable	4.83	0.51
Entertaining	4.78	0.55
Flexible	4.67	0.59
Organized	4.78	0.43
Enthusiastic	4.78	0.55
Patient	4.78	0.55
Charismatic-likeable	4.72	0.57
Explained things clearly	4.78	0.55

Staff Rating Category	Mean*	SD
Communicated an explicit message	4.83	0.51
Interacted positively with students	4.89	0.47
Worked well with teachers	4.89	0.47
Overall performance	4.82	0.53

Scale: 1=Very poor, 2=Poor, 3=Average, 4=Good, 5=Very good

Teacher actions before and after the trip

These questions investigated teachers' intentions to incorporate environmental themes, outdoor activities, and inquiry-based, hands-on activities into their teaching. Teachers were asked: "Prior to participation in the GRSM program, how often have you done the following?" Response categories included: very often, often, sometimes, rarely, and never. Teachers were also asked: "As a result of participating in the GRSM program, are you more or less likely to participate in the following activities in the next year." Response categories included: much less likely, less likely, same as before, more likely, much more likely. "Incorporate inquiry based, hands on activities into the students' school experience" was the most common pre-visit action (M=4.00) (Table 6.16). "Use environmental themes to better meet state standards" was the least common pre-trip action (M=3.61), and this was also the least likely post-visit activity (M=3.61). "Incorporate outdoor activities into your classes" was the only action that received a mean rating of 4.0 (more likely) or more for post-visit likelihood.

Table 6.16. Teacher action behaviors before and after the GSMIT program (N=18)

Actions	Pre-visit frequency		Post-visit likelihood	
	Mean[1]	SD	Mean[2]	SD
Volunteer to help the environment.	3.67	1.33	3.67	0.69
Incorporate environmental themes in my teaching.	3.72	1.18	3.83	0.71
Use environmental themes to better meet state standards.	3.61	1.20	3.61	0.85
Incorporate inquiry based, hands on activities into the students' school experiences	4.00	0.84	3.83	0.71
Incorporate outdoor activities into your classes.	3.89	0.90	4.00	0.77

[1]Scale: 1=Never, 2=Rarely, 3=Sometimes, 4=Often, 5=Very often
[2]Scale: 1=Much less likely, 2=Less likely, 3=Same as before, 4=More likely, 5=Much more likely

Visitation

Since the teacher survey occurred after the GSMIT visit, all of the respondents had visited GRSM at least once in the current academic year. For all of the respondents, this was the only field trip they had taken in the current academic year. Only 19% indicated that they planned one additional field trip to the GRSM in the current academic year. None of the respondents had a GRSM ranger visit their class during this academic year. All of the respondents had visited GRSM with their school at least once in total (Once: 17%, Twice: 39%, 3-5 times: 17%, More than 5 times: 28%). All but one of the respondents had visited GRSM with their family, friends, or other groups, with the majority (72%) having visited more than 5 times.

Teacher comments

- Having had experience with many different outdoor education programs, [I think] Tremont is by far the best. I appreciate the quality and professionalism of the staff, in addition to the science based curriculum. The setting of GRSM is a once in a lifetime opportunity for many students. My wish is that my students will use this experience to develop a lifelong love and respect for our world. The Tremont experience is perfect for this.

- The staff at Tremont always do an outstanding job! They often visit our school & follow up with our students [*comment on Staff rating section:* All except 1 staff member]

- The students loved this experience. The roll playing was awesome. The staff was pleasant and knowledgeable, We look forward to bringing students next year. The cooks were very helpful with food allergies. Love the microscope! Thanks so Much!

- The trip was my first to Tremont, and I can't wait to go back! Everyone who worked on the Tremont staff was helpful and awesome with our kids.

- With the exception of one staff member, I think the staff is an exceptional group!

Chapter Seven
EUGENE HUSKEY
ENVIRONMENTAL EDUCATION CENTER

Program Summary

The Eugene W. Huskey Environmental Education Center is located in Sevier County in Tennessee near the Great Smoky Mountains National Park and is supported by the county school district. The Eugene Huskey program is typically a 2-day residential program and is unique from the other "field trip" programs evaluated in this report because it is the only site not located within the GRSM. During the 2-day program, GRSM staff provided a half day presentation at the center. The instructional program at Eugene Huskey is designed for easy integration with school curricula and emphasizes flora, fauna, and environment of the Great Smoky Mountains as well as the social and cultural heritage of mountain people in East Tennessee. Lesson topics typically include Early Pioneer Life, Indian History, Appalachian Culture (music, arts and crafts) and the environment of GRSM (stream ecology; plants and animals).

Sample

Six different groups from a total of four different schools (two schools sent two different groups) attended the Eugene Huskey program in April or May, 2010 (Table 7.1). There were 93 total respondents with matched pre-visit and post-visit surveys. There were 53 unmatched surveys and these were excluded from analysis.

Table 7.1. Number of respondents by group and percentage of sample

Group*	N	%	Month	Incomplete	Unmatched
1[a]	13	14.0	April 2010	0	11
2[a]	13	14.0	April 2010	0	9
3[b]	14	15.1	May 2010	0	7
4[b]	14	15.1	May 2010	0	2
5	20	21.5	May 2010	0	15
6	19	20.4	May 2010	0	9
Total	93	100.0		0	

Groups with like superscripts are from the same school.

Demographics

Demographic results are based on post-visit survey responses (Table 7.2). Just over half of the respondents were female (52%). All respondents were enrolled in grade 6. The average age of respondents was 11.8 years (SD=0.6). The majority of respondents (85%) indicated they were "White, not of Hispanic descent."

Table 7.2. Eugene Huskey demographics (Post-visit data)

VARIABLE	CATEGORY	n	(%)
Gender			
	Female	48	52
	Male	44	47
Grade			
	5	0	0
	6	92	99
	7	0	0
Age			
	10	0	0
	11	26	28
	12	60	64
	13	6	6
	14	0	0
Ethnicity			
	White, not Hispanic	79	85
	Black, not Hispanic	3	3
	Hispanic	0	0
	Asian	1	1
	Mixed	7	8
	Native Hawaiian	1	1
	American Indian	1	1

Visits to GRSM

Respondents were asked to estimate the number of times they had visited GRSM in the last year and in their entire life (Table 7.3). For the question asking about visits in the last year with your school, 33% of students indicated "Never" on the post-visit survey (76% indicated "Never" on pre-visit survey). This post-visit response suggests that even though respondents attended the Eugene Huskey program (which is not located in the GRSM), they may have been unsure whether they had visited the GRSM with their school. The majority of respondents had visited GRSM with their family, friends or other groups in the last year (74%) or at least once during their life (84%). Just over half (56%) of the respondents attending the Eugene Huskey program did not have a GRSM ranger visit their Classrooms in the last year.

Table 7.3. How many visits have Eugene Huskey respondents taken to GRSM?

VISITATION	N	MEAN (SD)	MIN	MAX	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
					Never	Once	Twice	3-5 Times	More than 5 times
1. In the <u>last year</u>, how many times have you visited Great Smoky Mountains National Park with your school? (post-visit)	86	1.94[1] (5.52)	0	50	33	38	8	18	3
2. In the <u>last year</u>, how many times have you visited Great Smoky Mountains National Park with your family, friends, or other groups? (post-visit)	86	4.21[1] (8.01)	0	60	26	12	9	35	18
3. In the <u>last year</u>, how many times has a ranger from Great Smoky Mountains National Park visited your class? (post-visit)	83	0.86[1] (1.47)	0	7	56	29	4	7	4
4. In your <u>entire life</u>, how many times have you visited Great Smoky Mountains National Park with your school? (pre-visit)	90	2.60[2] (1.45)	1	5	33	19	16	19	13
5. In your <u>entire life</u>, how many times have you visited Great Smoky Mountains National Park with your family, friends, or other groups? (pre-visit)	88	3.57[2] (1.46)	1	5	16	10	10	29	35

[1]*Respondents provided a number*
[2]*Response was on a 5-point scale (1=Never, 2=Once, 3=Twice, 4=3-5 times, 5=More than 5 times)*

Influence of the Eugene Huskey Program on Students: Pre-visit vs. Post-visit

Attitudes towards school

There was no significant change in the composite mean for the *Attitude towards school (AtS)* scale (Table 7.4). Overall, Eugene Huskey students had positive attitudes about school with between 53% and 90% of respondents indicating strongly agree or agree to the items in the *AtS* scale, before and after attending the program.

There was no significant change in mean scores from the pre-visit to the post-visit survey for any items in the *AtS* scale. The item with the highest level of agreement (mean=4.6) was "I believe I will go to college." Almost all (90-93%) of respondents strongly agreed or agreed with this item before and after attending the program. "My teachers believe that I can succeed" was the item with the next highest level of agreement (mean=4.4). The lowest scored item was "I enjoy school" (mean = 3.5); however, over half of the respondents agreed or strongly agreed with this item before and after attending the program. In general, the majority of the respondents indicated a positive attitude about school both before and after attending the program.

Stewardship

Students demonstrated a significant increase ($p \leq .05$) on the composite mean (mean was 4.2 on the pre-visit and 4.3 on the post-visit survey) for the *Stewardship* scale (Table 7.5). Overall, Eugene Huskey students were very positive about *Stewardship* with between 72% and 88% of respondents indicating strongly agree or agree to the items in the scale, before and after attending the program.

Two items demonstrated a significant increase ($p \leq .05$) in agreement. For "I can reduce the amount of electricity I use," 52% of respondents indicated strongly agree or agree on the pre-visit and 78% on the post-visit survey. This increase represented a 5.8% change in magnitude. For "I can make a difference in my community," 76% of respondents agreed or strongly agreed with this item before the program and 85% after the program, and the increase represented a 5.6% change. The item with the highest level of agreement (mean = 4.5 on the pre-visit and 4.4 on the post-visit survey) was "I feel it is important to take good care of the environment." 88% of respondents indicated agree or strongly agree for this item before and after attending the program.

Interest

There was no significant change in the composite mean for the *Interest* scale (Table 7.6). Overall, Eugene Huskey students were positive about learning and exploring with between 54% and 81% of respondents indicating they were extremely interested or very interested in the items on the *Interest* scale, before and after attending the program.

One item had a significant increase ($p \leq .01$) in interest. "Learning how to protect the environment" had the highest magnitude increase (9.0%) in the mean score (3.5 on the pre-visit and 3.9 on the post-visit survey). Also for this item, 53% of respondents were extremely or very interested before the program and 64% after the program. However this item was the lowest rated item both before and after the program. The item with the highest rating for the level of interest (mean = 4.33 on the pre-visit and 4.30 on the post-visit survey) was "Exploring the

outdoors near my home" with 81% indicating extreme or very strong interest before the program and 78% after the program.

Social Norms
The composite mean score (mean was 3.7 on the pre-visit and 3.9 on the post-visit survey) for the *Social Norms* scale showed a significant increase (p ≤.05)(Table 7.7). Overall, Eugene Huskey students held somewhat positive attitudes about *Social Norms* with between 53% and 77% of respondents indicating strongly agree or agree to all but one item ("My friends think cleaning up a park is cool") in the scale, before and after attending the program.

The item with the lowest rating was "My friends think cleaning up a park is cool" (mean was 2.8 on the pre-visit and 3.2 on the post-visit survey). This item was the only item that showed a significant (p ≤.01) positive change after the program. The portion of respondents indicating strongly agree or agree on this item was 21% on the pre-visit and 35% on the post-visit survey, and the magnitude of increase (12.1%) was the highest among all of the items. There was no significant change in responses from the pre-visit to the post-visit survey for any other items in the *Social Norms* scale. The item with the highest level of agreement on this scale was "My family would be proud of me if I volunteered at GRSM" (mean was 4.24 pre-visit and 4.21 on the post-visit survey).

Attachment to GRSM
There was no significant change in the composite mean score for the *Attachment to GRSM* scale (Table 7.8). In general, the scores on items for *Attachment to GRSM* were high for Eugene Huskey students, with between 56% and 93% of respondents indicating strongly agree or agree to the items in the scale, before and after attending the program.

The item with the lowest rating was "GRSM is one of my favorite places to visit" (mean was 3.7 on the pre-visit and 3.9 on the post-visit survey). This item was the only item that showed a significant (p≤.05) increase. The magnitude of increase for this item was 6.75%, and the portion of respondents indicating strongly agree or agree was 58% on the pre-visit and 65% on the post-visit survey. The item with the highest mean on the *Attachment to GRSM* scale was "I would like to visit GRSM with my family or friends" (mean was 4.54 on the pre-visit and 4.45 on the post-visit survey), and the portion of respondents indicating strongly agree or agree for this item was 93% on the pre-visit and 86% on the post-visit survey. Although this item showed a negative change (2.2%), this change was not significant and likely due to the initial high score (i.e., items that score high on an initial test may decrease due to a ceiling effect).

Park and Community Behaviors
There was a significant increase (p≤.05) on the composite mean score (mean was 3.0 on the pre-visit and 3.2 on the post-visit survey) of the *Park and Community Behaviors* scale after participation in the Eugene Huskey program (Table 7.9). Overall, Eugene Huskey students were only somewhat positive about *Park and Community Behaviors,* with between 20% and 58% of respondents indicating that they perform or intend to perform the activities in the scale very often or often. While all *Park and Community* behavior items had a positive change in frequency (plan on doing in the next three months), only half of the items significantly increased (p≤.05). These significant items were "Volunteer to help the environment," "Participate in activities to improve my school" and "Talk to my friends about the environment when I am not at school."

Among these three significant items, "Participate in activities to improve my school" had a mean of 3.5 on the pre-visit survey and a 3.7 on the post-visit survey. The portion of respondents indicating very often or often was 52% before the program and 58% after the program. "Talk to my friends about the environment when I am not at school" had the lowest mean score of any item on the scale (mean was 2.4 on pre-visit survey and 2.7 on post-visit survey) and the majority of respondents indicated rarely or never (60% on the pre-visit and 48% on the post-visit survey). However, this low rated item had the highest magnitude of positive change (12.3%) from pre-visit to post-visit. "Volunteer to help the environment" had a mean of 2.6 on pre-visit survey and 2.7 on post-visit survey. This item had the second largest magnitude of change in score (9.4%), and the portion of respondents indicating very often or often increased from 16% before the program to 25% after the program. None of the items showed a decline in the mean score from the pre-visit to the post-visit survey.

Home Behaviors

The composite mean score (mean was 3.5 on the pre-visit and 3.7 on the post-visit survey) on the *Home Behaviors* scale (Table 7.10) increased significantly ($p \leq .01$). The composite mean increased 6.6% on the post-visit survey. Three out of the five items had a significant change in the mean score. Prior to participating in the Eugene Huskey progrm, 25% of respondents indicated they would "Talk to my family about ways to protect the environment" often or very often. After the Eugene Huskey program, 32% indicated they would talk to their family about ways to protect the environment often or very often. This item had the greatest magnitude of increase in mean score (15.0%), and was significant at the .01 level. This suggests that students were feeling more comfortable with this home behavior after participating in the Eugene Huskey program.

"Collect aluminum cans for recycling" and "Recycle paper products" also showed a significant increase ($p \leq .01$). The portion of respondents indicating very often or often for "Collect aluminum cans for recycling" was 38% before the program and 46% after the program. The portion of respondents indicating very often or often for "Recycle paper products" was 24% before the program and 42% after the program. This item also had the largest magnitude of increase in mean score (17.16%). Finally, "Turn off the water when brushing my teeth" was the most often performed behavior (mean was 4.6 on pre-visit and 4.5 on post-visit survey).

Self-assessed Learning

Respondents were asked to rate how much they learned about concepts related to GRSM and the natural environment during the Eugene Huskey program (Table 7.11). The composite mean was 4.4 indicating an overall high level of *Self-assessed Learning*. Overall, the majority (82% or more) of Eugene Huskey students believed they learned a great deal or moderate amount on all *Self-assessed Learning* items.

The learning about GRSM item received the highest rating (mean was 4.7) with 91% of respondents indicating they learned a great deal or a moderate amount about GRSM. This is interesting given that 33% of respondents indicated on the post-visit survey that they had never visited GRSM with their school (Table 7.3). The item that received the lowest rating was "How plants and animals interact" (mean was 4.3), although a majority of respondents (82%) indicated learning a great deal or a moderate amount on this topic.

Field Trips
The composite mean score for attitudes toward field trips (mean was 4.0 on the pre-visit and 4.3 on the post-visit survey) showed a significant increase (p≤.01) after participation in the Eugene Huskey program (Table 7.12) . Overall, Eugene Huskey students held positive attitudes about *Field Trips* both before and after the program with between 46% and 91% of respondents indicating strongly agree or agree to all items in the scale. All but one of the items had a significant increase in the mean score. "I meet interesting people on field trips" was the item with the lowest score on the pre-visit survey and with the largest increase (22.32%, p<.001). The portion of respondents that indicated strongly agree or agree for this statement was 46% on the pre-visit survey and 78% on the post-visit survey. The highest rated item was "I have a lot of fun on field trips" (the mean was 4.62 on the pre-visit and 4.57 on the post-visit survey), but this item did not show a significant change.

Table 7.4. Eugene Huskey – Attitudes toward school (AtS)

ITEM		MEAN (SD)	t	df	SIG	% CHANGE **	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I enjoy school.	pre	3.55 (1.03)	0.56	92	.57	-1.21	18	34	37	5	6
	post	3.51 (1.04)					16	37	36	5	6
I pay attention to the teacher in class.	pre	4.13 (0.86)	0.97	90	.33	-1.60	39	38	18	5	0
	post	4.07 (0.87)					35	41	21	2	1
My teachers really care about me.	pre	4.34 (0.87)	1.40	92	.16	-2.98	54	31	13	0	2
	post	4.22 (0.94)					46	37	13	1	3
I believe that I will go to college.	pre	4.63 (0.77)	0.17	91	.86	-2.38	76	14	8	1	1
	post	4.62 (0.74)					73	20	5	1	1
The time I spend in school will benefit me in the long run.	pre	4.15(1.01)	-1.24	90	.22	2.92	48	27	19	4	2
	post	4.27 (0.91)					52	27	18	2	1
My teachers believe that I can succeed.	pre	4.44 (0.88)	0.86	88	.39	-1.51	62	25	10	1	2
	post	4.37 (0.87)					56	33	6	4	1
Going to school is *not* a waste of time for me.*	pre	4.11 (1.12)	1.90	87	.06	-6.08	49	23	20	3	5
	post	3.86 (1.32)					45	22	15	10	8
I enjoy learning about new subjects in school.	pre	3.74 (1.11)	-1.69	91	.10	5.24	30	29	29	8	4
	post	3.93 (1.06)					38	28	26	4	4
AtS Composite Mean	pre	4.19 (0.60)	1.10	81	.28	-1.67					
	post	4.12 (0.69)									

*Reverse coded for analysis (Original statement in survey was "Going to school is a waste of time for me"); **(post-visit mean minus pre-visit mean)/pre-visit mean

Table 7.5. Eugene Huskey – Stewardship

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I can reduce the amount of electricity I use.	pre	3.91 (0.89)	-2.42	88	.018	5.75	25	47	24	2	2
	post	4.13 (0.91)					40	38	18	2	2
If I find an arrowhead in GRSM, I should leave it alone.	pre	3.95 (1.19)	-0.87	92	.39	2.46	48	14	25	10	3
	post	4.04 (1.21)					50	24	15	5	6
I can make a difference in my community.	pre	4.03 (0.94)	-2.22	92	.029	5.61	36	40	19	3	2
	post	4.26 (0.82)					45	40	11	4	0
I feel it is important to take good care of the environment.	pre	4.46 (0.70)	1.07	91	.29	-1.95	58	30	12	0	0
	post	4.37 (0.69)					49	39	12	0	0
I should not pick wildflowers in GRSM.	pre	4.22 (1.08)	-1.95	90	.055	4.69	54	25	16	0	5
	post	4.42 (0.82)					60	26	11	3	0
My actions can influence the health of the environment.	pre	4.17 (0.97)	-1.89	91	.063	4.17	45	36	13	4	2
	post	4.35 (0.70)					48	39	13	0	0
When I'm outside, I like to explore nature.	pre	4.35 (0.10)	-0.12	87	.90	0.25	62	23	10	2	3
	post	4.36 (0.82)					56	28	14	2	0
I have the power to help protect the environment.	pre	4.24 (0.86)	-0.12	90	.90	0.26	45	39	12	3	1
	post	4.25 (0.78)					45	36	18	1	0
It is up to me to make sure I do not harm the environment when I am playing outside.	pre	4.22 (0.85)	-0.62	91	.54	1.28	46	30	22	2	0
	post	4.27 (0.80)					48	33	18	1	0
STEWARDSHIP Composite Mean	pre	4.17 (0.58)	-2.51	81	.014	3.12					
	post	4.30 (0.53)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 7.6. Eugene Huskey – Interest

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Extremely Interested)	4 (Very Interested)	3 (Somewhat Interested)	2 (Slightly Interested)	1 (Not at all Interested)
Learning about plants, animals, and the places they live.	pre	3.71 (1.10)	-1.89	91	.06	4.99	29	29	30	8	4
	post	3.89 (0.96)					35	24	38	2	1
Learning about cultural and historic sites in GRSM.	pre	3.79 (1.08)	-1.24	90	.22	3.19	32	32	24	9	3
	post	3.91 (1.02)					36	29	26	8	1
Learning how to protect the environment.	pre	3.53 (1.15)	-2.92	90	.004	9.04	23	31	28	13	5
	post	3.85 (0.99)					31	33	27	8	1
Learning about environmental threats to GRSM, such as air pollution.	pre	3.79 (1.15)	0.10	91	.92	-0.29	35	25	26	11	3
	post	3.78 (1.00)					28	33	30	7	2
Exploring the outdoors near my home.	pre	4.33 (1.90)	0.19	91	.85	-0.51	65	16	12	3	4
	post	4.30 (0.94)					58	20	19	2	1
Making my community a better place.	pre	3.86 (1.02)	-0.88	91	.38	2.25	28	43	21	4	4
	post	3.95 (0.94)					33	37	24	5	1
INTEREST Composite Mean	pre	3.85 (0.81)	-1.56	89	.12	2.86					
	post	3.96 (0.78)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 7.7. Eugene Huskey – Social Norms

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
My teachers encourage me to help protect the environment.	pre	3.66 (0.93)	-1.91	89	.59	4.61	26	44	21	8	1
	post	4.03 (0.89)					34	40	20	5	1
My family likes me taking field trips to the park.	pre	3.94 (1.01)	-0.32	89	.75	0.84	33	39	23	1	4
	post	3.98 (0.96)					33	40	23	1	3
My friends think cleaning up a park is cool.	pre	2.81(1.06)	-2.68	90	.009	12.14	5	16	49	15	15
	post	3.15 (0.95)					7	28	47	12	6
My family would be proud of me if I volunteered at GRSM.	pre	4.24 (0.95)	0.33	90	.74	-0.78	52	25	19	3	1
	post	4.21 (0.90)					47	34	15	3	1
My family wants me to help protect the environment.	pre	3.64 (0.87)	-1.58	91	.12	3.87	17	36	43	2	2
	post	3.78 (0.96)					27	33	33	6	1
SOCIAL NORMS Composite Mean	pre	3.73 (0.68)	-2.34	83	.021	3.75					
	post	3.87 (0.71)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

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Table 7.8. Eugene Huskey – Attachment to GRSM

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I would like to visit GRSM with my family or friends.	pre	4.54 (0.75)	1.09	91	.28	-2.16	66	27	5	1	1
	post	4.45 (0.76)					60	26	13	1	0
GRSM is one of my favorite places to visit.	pre	3.66 (1.24)	-2.27	89	.025	6.67	31	27	25	8	9
	post	3.90 (1.03)					35	30	28	5	2
GRSM is important to me.	pre	4.35 (0.94)	-0.76	88	.45	1.82	57	27	13	0	3
	post	4.43 (0.75)					57	30	12	1	0
I love GRSM.	pre	4.31 (0.96)	0.45	90	.65	-1.02	55	28	13	1	3
	post	4.26 (0.90)					50	33	14	1	2
ATTACHMENT TO GRSM Composite Mean	pre	4.21(0.82)	-0.83	83	.41	1.43					
	post	4.27(0.71)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 7.9. Eugene Huskey – Park and Community Behaviors

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	**RESPONSE FREQUENCY DISTRIBUTIONS (%)**				
							5 (Very Often)	4 (Often)	3 (Sometimes)	2 (Rarely)	1 (Never)
Volunteer to help the environment.	pre	2.62 (0.96)	-2.40	91	.019	9.43	2	14	40	30	14
	post	2.87 (0.98)					5	20	37	33	5
Pick up trash left by others.	pre	3.50 (0.98)	-0.22	91	.82	0.63	13	41	32	9	5
	post	3.52 (1.05)					20	33	31	13	3
Help clean up a local park when asked.	pre	3.28 (1.28)	-0.71	91	.48	2.65	20	27	22	20	11
	post	3.37 (1.16)					18	28	33	13	8
Work with others to clean up my community.	pre	2.98 (1.11)	-1.02	87	.31	4.19	9	22	34	23	12
	post	3.10 (1.16)					13	22	32	25	8
Participate in activities to improve my school*	pre	3.46 (1.18)	-2.11	90	.038	6.68	21	31	27	12	9
	post	3.69 (1.07)					26	32	31	7	4
Talk to my friends about the environment when I am not at school.	pre	2.42 (1.26)	-2.40	90	.018	12.27	10	10	20	32	28
	post	2.71 (1.26)					12	13	27	29	19
COMMUNITY Composite Mean	pre	3.04 (0.84)	-2.18	85	.034	5.26					
	post	3.20 (0.84)									

*Surveys distributed early in the study had "Work with my teachers and friends to improve my school" on the pre-visit version and "Participate in activities to improve my school" on post-visit version. Halfway through the study, this was corrected to "Participate in activities to improve my school" for both versions. [NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 7.10. Eugene Huskey – Home Behaviors

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Very Often)	4 (Often)	3 (Sometimes)	2 (Rarely)	1 (Never)
Turn off the water when brushing my teeth.	pre	4.58 (0.83)	1.15	90	.25	-2.40	73	16	6	4	1
	post	4.47 (0.94)					69	14	9	8	0
Collect aluminum cans for recycling.	pre	2.93 (1.42)	-3.39	89	.001	14.03	17	19	26	12	26
	post	3.34 (1.25)					22	24	31	13	10
Talk to my family about ways to protect the environment.	pre	2.60 (1.29)	-2.72	89	.008	14.96	10	15	26	23	26
	post	2.99 (1.21)					15	17	34	22	12
Turn the lights out when I leave a room.	pre	4.36 (0.88)	0.50	90	.62	-1.01	58	26	13	2	1
	post	4.32 (0.93)					57	25	12	6	0
Recycle paper products.	pre	2.82 (1.28)	-3.43	90	.001	17.16	11	23	27	18	21
	post	3.31 (1.24)					23	19	33	18	7
HOME Composite Mean	pre	3.47 (0.78)	-2.70	88	.008	6.63					
	post	3.70 (0.78)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 7.11. Eugene Huskey – Self -assessed learning (Post-visit survey only)

How much did you learn about...	MEAN (SD)	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
		5 (A great deal)	4 (A moderate amount)	3 (A little)	2 (Almost none)	1 (None)
The natural environment	4.63 (0.62)	70	22	8	0	0
GRSM	4.67 (0.61)	74	17	8	0	0
How plants and animals interact	4.33 (0.83)	52	30	13	3	0
The history of the people in GRSM	4.36 (0.75)	50	34	13	1	0
The purpose of the NPS	4.40 (0.74)	54	29	15	0	0
LEARNING Composite Mean	4.47 (0.57)					

Table 7.12. Eugene Huskey – Field Trips

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I meet interesting people on field trips.	pre	3.45 (1.05)	-6.82	90	.000	22.32	18	28	41	8	5
	post	4.22 (0.84)					45	33	20	2	0
What I learn on field trips is useful to me.	pre	3.85 (0.83)	-3.52	92	.01	8.57	23	44	30	2	1
	post	4.18 (0.87)					43	37	17	2	1
I enjoy learning when I am outside.	pre	3.98 (1.15)	-2.54	90	.013	6.28	44	26	20	4	6
	post	4.23 (0.84)					44	40	13	2	1
I have a lot of fun on field trips.	pre	4.62 (0.73)	.47	90	.64	-1.08	73	18	8	0	1
	post	4.57 (0.65)					66	25	9	0	0
Field trips help me understand what I am taught in class.	pre	3.90 (0.96)	-2.98	91	.004	7.95	31	35	29	3	2
	post	4.21 (0.83)					44	37	16	3	0
FIELD TRIP Composite Mean	pre	3.97 (0.63)	-5.17	86	.000	8.56					
	post	4.31 (0.59)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

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Teacher responses regarding the Eugene Huskey program

All respondents were sixth grade teachers. Teachers taught primarily language arts, social studies, science, and/or math. The average number of years that teachers had taught was 18.6 (SD=11.03). However, all but one teacher had 10 or more years of experience (min=1, max=35). All but one of the teachers was female. All teachers were "White, not of Hispanic descent."

Pre-Trip & Post-Trip Curriculum

Two (28.6%, N=7) respondents indicated they had used pre-trip activities to prepare their students for the Eugene Huskey program. Two teachers indicated they would like GRSM to provide more visual materials (powerpoint, website, or other visual materials that are self-explanatory) for use in preparing their students for the trip. None of the teachers had participated in professional development training with GRSM.

Satisfaction

Teacher satisfaction with the Eugene Huskey program was extremely high. On a scale of 1 (Very dissatisfied) to 10 (Very satisfied) all teachers (N=7) indicated either 9 or 10 (mean=9.86, SD=0.38). Only one respondent indicated a satisfaction rating of 9 and all others rated their satisfaction as a 10.

General Impacts of the Program

Teachers reported very positive attitudes regarding the influence of the Eugene Huskey program (Table 7.13). Teachers indicated that the program helped them meet state standards (M=4.67), that the curriculum was appropriate (M=5.00), that students became more motivated academically (M=4.67), that students learned a lot (M=5.00), and that content was relevant to students' lives (M=4.83). Teachers were also positive about doing another GRSM program with their students (M=4.67).

Table 7.13. Teacher rating of the general impacts of the Eugene Huskey experience (N=7)

General Impacts	Mean*	SD
This program helped my class meet state curriculum standards.	4.67	0.52
The program content was academically appropriate for my students.	5.00	0.00
My students became motivated to perform better academically.	4.67	0.52
My students learned a lot about important topics.	5.00	0.00
I would like to do another GRSM program with my students.	4.67	0.52
My students had fun.	5.00	.00
The program content was relevant to my students' lives.	4.83	0.41

*Scale: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree.

Impacts on Student Outcomes

Teachers were also very positive about the impact of the Eugene Huskey program on their students (Table 7.14). The outcomes with the highest impact ratings were "Appreciation for the natural environment," "Environmental stewardship," "Appreciation for biological diversity" and "Interest in taking actions to conserve or improve the environment" (M=5.0). "Academic performance was the lowest rated item (M=4.43); however 50% of teachers indicated that at least 60% of students improved their "Academic performance." "Positive attitudes toward school" also had one of the

lower relative ratings (M=4.57), but 66% of teachers indicated that at least 60% of students increased their "Positive attitudes toward school." Otherwise, 100% of teachers indicated that at least 60% of students increased on all other items.

Table 7.14. Teacher rating of student outcomes from participation in the Eugene-Huskey program.

Outcomes	Impact rating* (N=7)		% Students increasing their…(N=6)				
	Mean	SD	0-20	21-40	41-60	61-80	81-100
Academic performance.	4.43	0.54	0	17	33	17	33
Positive attitudes toward school	4.57	0.54	0	0	33	33	33
Appreciation for the natural environment.	5.00	0.00	0	0	0	33	67
Environmental stewardship.	5.00	0.00	0	0	0	50	50
Understanding of ecological processes.	4.71	0.49	0	0	0	33	67
Knowledge of the history of GSMNP.	4.71	0.49	0	0	0	33	67
Understanding of the mission of the National Park Service.	4.71	0.49	0	0	0	50	50
Knowledge of GSMNP natural history.	4.71	0.49	0	0	0	50	50
Appreciation for biological diversity.	5.00	0.00	0	0	0	33	67
Concern about issues and threats facing GSMNP.	4.86	0.38	0	0	0	33	67
Interest in taking actions to conserve or improve the environment	5.00	0.00	0	0	0	33	67
Scientific inquiry skills.	4.57	0.54	0	0	0	67	33

Scale: 1=None, 2=Almost none, 3=A little, 4=A moderate amount, 5=A great deal

EH and GRSM Staff

Teacher ratings of staff on all categories (Table 7.15) were overwhelmingly positive. Teachers rated the overall performance of the staff as very good (5). Teachers gave the highest rating (M=5.0) for staff on their knowledge, organization, patience, ability to explain things clearly, ability to communicate an explicit message, and positive interaction with students. Staff were rated slightly lower (4.86) on their ability to be entertaining, flexibility, enthusiasm, charisma/likeability, and ability to work well with teachers.

Table 7.15. Teacher ratings of GRSM staff working with the Eugene Huskey program (N=7)

Staff Rating Category	Mean*	SD
Knowledgeable	5.00	0.00
Entertaining	4.86	0.38
Flexible	4.86	0.38

Staff Rating Category	Mean*	SD
Organized	5.00	0.00
Enthusiastic	4.86	0.38
Patient	5.00	0.00
Charismatic-likeable	4.86	0.38
Explained things clearly	5.00	0.00
Communicated an explicit message	5.00	0.00
Interacted positively with students	5.00	0.00
Worked well with teachers	4.86	0.38
Overall performance	5.00	0.00

Scale: 1=Very poor, 2=Poor, 3=Average, 4=Good, 5=Very good

Teacher actions before and after the trip

After participating in the EH program, teachers reported that they were somewhat more likely to participate in all of the activities. "Incorporate inquiry based, hands on activities into the students' school experience" was the most common pre-visit action, and the most likely post-visit action (Table 7.16). "Use environmental themes to better meet state standards" was the least common pre-visit action and was among the least likely post-visit actions. The results may suggest that teachers could use additional guidance in understanding how to use environmental themes to meet state standards.

Table 7.16. Teacher action behaviors before and after the Eugene Huskey visit (N=7)

Actions	Pre-visit frequency		Post-visit likelihood	
	Mean[1]	SD	Mean[2]	SD
Volunteer to help the environment.	3.29	0.76	3.86	0.38
Incorporate environmental themes in my teaching.	3.43	0.79	3.71	0.49
Use environmental themes to better meet state standards.	3.14	0.90	3.71	0.49
Incorporate inquiry based, hands on activities into the students' school experiences	4.14	0.38	4.00	0.82
Incorporate outdoor activities into your classes.	3.29	0.95	4.14	0.69

[1]*Scale: 1=Never, 2=Rarely, 3=Sometimes, 4=Often, 5=Very often*
[2]*Scale: 1=Much less likely, 2=Less likely, 3=Same as before, 4=More likely, 5=Much more likely*

Visitation

Six of the seven teachers had made one field trip to the GRSM this academic year. No teachers planned an additional field trip to GRSM this year. Only one teacher indicated that a GRSM ranger had visited their class this year. All seven teachers had visited the GRSM with their school at least once, and four of these teachers (57%) had visited the GRSM more than 5 times with their school. Also, all teachers had visited GRSM more than 5 times with their family, friends, or other groups during their lifetime.

Teacher comments

- Students loved their environmental trip. They have talked non-stop about the experience.

- The GRSM is wonderful, and my students learned a lot on our environmental trip. Thanks.

- This is an experience of inestimable value for our students. My best and brightest say it is the greatest field trip they have every taken.

Chapter Eight
PI BETA PHI

Program Summary

The Pi Beta Phi Parks As Classrooms program is a partnership between the GRSM and Pi Beta Phi Elementary School, which is a public school in Gatlinburg, Tennessee (Sevier County). The program was first implemented during the 1993-94 school year. This program differs cfrom other Parks As Classrooms programs involved in this study in that the school curricula is fully integrated with the resources of GRSM. Students in grades K-8 participate in this program, which includes a minimum of three GRSM park experiences a year (grades 7 & 8) and a maximum of six per year in most grades. The GRSM units are interdisciplinary and have pre-site and post-site components. All visits are typically day trips to areas of the park that are accessible by a one-day bus trip. 7th and 8th graders also participate in an overnight backpacking trip and service projects within the park, and 8th grade graduates participate in a "reflections" campout. Curriculum units for grades 5 through 8 are unique for each grade level, but collectively focus on geology, geography, stream ecology, Appalachian culture, wilderness navigation, microhabitats, weather/air quality, biodiversity, land management, wildflowers, archeology, and fly-fishing. All students enrolled in grades 5, 6, 7, and 8 were asked to complete surveys during the start and end of the Fall, 2010 semester.

It is important to be cautious when interpreting results from the Pi Beta Phi program in comparison to the other programs involved in this study. Pi Beta Phi was a semester-long program that included multiple GRSM visits in addition to the usual school curriculum. Given the nature of the Phi Beta Phi intervention, it was not possible for this study to isolate park-related experiences from the usual school curriculum All other programs could be measured immediately before and after a single day or residential program. Meanwhile, we captured a full semester at Pi Beta Phi. Consequently, it may not be valid to attribute any changes between pre-experience and post-experience scores directly to students' GRSM experiences. Additional confounding factors include other activities during the semester, end-of-semester fatigue[4], or cumulative positive effects from prior experiences.

Response

All students enrolled in grades 5, 6, 7, and 8 participated in the study. For the Pi Beta Phi program, there were 130 total respondents with matched pre-visit and post-visit surveys (Table 8.1). There were 90 unmatched surveys, and these were excluded from analysis. The 5th grade group had the largest portion of unmatched surveys.

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[4] Examples of this can be found in:
Ames, C. (1992). Classrooms: Goals, structures, and student motivation. *Journal of Educational Psychology*, *84*, 261–271.
Meece, J. L., & Miller, S. D. (1999). Changes in elementary school children's achievement goals for reading and writing:
Results of a longitudinal and an intervention study. *Scientific Studies of Reading*, *3*, 207–229.
Stern, M.J., R.B. Powell, and N.M. Ardoin 2011. Evaluating a constructivist and culturally responsive approach to environmental education for diverse audiences. *Journal of Environmental Education* 42(2): 109-122

Table 8.1. Number of respondents by group and percentage of sample

Grade	N	%	Month	Bad	Unmatched
5	11	8	Fall 2010	0	46
6	36	28	Fall 2010	0	13
7	42	32	Fall 2010	0	14
8	41	32	Fall 2010	0	17
Total	130	100.0			

Demographics

Demographic results are based on post-visit survey responses (Table 8.2). Just over half of the respondents were female (51%). Respondents were enrolled in grades 5 through 8. The number of respondents was similar for each grade level, except for 5th grade which returned a high number of unmatched surveys. The average age of respondents was 12.3 years (SD=1.0). The majority of respondents (82%) indicated they were "White, not of Hispanic descent".

Table 8.2. Pi Beta Phi demographics (Post-visit data)

VARIABLE	CATEGORY	n	(%)
Gender			
	Female	66	51
	Male	64	49
Grade			
	5	11	8
	6	36	28
	7	42	32
	8	41	32
Age			
	10	7	5
	11	19	15
	12	42	32
	13	48	37
	14	13	10
	15	1	1
Ethnicity			
	White, not Hispanic	106	82
	Black, not Hispanic	0	0
	Hispanic	7	5
	Asian	6	5
	Mixed	6	5
	Native Hawaiian	0	0
	American Indian	2	1
	Other	3	2

Visits to GRSM

Respondents were asked to estimate the number of times they had visited GRSM in the last year and during their entire life (Table 8.3). The majority of respondents reported that they had visited the GRSM at least once with their school in the last year (96%) or at least once during their life (93%). The majority of respondents also reported that they had visited GRSM with their family, friends or other groups in the last year (85%) or at least once during their life (90%).

Since the Pi Beta Phi program regularly visits GRSM, and there are repeat visits for each grade level, the expectation was that all respondents would indicate on the post-visit survey that they had visited GRSM at least "Once" with their school in the last year. The post-visit response suggests that a small number of respondents were still not aware that they had visited the GRSM with their school (4% of students indicated "Never" in the last year on the post-visit survey). This suggests that a few respondents may be misinterpreting the question or are not associating their field trip destinations with the GRSM. Respondents were also asked to estimate the frequency of ranger visits to their class in the last year. Although 33% of respondents indicated that a ranger had never visited, 21% of respondents indicated a ranger had visited their class 3 or more times.

Table 8.3. How many visits have Pi Beta Phi respondents taken to GRSM?

VISITATION	N	MEAN (SD)	MIN	MAX	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
					Never	Once	Twice	3-5 Times	More than 5 times
1. In the <u>last year</u>, how many times have you visited Great Smoky Mountains National Park with your school? (post-visit)	123	4.15[1] (2.57)	0	15	4	2	19	55	20
2. In the <u>last year</u>, how many times have you visited Great Smoky Mountains National Park with your family, friends, or other groups? (post-visit)	123	6.93[1] (13.89)	0	105	15	9	20	15	26
3. In the <u>last year</u>, how many times has a ranger from Great Smoky Mountains National Park visited your class? (post-visit)	125	1.50[1] (1.65)	0	9	33	27	19	18	3
4. In your <u>entire life</u>, how many times have you visited Great Smoky Mountains National Park with your school? (pre-visit)	128	4.38[2] (1.20)	1	5	7	5	2	14	72
5. In your <u>entire life</u>, how many times have you visited Great Smoky Mountains National Park with your family, friends, or other groups? (pre-visit)	128	4.08[2] (1.37)	1	5	10	7	8	15	60

[1]*Respondents provided a number for pre-visit questions*
[2]*Response was on a 5-point scale (1=Never, 2=Once, 3=Twice, 4=3-5 times, 5=More than 5 times)*

Influence of the Pi Beta Phi Program on Students: Pre-visit vs. Post-visit

Attitudes towards school

There was no significant change in the composite mean for the *Attitude towards school (AtS)* scale (Table 8.4). Overall, Pi Beta Phi students had positive attitudes about school with between 60% and 98% of respondents indicating strongly agree or agree to the items in the *AtS* scale, before and after attending the program. There was a significant change in the means for three of the eight items for this scale.

The item with the highest level of agreement (mean was 4.6 on the pre-visit and 4.7 on the post-visit survey) was "I believe I will go to college." The increased mean score for this item was significant (p≤.05), and the portion of respondents indicating strongly agree or agree was 90% before the program and 97% after the program. "I pay attention to the teacher in class" was also among the higher rated items (mean was 4.4 on the pre-visit and 4.3 on the post-visit survey), but showed a significant (p≤.01) decrease in the mean score (-4.06% change in magnitude) from the pre-visit to the post-visit survey. While the portion of respondents indicating strongly agree or agree to this item was 91% before the program, it was 86% after the program. "I enjoy learning about new subjects in school" also showed a significant (p≤.05) decrease in the mean score (mean was 3.9 on the pre-visit and 3.8 on the post-visit survey). This item was the second lowest rated and the magnitude of the decrease in mean score was the largest change (-4.26%) of all of the items. For this item, the portion of respondents indicating strongly agree or agree was 67% before the program and 60% after the program.

Stewardship

There was no significant change in the composite mean score for the *Stewardship* scale (Table 8.5). Overall, Pi Beta Phi students were very positive about *Stewardship* with between 78% and 91% of respondents indicating strongly agree or agree to the items in the scale, both before and after attending the program.

There was a significant change (p≤.05) for only two of the nine items for this scale, and both of these significant items showed a decrease in their mean score. The portion of respondents indicating strongly agree or agree on "I have the power to help protect the environment" was 88% before the program and 81% after the program, and the change in magnitude was -3.97%. The portion of respondents indicating strongly agree or agree on "It is up to me to make sure I do not harm the environment when I am playing outside" was 83% before the program and 79% after the program, and the change in magnitude was -4.78%. The lowest rated item was "I can reduce the amount of electricity I use" (mean was 4.1 on the pre-visit and post-visit surveys). "I feel it is important to take good care of the environment" was the highest rated item (mean was 4.5 on the pre-visit and 4.4 on the post-visit survey).

Interest

There was a significant decrease (p ≤.05) on the composite mean score (mean was 3.8 on the pre-visit and 3.6 on the post-visit survey) for the *Interest* scale (Table 8.6). Overall, Pi Beta Phi students were somewhat positive about learning and exploring with between 46% and 73% of respondents indicating they were extremely interested or very interested in the items on the *Interest* scale, both before and after attending the program. For all items, the mean score decreased

from the pre-visit to the post-visit survey, and this decrease was significant for 3 of the 6 items on the scale.

The item with the largest magnitude of change (-7.62%) was "Learning about cultural and historic sites in GRSM." The decrease on the score for this item was significant (p ≤.01) and the portion of respondents indicating extremely interested or very interested was 65% on the pre-visit and 55% on the post-visit survey. "Learning about environmental threats to GRSM, such as air pollution" also had a significant decrease (p ≤.05) and was one of the lowest rated items (mean was 3.6 on the pre-visit and 3.4 on the post-visit survey)). For this item, the portion of respondents indicating extremely interested or very interested was 59% before the program and 46% after the program. There was also a significant decrease (p ≤.05) in the mean score for "Learning about plants, animals, and the places they live." For this item, the portion of respondents indicating extremely interested or very interested was 54% before the program and 46% after the program, and the magnitude of the change was -5.37%. The item with the highest level of interest was "Exploring the outdoors near my home" (4.0 on the pre-visit and 4.0 on the post-visit survey); however, there was no change in the score on this item.

Social Norms
The composite mean score (mean was 4.0 on the pre-visit and 3.9 on the post-visit survey) for the *Social Norms* scale had a statistically (p ≤.05) significant decrease (Table 8.7). Overall, Pi Beta Phi students were positive about *Social Norms* with between 69% and 84% of respondents indicating strongly agree or agree to all but one item ("My friends think cleaning up a park is cool"), both before and after attending the program.

All but one item showed a decline in the mean score. The item with the highest level of agreement was "My family would be proud of me if I volunteered at GRSM" (mean was 4.4 on the pre-visit and 4.2 on the post-visit survey). This item showed a significant (p ≤.01) decrease in the mean score and the portion of respondents indicating strongly agree or agree was 84% before the program and 82% after the program. "My family likes me taking field trips to the park" also showed a significant (p ≤.01) decrease in mean score, but was the second highest rated item (mean was 4.3 on the pre-visit and 4.1 on the post-visit survey). The item with the lowest rating was "My friends think cleaning up a park is cool" (mean was 3.3 on the pre-visit and 3.0 on the post-visit survey). This item showed a significant (p ≤.05) decrease and the portion of respondents indicating strongly agree or agree for this item was 39% before the program and 33% after the program. The magnitude of decrease (-6.90%) for this item was the greatest change among all of the items.

Attachment to GRSM
The change in the composite mean for the *Attachment to GRSM* scale was not significant (Table 8.8). Overall, Pi Beta Phi students held positive attitudes toward *GRSM,* with between 59% and 87% of respondents indicating strongly agree or agree to the items in the scale, both before and after attending the program. All items on the *Attachment to GRSM* scale showed a slight decrease in the mean score, but this change was only significant for two items. "I would like to visit GRSM with my family or friends" showed a significant (p ≤.05) decrease in the mean score and the portion of respondents indicating strongly agree or agree was 80% before the program and 71% after the program. This item also had the largest magnitude of change (-5.97%). "I love GRSM" also showed a significant decrease in the mean score, and the portion of respondents indicating strongly agree or agree was 81% before the program and 74% after the program. The

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item with the highest rating was "GRSM is important to me" (mean was 4.31 on the pre-visit and 4.23 on the post-visit survey). The item with the lowest rating was "GRSM is one of my favorite places to visit" (mean was 3.74 on the pre-visit and 3.71 on the post-visit survey).

Park and Community Behaviors

The change in the composite mean score for the *Park and Community Behaviors* scale was not significant (Table 8.9). Overall, Pi Beta Phi students were somewhat positive about *Park and Community Behaviors,* with between 23% and 66% of respondents indicating they intended to perform the behaviors in the scale very often or often, both before and after attending the program. All but one of the items in this scale showed a decrease in the mean score, but none of these items showed a significant change. The highest rated item was "Pick up trash left by others" (mean was 3.8 on the pre-visit and 3.7 on the post-visit survey). The lowest rated item was "Talk to my friends about the environment when I am not at school" (mean was 2.6 on the pre-visit and 2.6 on the post-visit survey).

Home Behaviors

The change in the composite mean for the *Home Behaviors* scale was not significant (Table 8.10). Overall, Pi Beta Phi students were positive about *Home Behaviors,* with between 44% and 85% of respondents indicating they intended to perform the behaviors in the scale very often or often, both before and after attending the program.

Only one item had a significant change. "Recycle paper products" showed a significant increase (p≤.001) in the mean score (mean was 3.8 on the pre-visit and 4.4 on the post-visit survey). The magnitude of the increase was 16.36%. For this item, the portion of respondents indicating very often or often was 61% before the program and 78% after the program. The item with the lowest rating was "Talk to my family about ways to protect the environment" (mean was 2.9 on the pre-visit and 2.8 on the post-visit survey). The highest rated item was "Turn off the water when brushing my teeth" (mean was 4.42 on the pre-visit and 4.43 on the post-visit survey).

Self-assessed learning

Respondents were asked to rate how much they learned about concepts related to GRSM and the natural environment during the Pi Beta Phi program (Table 8.11). Overall, the majority (84% or more) of Pi Beta Phi students believed they learned a great deal or moderate amount on all *Self-assessed learning* items. The composite mean was 4.4 (SD=0.69). The learning about GRSM item received the highest rating (mean was 4.7) with 92% of respondents indicating a great deal or a moderate amount. The item that received the lowest rating was "How plants and animals interact" (mean was 4.3).

Field Trips

There was no significant change in the composite mean for the *Field Trips* scale (Table 8.12). Overall, Pi Beta Phi students were positive about *Field Trips* with between 61% and 86% of respondents indicating strongly agree or agree to all items in the scale, both before and after attending the program. Only one item, "I have a lot of fun on field trips," had significant (p≤.05) change, and this change was negative. The portion of respondents that indicated strongly agree or agree on this item was 86% before the program and 79% after the program. This item was also the highest rated item (mean was 4.4 on the pre-visit and 4.2 on the post-visit survey). The lowest rated item was "I meet interesting people on field trips" (mean was 3.8 on the pre-visit and 3.9 on the post-visit survey).

Table 8.4. Pi Beta Phi – Attitudes toward school (AtS)

ITEM		MEAN (SD)	t	df	SIG	% CHANGE **	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I enjoy school.	pre	3.82 (1.01)	1.97	129	.051	-3.82	27	40	26	2	5
	post	3.68 (1.13)					24	40	25	3	8
I pay attention to the teacher in class.	pre	4.43 (0.66)	2.84	127	.005	-4.06	53	38	9	0	0
	post	4.25 (0.76)					41	45	12	1	1
My teachers really care about me.	pre	4.45 (0.74)	1.52	129	.13	-1.91	55	35	8	1	1
	post	4.36 (0.77)					51	35	13	0	1
I believe that I will go to college.	pre	4.59 (0.79)	-2.13	128	.035	2.53	73	17	7	2	1
	post	4.71 (0.67)					78	19	2	0	1
The time I spend in school will benefit me in the long run.	pre	4.39 (0.82)	0.44	128	.66	-0.89	55	33	10	1	1
	post	4.35 (0.91)					57	26	13	2	2
My teachers believe that I can succeed.	pre	4.46 (0.83)	0.12	127	.91	-0.18	60	31	6	1	2
	post	4.45 (0.74)					57	34	7	1	1
Going to school is *not* a waste of time for me.*	pre	4.24 (1.14)	0.00	126	1.00	0.00	60	18	13	3	6
	post	4.24 (1.13)					57	23	12	2	6
I enjoy learning about new subjects in school.	pre	3.94 (0.98)	2.14	124	.034	-4.26	35	32	25	7	1
	post	3.78 (1.11)					33	27	30	5	5
ATTITUDE Composite Mean	pre	4.29 (0.53)	1.67	122	.10	-1.17					
	post	4.24 (0.64)									

*Reverse coded for analysis (Original statement in survey was "Going to school is a waste of time for me"); **(post-visit mean minus pre-visit mean)/pre-visit mean [NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 8.5. Pi Beta Phi – Stewardship

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I can reduce the amount of electricity I use.	pre	4.09 (0.71)	-0.50	128	.62	0.95	29	51	19	1	0
	post	4.13 (0.76)					33	49	16	1	1
If I find an arrowhead in GRSM, I should leave it alone.	pre	4.13 (1.12)	-1.03	126	.30	2.66	51	27	11	7	4
	post	4.24 (1.10)					57	24	11	2	6
I can make a difference in my community.	pre	4.17 (0.87)	0.00	129	1.00	0.00	40	43	12	3	2
	post	4.17 (0.87)					42	37	17	3	1
I feel it is important to take good care of the environment.	pre	4.48 (0.70)	1.00	128	.32	-1.38	58	33	7	2	0
	post	4.42 (0.73)					53	36	9	1	1
I should not pick wildflowers in GRSM.	pre	4.33 (1.05)	0.34	126	.74	-0.72	62	21	10	3	4
	post	4.30 (0.96)					54	33	7	3	3
My actions can influence the health of the environment.	pre	4.31 (0.73)	0.90	127	.37	-1.62	44	46	8	1	1
	post	4.24 (0.77)					42	43	13	1	1
When I'm outside, I like to explore nature.	pre	4.17 (1.04)	-0.18	125	.85	0.38	52	24	18	3	3
	post	4.19 (0.95)					49	28	18	3	2
I have the power to help protect the environment.	pre	4.31 (0.81)	2.05	128	.042	-3.97	48	40	8	4	0
	post	4.14 (0.95)					42	39	13	4	2
It is up to me to make sure I do not harm the environment when I am playing outside.	pre	4.29 (0.81)	2.18	126	.031	-4.78	50	33	15	2	0
	post	4.09 (0.96)					39	40	16	2	3
STEWARDSHIP Composite Mean	pre	4.26 (0.53)	0.90	118	.37	-0.94					
	post	4.22 (0.62)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 8.6. Pi Beta Phi – Interest

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Extremely Interested)	4 (Very Interested)	3 (Somewhat Interested)	2 (Slightly Interested)	1 (Not at all Interested)
Learning about plants, animals, and the places they live.	pre	3.61 (0.90)	2.07	128	.040	-5.37	17	37	37	7	2
	post	3.42 (1.03)					15	31	40	9	5
Learning about cultural and historic sites in GRSM.	pre	3.79 (1.04)	3.16	127	.002	-7.62	27	38	27	4	4
	post	3.50 (1.14)					19	36	25	12	8
Learning how to protect the environment.	pre	3.57 (1.09)	0.92	128	.36	-2.38	22	32	31	10	5
	post	3.49 (1.16)					23	29	29	13	6
Learning about environmental threats to GRSM, such as air pollution.	pre	3.58 (1.15)	2.07	127	.041	-5.25	23	36	23	12	6
	post	3.39 (1.16)					21	25	33	13	8
Exploring the outdoors near my home.	pre	4.02 (1.15)	0.20	128	.85	-0.57	45	28	16	6	5
	post	3.99 (1.16)					46	24	21	5	4
Making my community a better place.	pre	3.99 (1.00)	1.67	128	.098	-3.51	37	35	20	6	2
	post	3.85 (1.06)					32	36	20	9	3
INTEREST Composite Mean	pre	3.76 (0.75)	2.26	126	.025	-3.46					
	post	3.63 (0.81)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 8.7. Pi Beta Phi – Social Norms

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
My teachers encourage me to help protect the environment.	pre	3.99 (0.86)	-1.52	125	.13	3.78	30	43	21	6	0
	post	4.14 (0.90)					44	31	22	2	1
My family likes me taking field trips to the park.	pre	4.29 (0.84)	2.67	126	.008	-5.50	50	32	15	3	0
	post	4.06 (0.95)					37	40	19	12	3
My friends think cleaning up a park is cool.	pre	3.26 (1.09)	2.19	128	.031	-6.90	15	24	41	13	7
	post	3.04 (1.14)					10	23	42	12	13
My family would be proud of me if I volunteered at GRSM.	pre	4.39 (0.80)	2.76	127	.007	-4.99	56	28	15	1	0
	post	4.17 (0.89)					42	40	13	3	2
My family wants me to help protect the environment.	pre	3.95 (1.01)	0.80	126	.43	-1.59	35	36	22	4	3
	post	3.89 (1.06)					33	36	24	2	5
SOCIAL NORMS Composite Mean	pre	3.98 (0.67)	2.41	119	.017	-3.02					
	post	3.86 (0.72)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 8.8. Pi Beta Phi – Attachment to GRSM

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I would like to visit GRSM with my family or friends.	pre	4.19 (0.94)	2.57	127	.011	-5.97	47	33	13	6	1
	post	3.94 (1.11)					37	34	19	5	5
GRSM is one of my favorite places to visit.	pre	3.74 (1.12)	0.24	124	.81	-0.64	30	30	28	7	5
	post	3.71 (1.24)					34	25	27	6	8
GRSM is important to me.	pre	4.31 (0.92)	0.85	123	.40	-1.69	51	36	8	3	2
	post	4.23 (1.02)					52	28	15	1	4
I love GRSM.	pre	4.23 (0.93)	2.02	127	.045	-3.69	48	33	15	2	2
	post	4.08 (1.11)					47	27	18	4	4
ATTACHMENT TO GRSM Composite Mean	pre	4.14 (0.76)	1.65	116	.10	-2.42					
	post	4.04 (0.93)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 8.9. Pi Beta Phi –Park and Community Behaviors

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Very Often)	4 (Often)	3 (Sometimes)	2 (Rarely)	1 (Never)
Volunteer to help the environment.	pre	3.17 (1.07)	.095	128	.92	-0.25	13	20	44	16	7
	post	3.16 (1.07)					11	26	39	18	7
Pick up trash left by others.	pre	3.81 (1.05)	1.29	128	.20	-3.04	30	36	20	12	2
	post	3.69 (1.12)					27	36	20	13	4
Help clean up a local park when asked.	pre	3.67 (1.24)	0.79	128	.43	-2.12	34	24	24	12	6
	post	3.59 (1.20)					28	28	25	13	6
Work with others to clean up my community.	pre	3.45 (1.11)	0.081	124	.94	-0.23	20	29	34	12	5
	post	3.44 (1.19)					23	27	27	17	6
Work with my teachers and friends to improve my school./Participate in activities to improve my school	pre	3.60 (1.20)	1.14	126	.26	-3.50	28	29	27	9	8
	post	3.47 (1.21)					22	33	24	12	9
Talk to my friends about the environment when I am not at school.	pre	2.56 (1.28)	-0.72	124	.48	3.12	9	14	24	26	27
	post	2.64 (1.27)					10	15	28	24	23
COMMUNITY Composite Mean	pre	3.39 (0.89)	0.74	119	.46	-1.47					
	post	3.34 (0.95)									

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Table 8.10. Pi Beta Phi –Home Behaviors

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Very Often)	4 (Often)	3 (Sometimes)	2 (Rarely)	1 (Never)
Turn off the water when brushing my teeth.	pre	4.42 (1.09)	-0.20	128	.84	0.36	70	14	7	4	5
	post	4.43 (1.07)					71	14	8	2	5
Collect aluminum cans for recycling.	pre	3.28 (1.32)	0.00	128	1.00	0.00	25	19	28	17	11
	post	3.28 (1.35)					25	19	29	12	15
Talk to my family about ways to protect the environment.	pre	2.92 (1.34)	1.12	126	.27	-4.04	17	16	29	18	20
	post	2.80 (1.32)					12	22	19	26	21
Turn the lights out when I leave a room.	pre	4.25 (1.01)	-1.42	128	.16	2.91	55	24	13	6	2
	post	4.37 (0.96)					63	18	13	4	2
Recycle paper products.	pre	3.79 (1.27)	-5.52	128	.00	16.36	42	19	23	9	7
	post	4.41 (0.77)					45	23	19	7	6
HOME Composite Mean	pre	3.74 (0.90)	-0.54	126	.59	0.53					
	post	3.76 (0.89)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 8.11. Pi Beta Phi – Self -assessed learning (Post-visit survey only)

How much did you learn about...	MEAN (SD)	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
		5 (A great deal)	4 (A moderate amount)	3 (A little)	2 (Almost none)	1 (None)
The natural environment	4.42 (0.77)	55	33	10	1	1
GRSM	4.60 (0.71)	70	22	6	1	1
How plants and animals interact	4.28 (0.93)	50	34	12	1	3
The history of the people in GRSM	4.35 (0.90)	56	29	10	3	2
The purpose of the NPS	4.34 (0.93)	57	27	11	4	1
LEARNING Composite Mean	4.40 (0.69)					

Table 8.12. Pi Beta Phi- Field Trips

ITEM		MEAN (SD)	t	df	SIG	% CHANGE	RESPONSE FREQUENCY DISTRIBUTIONS (%)				
							5 (Strongly Agree)	4 (Agree)	3 (Neutral)	2 (Disagree)	1 (Strongly Disagree)
I meet interesting people on field trips.	pre	3.83 (0.97)	-.31	124	.756	0.78	29	32	31	6	2
	post	3.86 (0.94)					29	39	24	6	2
What I learn on field trips is useful to me.	pre	4.04 (0.90)	1.24	129	.216	-2.97	34	43	18	4	1
	post	3.92 (1.04)					33	37	23	2	5
I enjoy learning when I am outside.	pre	4.02 (1.03)	.46	122	.649	-1.00	41	33	17	6	3
	post	3.98 (1.00)					37	36	18	7	2
I have a lot of fun on field trips.	pre	4.38 (0.79)	2.45	127	.016	-4.34	54	32	12	1	1
	post	4.19 (0.92)					46	33	18	1	2
Field trips help me understand what I am taught in class.	pre	4.09 (0.92)	.69	128	.493	-1.71	39	36	19	5	1
	post	4.02 (1.07)					41	31	19	5	4
FIELD TRIP Composite Mean	pre	4.04 (0.64)	1.17	116	.245	-1.82					
	post	3.97 (0.79)									

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Teacher responses regarding the Pi Beta Phi program

Respondents included 5th (1), 6th (1) and 7&8th (3) grade teachers. Teachers taught all subjects, including language, arts, and math. The average number of years that teachers had taught was 11.5 years (SD=4.51, minimum was 8 years, maximum was 18 years). Of those who responded to the demographics questions (N=4), two were male, two were female, and all were "White, not of Hispanic descent." For Pi Beta Phi, teacher responses are based on the entire semester-long experience which included multiple visits to GRSM, rather than a single GRSM visit.

Pre-Trip & Post-Trip Curriculum
All but one of the respondents indicated they used pre-trip and post-trip activities with their students involved in the Pi Beta Phi program. Pre-trip activities included teacher developed activities, mathematics activities, reading about the CCC, and hands-on activities and manipulatives. Post-trip activities included students writing Diamante poems and stewardship essays; lessons about mean, median mode of death ages and probable cause of young death ages; and the post-visit survey. One teacher indicated that more GRSM specific materials ("a full class set") would be helpful to prepare students for their GRSM experience. Four of the respondents had participated in professional development training with GRSM.

Satisfaction
Teacher satisfaction was high (mean=9.00, SD=1.73). On a scale of 1 (Very dissatisfied) to 10 (Very satisfied), three of the five teachers selected 10, one teacher selected 9, and one teacher selected 6.

General Impacts of the Program
Teachers reported positive attitudes regarding the influence of the Pi Beta Phi program (Table 8.13). Teachers indicated that the program helped them meet state standards (M=4.20), the curriculum was appropriate (M=4.60), students became more motivated academically (M=4.00), students learned a lot (M=4.40), and content was relevant to students' lives (M=4.60). Teachers were also very positive about participating in another GRSM program with their students (M=4.80).

Table 8.13. Teacher rating of the general impacts of the Pi Beta Phi experience (N=5)

General Impacts	Mean	SD
This program helped my class meet state curriculum standards.	4.20	0.45
The program content was academically appropriate for my students.	4.60	0.55
My students became motivated to perform better academically.	4.00	0.00
My students learned a lot about important topics.	4.40	0.55
I would like to do another GRSM program with my students.	4.80	0.45
My students had fun.	4.60	0.55
The program content was relevant to my students' lives.	4.60	0.55

Scale: 1=Strongly disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly agree.

Impacts on Student Outcomes
These questions investigated teachers' perceptions regarding the influence of the GRSM programs on students' appreciation, stewardship, knowledge, understanding, and interest pertaining to a range of topics. Teachers were asked: "Indicate to what extent you think the GRSM experience has positively impacted your class overall in the following areas." Response categories included: a great

deal, a moderate amount, a little, almost none, and none. Teachers were also asked: "As a result of your recent GRSM educational program, what percentage of your students increased their…" Response categories for this question included: 0-20% 21-40%, 41-60%, 61-80%, and 81-100%.

Teachers were very positive about the impact of the program on their students (Table 8.14). "Appreciation for the natural environment" and "Knowledge of GRSM natural history" were both highly rated (mean impact rating=4.80) and 100% of teachers indicated that at least 60% of students improved on these outcomes. Also, 100% of teachers indicated that at least 60% of students increased their "Understanding of ecological processes," "Understanding of the mission of the National Park Service," and "Appreciation for biological diversity." Furthermore, 80% of teachers indicated that at least 60% of students improved on "Environmental stewardship," "Concern about issues and threats facing GRSM," and "Interest in taking actions to conserve or improve the environment." "Academic performance" and "Scientific inquiry skills" were the lowest rated (mean impact rating was 4.0). Only 20% of teachers indicated that at least 60% of students improved on "Academic performance," while 60% of teachers indicated at least 60% of students improved on "Scientific inquiry skills."

Table 8.14. Teacher rating of student outcomes from participation in the Pi Beta Phi program.

Outcomes	Impact rating* (N=7)		% Students increasing their…(N=5)				
	Mean	SD	0-20	21-40	41-60	61-80	81-100
Academic performance.	4.00	0.00	0	40	40	20	0
Positive attitudes toward school.	4.40	0.89	0	0	60	40	0
Appreciation for the natural environment.	4.80	0.45	0	0	0	60	40
Environmental stewardship.	4.60	0.55	0	0	20	60	20
Understanding of ecological processes.	4.40	0.55	0	0	0	80	20
Knowledge of the history of GRSM.	4.20	0.84	0	0	20	60	20
Understanding of the mission of the National Park Service.	4.20	0.84	0	0	0	80	20
Knowledge of GRSM natural history.	4.80	0.45	0	0	0	80	20
Appreciation for biological diversity.	4.60	0.55	0	0	0	60	40
Concern about issues and threats facing GRSM.	4.40	0.89	0	0	20	40	40
Interest in taking actions to conserve or improve the environment	4.60	0.55	0	0	20	40	40
Scientific inquiry skills.	4.00	0.71	0	0	40	40	20

*Scale: 1=None, 2=Almost none, 3=A little, 4=A moderate amount, 5=A great deal

GRSM Staff

Teacher ratings of GRSM staff on all categories (Table 8.15) were very positive. Teachers rated the overall performance of the staff as between good and very good (4.4). Staff received the highest rating (mean=4.8) for organization and the lowest rating (4.0) for flexibility.

Table 8.15. Teacher ratings of GRSM Staff working with Pi Beta Phi (N=5)

Staff Rating Category	Mean*	SD
Knowledgeable	4.60	0.55
Entertaining	4.20	0.84
Flexible	4.00	1.41
Organized	4.80	0.45
Enthusiastic	4.60	0.89
Patient	4.40	0.89
Charismatic-likeable	4.40	0.89
Explained things clearly	4.60	0.55
Communicated an explicit message	4.60	0.55
Interacted positively with students	4.40	0.89
Worked well with teachers	4.20	1.30
Overall performance	4.40	0.89

Scale: 1=Very poor, 2=Poor, 3=Average, 4=Good, 5=Very good

Teacher actions before and after the trip

These questions investigated teachers' intentions to incorporate environmental themes, outdoor activities, and inquiry-based, hands-on activities into their teaching. Teachers were asked: "Prior to participation in the GRSM program, how often have you done the following?" Response categories included: very often, often, sometimes, rarely, and never. Teachers were also asked: "As a result of participating in the GRSM program, are you more or less likely to participate in the following activities in the next year." Response categories included: much less likely, less likely, same as before, more likely, much more likely.

"Incorporate environmental themes in my teaching" was the most common pre-visit action (M=4.0), and the most likely post-visit action (M=4.0) (Table 8.16). "Incorporate outdoor activities into your classes" was the least common pre-visit action (M=3.6) and also among the least likely post-visit actions (M=3.8). "Volunteer to help the environment" was the next lowest rated pre-visit activity (M=3.6), and the least likely post-visit activity (M=3.6).

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Table 8.16. Teacher action behaviors before and after the Pi Beta Phi semester (N=5)

Actions	Pre-visit frequency		Post-visit likelihood	
	Mean[1]	SD	Mean[2]	SD
Volunteer to help the environment.	3.60	0.89	3.60	0.55
Incorporate environmental themes in my teaching.	4.00	1.00	4.00	0.71
Use environmental themes to better meet state standards.	4.00	0.71	3.80	0.84
Incorporate inquiry based, hands on activities into the students' school experiences	3.80	0.45	4.00	0.71
Incorporate outdoor activities into your classes.	3.40	0.55	3.80	0.84

[1]*Scale: 1=Never, 2=Rarely, 3=Sometimes, 4=Often, 5=Very often*
[2]*Scale: 1=Much less likely, 2=Less likely, 3=Same as before, 4=More likely, 5=Much more likely*

Visitation

Four of the five respondents answered questions about visiting GRSM. Of these, all had taken at least 2 field trips to the GRSM in the current academic year (min=2, max=5) and all planned at least 2 additional field trips to the GRSM in the current academic year (min=2, max = 4). A GRSM ranger had visited one teacher's class twice and another teacher's class three times. The other two respondents had not received a visit from a GRSM ranger in the current academic year. All four respondents to the visitation questions had visited GRSM with their school more than 5 times in total and had also visited the GRSM with their family, friends, or other groups 3-5 times (1 respondent) or more than 5 times (3 respondents) in total.

Teacher comments

- I am so glad to have a parks coordinator at my school. She is great.

Limitations

- Null or negative results, particularly those observed at Pi Beta Phi, may be due to:
  - A "ceiling effect," which describes the phenomenon when scores are very high on a pre-visit survey and provide little or no room to continue upward. Pi Beta Phi students had the highest pre visitation scores on the *Attitudes toward school, Stewardship attitudes, Social norms, Park and community stewardship behaviors*, and *Home stewardship behaviors* scales. In these cases, the survey items may not be sensitive enough to detect the influence of a program using a post-visit survey.
  - The treatment (an academic semester) encompasses much more than the GRSM experience.
  - The Pi Beta Phi program is a multi-year program, so our research design does not investigate the full "experience."
  - Student fatigue at the end of the semester.

Chapter Nine
PROGRAM COMPARISON

This study sought to gauge the immediate influence of GRSM curriculum-based programs on participating students' attitudes toward school, stewardship attitudes, interest in learning, perceptions of social acceptability (social norms) of stewardship, place attachment to GRSM, attitudes toward field trips, perceived learning, and behaviors associated with stewardship. The results are summarized first according to each program and then according to each scale (see also Tables 9.1, 9.2, 9.3 and 9.4).

Comparison of day, residential and semester programs

Day Programs

- **GRSM Parks as Classrooms (South District):** This program had a significantly positive influence on the mean score for the *Home Behaviors* scale, which measured students' intentions to perform home behaviors, such as turning off the water when brushing teeth, collecting aluminum cans for recycling, talking to family about ways to protect the environment, turning the lights out when leaving a room, and recycling paper products. The mean for the *Self-assessed Learning* scale was 4.2 out of 5. Overall, the majority (67% or more) of Parks As Classrooms (Oconaluftee) students believed they learned a great deal or moderate amount on all *Self-assessed Learning* items.

- **GRSM Parks as Classrooms (North District):** This program had a significantly positive influence on the mean score for the *Park and Community Behaviors* and *Home Behaviors* scales. The composite mean for *Self-assessed learning* was 3.9. The majority (70% or more) of Parks As Classrooms (North District) students believed they learned a great deal or moderate amount on all *Self-assessed learning* items except for "The history of the people in GRSM"(59%).

- **GRSM Appalachian Highlands Science Learning Center at Purchase Knob (Parks As Classrooms Purchase Knob):** This program had a significantly positive influence on the mean scale scores for students' *Stewardship Attitudes*, *Park and Community Behaviors,* and *Home Behaviors*. The *Self-assessed Learning* composite mean was 4.0. The majority (77% or more) of Parks As Classrooms (Purchase Knob) students believed they learned a great deal or moderate amount on all *Self-assessed learning* items except for "The history of the people in GRSM"(45%).

- **GRSM Parks in Classrooms (North District):** This program had a significantly positive influence on the mean score for the *Park and Community Behaviors* scale and the *Home Behaviors* scale. The composite mean for *Self-assessed Learning* was 3.9. The majority (67% or more) of Parks In Classrooms students believed they learned a great deal or moderate amount on all *Self-assessed learning* items except for "The history of the people in GRSM"(40%).

Residential Programs

- **Great Smoky Mountains Institute at Tremont:** This program had a significantly positive influence on the mean scores for each of the following scales: *Attitudes Toward School*, *Stewardship Attitudes*, *Attachment to GRSM*, *Park and Community Behaviors*, *Home Behaviors* and *Attitudes toward Field Trips*. The composite mean for this scale was 4.3. The majority (69% or more) of GSMIT students believed they learned a great deal or moderate amount on all *Self-assessed learning* items.

- **_Eugene Huskey Environmental Education Center:_** This program had a significantly positive influence on students' mean score on the *Stewardship Attitudes*, *Social Norms*, *Park and Community Behaviors*, *Home Behaviors* and *Attitudes toward Field Trips* scales. Eugene Huskey also had the highest mean score for student's perceptions regarding learning outcomes across all programs. The composite mean was 4.4 indicating an overall high level of *Self-assessed Learning*. Overall, the majority (82% or more) of Eugene Huskey students believed they learned a great deal or moderate amount on all *Self-assessed Learning* items.

Semester Program
- **_Pi Beta Phi Parks As Classrooms:_** This program had no significantly positive changes in mean scores on the outcomes evaluated. However, this program had the second highest mean score (*M*=4.4) across all programs for student's perceptions regarding learning outcomes (Table 9.3). The majority (84% or more) of Pi Beta Phi students believed they learned a great deal or moderate amount on all *Self-assessed learning* items. When interpreting these results it is important to recognize that Pi Beta Phi was a semester-long program with multiple GRSM visits in addition to the usual school curriculum and the "intervention" that occurred between the pre-visit and post-visit surveys was not a single GRSM visit. Consequently, it may not be valid to interpret the null or negative changes in the composite means as being caused directly by Pi Beta Phi/GRSM programming. The results could in part be due to other activities during the semester, end of semester fatigue, saturation with the concepts being evaluated, or a ceiling effect. The pre results for the Pi Beta Phi program were among the highest composite mean scores for almost all of the scales, which is why a ceiling effect is likely. Therefore, it is important to be cautious when interpreting results from the Pi Beta Phi program in comparison to the other programs involved in this study.

Across program type comparison
Comparing the outcomes of each program (Table 9.4) across program types (day, residential, and semester) suggests that the residential programs had a significantly greater impact than the day or semester programs for *Attitudes toward school, Attachment to GRSM, Park and Community Behaviors, Home Behaviors,* and *Attitudes toward Field Trips.* Also, both the day and residential programs had a significantly greater impact than the semester program for *Stewardship Attitudes, and Social Norms..* However, the residential and semester programs had a significantly greater impact on *Self-Assessed Learning* than the day programs.

Results organized by scale

Attitudes toward School: Overall, mean scores for this scale were very high on both the pre-visit and post-visit surveys (Table 9.1). There was a significant increase in the mean score for this scale for students attending GSMIT (Table 9.1). This increase at GSMIT was significantly greater than all others (Table 9.3). There was also a significant decrease in the mean score for this scale for the Parks As Classrooms (North District) and Parks In Classrooms programs. This could be a result of the field trip or in school ranger experience causing students to be relatively less excited about the regular school experience in the near term (i.e., they would rather be at the park than at school).

Attitudes toward Stewardship: Three programs showed a significant increase in the mean score for this scale: Parks As Classrooms (Purchase Knob), GSMIT, and Eugene Huskey (Table 9.1). The

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changes in the mean score of this scale were significantly more positive than those observed in the other programs (Table 9.3). The Eugene Huskey program had the largest magnitude of change (3.1%) for this scale (Table 9.2).

Interest in Learning: No program was associated with statistically significant positive gains on this outcome. There was a significant decrease in the mean score for this scale for two programs, Parks As Classrooms (South District) and Pi Beta Phi (Table 9.1). The Pi Beta Phi program resulted in the largest magnitude of change for this scale (-3.5%) (Table 9.2). This negative change is likely due to saturation (interest in learning about nature has been well-satisfied) or a ceiling effect given the initial high scores on the pre-visit survey.

Social Norms: The two programs with the highest mean scores for this scale on the pre-visit survey, Parks As Classrooms (South District) and Pi Beta Phi, had a significant decrease on the post-visit survey (Table 9.1). Given the initial high mean scores, this decline may be due to a ceiling effect. Eugene Huskey was the only program that showed a significant increase in the mean score for this scale (+3.75%) (Table 9.2), and this change in the mean score was significantly greater than all other programs except for GSMIT (Table 9.3).

Attachment to GRSM: The Parks As Classrooms (South District) resulted in a significant decrease, and the GSMIT program resulted in a significant increase in mean score for this scale (Table 9.1). The GSMIT program had the largest increase (4.64%) in this scale (Table 9.2), and this increase was significantly greater than all other programs (Table 9.3).

Park and Community Behaviors: All programs except for Parks As Classrooms (South District) and Pi Beta Phi had a significant increase in the mean score for this scale (Table 9.1). The Parks In Classrooms program had the largest magnitude of increase in the mean score for this scale (7.25%) (Table 9.2). For this scale, the mean score change for the Pi Beta Phi program was the only negative change and this drop was significantly greater than Parks As Classrooms (North District), Parks In Classrooms, GSMIT and Eugene Huskey and (Table 9.3).

Home Behaviors: All programs except for Pi Beta Phi exhibited a significant increase in the mean score for this scale (Table 9.1). The Eugene Huskey program had the highest magnitude of change for this scale (6.63%) (Table 9.2).

Attitudes toward Field Trips: Only the GSMIT and Eugene Huskey programs had a significant positive increase in the mean score for this scale (Table 9.1). The Eugene Huskey program resulted in the greatest magnitude of change for this scale (8.56%) (Table 9.2). Both the GSMIT and Eugene Huskey programs had a change in mean score that was significantly higher than all of the other programs (Table 9.3).

Self-Assessed Learning: All programs appeared to have a positive influence on students' perceptions of learning outcomes (Tables 9.3 & 9.4). The Eugene Huskey program had the highest mean score (4.47) for the Self-Assessed learning scale, and the Parks In Classrooms (3.92) and Parks As Classrooms (North District) (3.93) had the lowest mean scores for this scale (Table 9.3). The mean score for the Parks As Classrooms (North District) program was significantly lower than the mean score for all other programs except for the Parks In Classrooms program. The mean score for the Parks In Classrooms program was significantly lower than all but the Parks As Classrooms (Purchase Knob) and Parks As Classrooms (North District) programs. Also, residential and semester programs had a significantly higher mean on self-assessed learning than day programs (Table 9.4).

Table 9.1. Composite Mean score student outcomes for pre-visit and post-visit*

OUTCOME	SURVEY	MEAN (SD)						
		PAC SD	PAC ND	PAC PK	PIC	GSMIT	EH	PBP
Attitudes toward school (8 items)	pre	4.21 (0.64)	3.95 (0.64)	4.23 (0.56)	4.09 (0.54)	3.97 (0.73)	4.19 (0.60)	4.29 (0.53)
	post	4.17 (0.68)	3.88 (0.66)	4.23 (0.59)	3.99 (0.58)	4.04 (0.70)	4.12 (0.69)	4.24 (0.64)
Stewardship (9 items)	pre	4.16 (0.65)	3.96 (0.63)	4.04 (0.59)	3.94 (0.54)	3.98 (0.68)	4.17 (0.58)	4.26 (0.53)
	post	4.17 (0.74)	3.96 (0.67)	4.15 (0.61)	3.92 (0.66)	4.07 (0.69)	4.30 (0.53)	4.22 (0.62)
Interest (6 items)	pre	4.00 (0.73)	3.41 (0.82)	3.67 (0.80)	3.40 (0.82)	3.63 (0.84)	3.85 (0.81)	3.76 (0.75)
	post	3.92 (0.83)	3.40 (0.88)	3.66 (0.85)	3.40 (0.85)	3.64 (0.97)	3.96 (0.78)	3.63 (0.81)
Social Norms (5 items)	pre	3.81 (0.73)	3.45 (0.69)	3.69 (0.69)	3.33 (0.63)	3.61 (0.70)	3.73 (0.68)	3.98 (0.67)
	post	3.74 (0.82)	3.45 (0.72)	3.69 (0.69)	3.32 (0.70)	3.63 (0.77)	3.87 (0.71)	3.86 (0.72)
Attachment to GRSM (4 items)	pre	4.06 (0.76)	3.80 (0.81)	3.78 (0.82)	3.84 (0.86)	3.88 (0.80)	4.21 (0.82)	4.14 (0.76)
	post	3.98 (0.95)	3.78 (0.90)	3.79 (0.88)	3.78 (0.92)	4.06 (0.90)	4.27 (0.71)	4.04 (0.93)
Park/Community Behaviors (6 items)	pre	3.27 (1.00)	2.80 (0.88)	3.15 (0.90)	2.62 (0.89)	2.84 (0.98)	3.04 (0.84)	3.39 (0.89)
	post	3.29 (1.05)	2.93 (0.91)	3.21 (0.92)	2.81 (0.95)	3.01 (1.00)	3.20 (0.84)	3.34 (0.95)
Home Behaviors (5 items)	pre	3.74 (0.89)	3.33 (0.93)	3.74 (0.86)	3.30 (0.86)	3.43 (0.88)	3.47 (0.78)	3.74 (0.90)
	post	3.85 (0.96)	3.45 (0.93)	3.83 (0.87)	3.50 (0.85)	3.65 (0.87)	3.70 (0.78)	3.76 (0.89)
Field Trips (5 items)	pre	4.25 (0.64)	3.86 (0.68)	4.08 (0.65)	3.96 (0.59)	3.87 (0.76)	3.97 (0.63)	4.04 (0.64)
	post	4.21 (0.71)	3.83 (0.75)	4.11 (0.67)	3.93 (0.67)	3.96 (0.78)	4.31 (0.59)	3.97 (0.79)

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores (paired T-test within program) on the outcome for the specific program]

Table 9.2. Student Outcomes: Percent change and significance*

Outcome	% Change						
	PAC SD	PAC ND	PAC PK	PIC	GSMIT	EH	PBP
Attitudes toward school (8 items)	-0.95	-1.77	0.00	-2.44	1.76	-1.67	-1.17
Stewardship (9 items)	0.24	0.00	2.72	-0.51	2.26	3.12	-0.94
Interest (6 items)	-2.00	-0.29	-0.27	0.00	0.28	2.86	-3.46
Social Norms (5 items)	-1.84	0.00	0.00	-0.30	0.55	3.75	-3.02
Attachment to GRSM (4 items)	-1.97	-0.53	0.29	-1.56	4.64	1.43	-2.42
Park/Community Behaviors (6 items)	0.61	4.64	1.90	7.25	5.99	5.26	-1.47
Home Behaviors (5 items)	2.94	3.60	2.41	6.06	6.41	6.63	0.53
Field Trips (5 items)	-0.86	-0.78	0.71	-0.93	2.33	8.56	-1.82

[NOTE: Shaded cells indicate a statistically significant difference (p≤.05) between pre-visit and post-visit composite scores
(paired T-test within program) on the outcome for the specific program; % change = (post-visit mean minus pre-visit mean)/pre-visit mean]

Table 9.3. ANOVA test across GRSM programs for change in mean composite score and for self-assessed learning on post-test

Outcome	PAC SD(1) ΔMean[1] (SD)	PAC ND (2) ΔMean (SD)	PAC PK (3) ΔMean (SD)	PIC (4) ΔMean (SD)	GSMIT (5) ΔMean (SD)	EH (6) ΔMean (SD)	PBP (7) ΔMean (SD)	F	df	P	Post Hoc - LSD
Attitudes toward school (8 items)	-0.037 (0.42)	-0.063 (0.40)	0.0008 (0.37)	-0.095 (0.43)	0.074 (0.48)	-0.052 (0.43)	-0.058 (0.38)	4.54	6, 2325	≤.001	3 > 2, 4** 5 > 1, 7** 5 > 2, 4 *** 5 > 3, 6*
Stewardship (9 items)	0.0040 (0.45)	0.0031 (0.41)	0.11 (0.44)	-0.026 (0.51)	0.088 (0.44)	0.13 (0.47)	-0.040 (0.48)	6.23	6, 2278	≤.001	3 > 1, 2, 4, 7*** 5, 6 > 1,2* 5 > 4,7* 6 > 4,7**
Interest (6 items)	-0.083 (0.61)	-0.018 (0.59)	-0.015 (0.61)	-0.0060 (0.59)	0.014 (0.61)	0.10 (0.63)	-0.14 (0.67)	2.18	6, 2392	.042	3>7* 5 > 7* 6 > 1,7**
Social Norms (5 items)	-0.68 (0.58)	-0.0020 (0.50)	-0.0055 (0.48)	-0.013 (0.58)	0.013 (0.55)	0.14 (0.55)	-0.13 (0.58)	2.95	6, 2331	.007	2, 3 > 7* 5 > 7* 6 > 1** 6 > 2,3,4* 6 > 7***
Attachment to GRSM (4 items)	-0.083 (0.74)	-0.031 (0.59)	0.015 (0.60)	-0.061 (0.66)	0.18 (0.77)	0.060 (0.66)	-0.11 (0.70)	4.77	6, 2310	≤.001	3 > 1* 5 > 1, 2, 4,7*** 5 > 3**
Park/Community Behaviors (6 items)	0.018 (0.78)	0.13 (0.66)	0.062 (0.66)	0.19 (0.78)	0.17 (0.78)	0.16 (0.68)	-0.046 (0.67)	3.27	6, 2332	.003	2 > 1, 3,7* 4 > 1, 7** 4 > 3* 5 > 7** 5 > 1,3* 6 > 7*
Home Behaviors (5 items)	0.11 (0.74)	0.14 (0.66)	0.090 (0.60)	0.20 (0.69)	0.22 (0.54)	0.23 (0.79)	0.030 (0.63)	2.63	6, 2396	.015	4 > 3, 7* 5 > 1* 5 > 3,7** 6 > 7*
Field Trips (5 items)	-0.04 (0.53)	-0.02 (0.53)	0.03 (0.50)	-0.04 (0.59)	0.09 (0.61)	0.34 (0.61)	-0.07 (0.68)	7.52	6, 2291	≤.001	5>1,2,4,7 6>1,2,3,4,5,7
Self-Assessed Learning[2] (5 items)	4.24 (0.81)	3.93 (0.88)	4.02 (0.75)	3.92 (0.92)	4.29 (0.66)	4.47 (0.57)	4.40 (0.69)	17.59	6, 2418	≤.001	1 > 2, 3, 4*** 3 > 2* 5, 6, 7 > 2, 3, 4*** 6 > 1*

*p < .05, ** p < .01, *** p < .001; [1] Change in composite mean (post – pre); [2] Means are post-visit only, NOT the Δ mean for post-visit minus pre-visit

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Table 9.4. Comparison of GRSM day, residential and semester based programs (N is average across scales)

Outcome	Day[1] (N=1677)	Residential (N=295)	Semester (N=122)	ANOVA			Post Hoc - LSD
	ΔMean[2] (SD)	ΔMean (SD)	ΔMean (SD)	F	df	P	
Attitudes toward school (8 items)	-0.028 (0.40)	0.038 (0.47)	-0.058 (0.39)	3.72	2, 2073	.025	Residential>Day* Residential>Semester*
Stewardship (9 items)	0.046 (0.44)	0.101 (0.45)	-0.040 (0.48)	4.43	2, 2032	.012	Residential>Semester** Day>Semester*
Interest (6 items)	-0.027 (0.61)	0.041 (0.62)	-0.135 (0.67)	3.78	2, 2136	.023	Residential>Semester**
Social Norms (5 items)	-0.014 (0.52)	0.050 (0.55)	-0.127 (0.58)	4.92	2, 2085	.007	Day>Semester* Residential>Semester**
Attachment to GRSM (4 items)	-0.021 (0.63)	0.146 (0.74)	-0.107 (0.70)	9.6	2, 2061	≤.001	Residential>Day, Semester***
Park/Community Behaviors (6 items)	0.079 (0.69)	0.170 (0.75)	-0.046 (0.67)	4.30	2, 2085	.014	Residential>Day* Residential>Semester**
Home Behaviors (5 items)	0.112 (0.65)	0.225 (0.62)	0.030 (0.63)	5.37	2, 2141	.005	Residential>Day, Semester**
Field Trips (5 items)	-0.002 (0.52)	0.160 (0.62)	-.074 (0.68)	12.70	2, 2048	≤.001	Residential>Day, Semester***
Self-Assessed Learning[3] (5 items)	4.03 (0.83)	4.34 (0.64)	4.40 (0.70)	30.88	2, 2161	≤.001	Residential, Semester >Day***

*p < .05, ** p < .01, *** p < .001; [1] Parks In Classroom and the two groups that camped as part of their Purchase Knob trip were excluded from analysis, [2] Change in composite mean (post – pre); [3] Means are post-visit only, NOT the Δ mean for post-visit minus pre-visit.

Chapter Ten
MANAGEMENT IMPLICATIONS AND RECOMMENDATIONS

Introduction

Currently Great Smoky Mountains National Park (GRSM) provides, directly or through partnerships, a range of curriculum-based educational opportunities that serve thousands of students and hundreds of schools in Tennessee, North Carolina, and surrounding states each year. The curriculum is delivered through a variety of day, residential and integrated school semester experiences. To investigate the immediate influence of these programs on primarily middle school students (90% of sample are from grades 5-8), we evaluated the following 7 programs: Parks as Classrooms programs offered by GRSM South District and North District; GRSM Appalachian Highlands Science Learning Center at Purchase Knob; Parks In Classrooms programs offered by GRSM for grades 5-8; GSMIT; Eugene Huskey Environmental Education Center; and Pi Beta Phi School.

Specifically, this study sought to gauge the immediate influence of these programs on a wide range of potential outcomes. The student outcomes of interest included: attitudes toward school, stewardship attitudes, interest in learning, perceptions of social acceptability (social norms) of stewardship, place attachment to GRSM, attitudes toward field trips, perceived learning, and behaviors associated with stewardship. A census of all students that attended selected programs during the specified times was attempted. For day and residential programs, each student completed a "pre-visit" survey in class 3-5 days prior to participating in one of the educational programs and completed a similar "post-visit" survey 2 days after attending the program. For (for the Pi Beta Phi integrated semester program, students completed the survey at the start and end of the fall semester). Each survey took approximately 10-15 minutes to complete. In addition, all attending/participating teachers were asked to complete a short survey 10 days after the educational program regarding their perceptions of student outcomes and their assessment of satisfaction with the program.

Management Implications and Recommendations

The results of the study have provided several key findings, which have management implications including:

1. The GRSM programs appear to be of very high quality and produce very satisfied teachers. The results of the study also suggest that GRSM programs and their curricula are meeting the expectations of teachers that attend the programs.

2. According to students and teachers, all of the programs had a positive influence on content-related learning outcomes pertaining to the environment, science skills, ecological processes, appreciation for biodiversity, knowledge of the NPS, and environmental stewardship, among others. The programs appear to be successful at delivering outcomes that are directly related to the curricula, which are designed to help teachers of local schools meet state education standards and are focused on providing place-based and hands-on, inquiry-based education in GRSM settings. This finding supports the results from prior evaluation efforts at Purchase Knob that

were focused directly on understanding teachers' perceptions of student learning outcomes.

3. The programs also almost universally influenced intentions to perform both home and park/community stewardship behaviors. These results suggest that students are making connections between what they learned and experienced in these programs and the role that their individual behaviors may have on the environment in GRSM and at home.

4. In general, these programs do not appear to improve students' attitudes toward school, interest in learning, social norms, or attitudes toward GRSM. If these outcomes are desired and become explicit goals of the GRSM curriculum-based programs, then program revisions should be considered that explicitly link program content and approaches to these particular outcomes (e.g., Stern, Powell, and Ardoin, 2010).

5. The two items that involved "friends" were the lowest rated. These were "My friends think cleaning up a park is cool" (between 9% and 40% of respondents agreed or strongly agreed depending on the program) and "Talk to my friends about the environment when I am not at school." (between 13% and 30% of respondents agreed or strongly agreed depending on the program). These results suggest that students appeared to be unwilling to discuss environmental and stewardship related topics with friends. GRSM may want to develop materials or curricula to address this issue. This may include material that demonstrates peers or influential role models (sport figures, musicians, etc.) performing desired activities.

6. Residential programs appear to have broader impacts on student's attitudes toward a range of topics including environmental literacy. Past research supports the idea that longer, more immersive programs may produce more powerful student outcomes pertaining to environmental literacy (e.g., Stern, Powell, and Ardoin, 2008).

7. One-fifth of students who attended programs within GRSM did not recognize (on post-visit survey) that they had visited the GRSM with their school. The management implication is that programs should continue to emphasize that students are in the park, particularly if recognition of GRSM is an important learning objective.

8. The programs that were evaluated had varying degrees of success at influencing the wide-range of student outcomes. Staff from each of the seven programs should meet to discuss the results of this study and share their specific program approaches so that all may benefit and learn. For example. GSMIT was the only program to positively influence attitudes toward school and attachment to GRSM, and Eugene Huskey was the only program to positively influence social norms.

9. After attending the programs, teachers indicated that they were more likely or much more likely to engage in integrating environmental curriculum and activities into their teaching. This suggests that involvement with the GRSM curriculum-based programs serves as an important form of professional development for teachers. For example, teachers visiting the GRSM with their school have the opportunity to observe GRSM staff and student activities in an outdoor setting and get ideas for integrating environmental themes and activities in their curriculum. Also, teachers involved in the Parks In Classrooms program have an opportunity to observe teaching that incorporates environmental stewardship themes and activities in the classroom setting.

Limitations

There are limitations that should be considered when interpreting the data and drawing conclusions. These include:

- Null or negative results may be due to a "ceiling effect" which describes the phenomenon when scores are very high on a pre-visit survey and provide little or no room to continue upward.
- The surveys may not be sensitive enough to measure the concepts under consideration.
- Null or negative results may be due to measurement error, which includes poorly worded questions.
- Some of the outcomes selected for this study may not reflect the curriculum of particular programs
- Self-reported behaviors and behavioral intentions may not reflect actual behaviors.
- Social desirability bias may influence the results of this study, especially as it pertains to stewardship.

In addition, an important limitation of this study was the ability to detect differences in outcomes for the Pi Beta Phi program. This was a semester-long program that included multiple GRSM visits in addition to the usual school curriculum. Consequently, unlike the day and residential programs, the "intervention" that occurred between the pre-visit and post-visit surveys was not a single GRSM-related visit. Therefore, we believe that it may not be valid to interpret the results as being caused directly by Pi Beta Phi/GRSM programming. Specifically, the null or negative change findings discussed in this chapter could in part be due to other activities during the semester, end of semester fatigue, saturation with the concepts being evaluated, or a ceiling effect. The results for the Pi Beta Phi program were among the highest composite mean scores for almost all of the scales, which is why a ceiling effect is likely. It is also important to note that some participants in the study may have been involved in the Pi Beta Phi program since Kindergarten. This is another reason why the pre/post visit research design may not be suitable for this group. To more effectively capture the range of potential impacts of the Pi Beta Phi program future research should investigate the influence of multi-year participation. In addition, examining impacts at time steps consistent with each GRSM field trip event in the semester-based program may reveal whether there are more direct impacts of site visits.

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