

Barriers to and Motivations for Curriculum-Based Education Program Participation at
Great Smoky Mountains National Park

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Abstract

Great Smoky Mountains National Park (GRSM) provides quality education programs to local schools. In order to continue this success and expand programs to reach more middle and high school students, a mixed methods study was conducted to help better understand why local middle and high school teachers participate or not in park educational programs. Using the Theory of Planned Behavior, teacher surveys measured factors that influence teacher intentions to participate in park programs to best predict their likelihood of future involvement. In addition, school administrators were interviewed to understand their perceptions of teacher involvement. Results provided insight to how GRSM can better provide valuable services to local middle and high schools. The best predictors of teachers' intentions to participate in future programs were their perceptions of whether programs would enhance academic achievement, how easily and comfortably they could incorporate the programs into their pre-existing curricula, and whether the experience would be a fun experience in nature for both their students and themselves. Future communications with teachers should therefore emphasize that Park programs are fun, relevant learning experiences that address academic requirements for various subjects and are relatively easy to incorporate into pre-existing curricula.

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EXECUTIVE SUMMARY

Great Smoky Mountains National Park (GRSM) provides a variety of curriculum-based education program opportunities for local schools surrounding the park. To better understand how the park can increase participation in these programs by local middle and high schools, a mixed methods study was conducted with 14 schools (7 middle, 7 high) from school systems adjacent to the park. Following a focus group and preliminary administrator interviews, teacher surveys were developed to determine what factors best predict teachers' likely participation in potential programs (n=387). The study addresses the following research questions:

1. What are current levels of teachers' awareness and participation in GRSM education offerings?
2. What are teachers' opinions of GRSM education offerings?
3. How are teachers receiving information about programs and what methods would be preferred for future communication?
4. What are teachers' and administrators' perceived barriers to participation in GRSM education programs?
5. What factors best predict the likelihood of future participation?
6. In what potential programs/topics are teachers most interested?
7. How can GRSM enhance education program participation?

Awareness, participation, and opinions of current programs

Of the teachers surveyed, 73% were aware of at least one park education program; however, only 35.9% had participated in any current offering. Teachers were most aware of and had participated most often in *ranger-led nature-based programs in the park*. They were least aware of *park-led in-service trainings* and participated least often in *teacher-led history-based programs in the park*.

Science teachers were the most aware of programs and had participated more often than teachers of any other subject.

All current programs were rated highly by most teachers surveyed. Programs led by rangers (in the park, at school, or in-service trainings), however, were believed to be of better quality on average than teacher-led programs.

Communication Methods

The most common method by which teachers received information about current programs was through other teachers (37.7%). For future programs, teachers suggested that email would be the best way to communicate about offerings (39.5%). Current communication through school administrators was minimal and was not desired in the future (<5% each).

Perceived Barriers to Participation

The most common self-reported barriers to program participation by teachers were money and time. School administrators agreed that time needed to prepare for state-mandated tests was of

greatest concern. However, administrators also noted that if teachers could demonstrate that GRSM programs meet the necessary learning standards/curriculum goals, then they typically grant permission to participate. All administrators interviewed suggested that the choice to attend park programs lay primarily with the teachers. In other words, if teachers take the initiative, administrative barriers can typically be overcome in any case.

Money was not seen as a major barrier by some administrators due to their knowledge of travel grants. However, this knowledge was variable.

Best Predictors of Likely Future Participation

Our analysis measured the relationship between eight constructs representing teachers' perceptions about park education programs and their likely participation in any program. These constructs were developed through exploratory factor analysis which identified the underlying constructs, thus reducing the number of independent variables used in analysis. They include:

Academic achievement: The degree to which teachers believe that park-provided programs will enhance students' academic achievement by meeting necessary standards of learning and improving standardized test scores.

Control: The degree to which teachers feel in control of field trip participation decisions.

Ease of Incorporation: Teachers' degree of comfort with relating park programs to the subject matter of their courses.

Environmental affinity: Appreciation for natural settings at Great Smoky Mountains National Park.

Positive environmental experiences: General positive experiences for teachers and students statistically linked to environmental themes and the National Park.

Parent norms: Teachers' perceptions of parents' opinions of field trips and Great Smoky Mountains National Park.

Teacher norms-field trips: Teachers' perceptions of other teachers' opinions of field trips.

Teacher norms-GRSM: Teachers' perceptions of other teachers' opinions of Great Smoky Mountains National Park.

We also tested the influence of teachers' perceptions of the availability of funding, current programs' quality, and previous participation in the Park's programs upon their likelihood of future participation. Each of the eight constructs defined above, along with perceptions of program quality and teachers' previous participation, were positively linked to teachers' self-reported likelihood of future participation in park educational programming. Perceptions of availability of funds were not linked to likely future participation. Binary logistic regression revealed that *academic achievement*, *ease of incorporation*, and *positive environmental experiences* were the best predictors of teachers' indication that they would be "very likely" to

participate in a future education offering by the park. The best predictors varied slightly for specific programs and their locations (at GRSM vs. at schools), across different schools, and across different groupings of respondents (females vs. males, North Carolina vs. Tennessee teachers, middle vs. high school teachers).

Potential Programs/Topics

Overall, teachers indicated they would be most likely to participate in ranger visits to the classroom, park-developed materials for the classroom, and in-person teacher workshops about park resources. Middle school teachers, however, more commonly noted that they would be more likely to use online lesson plans than attend in-person teacher workshops.

Natural and cultural history were the most commonly desired topics for park programs reported by teachers completing the survey, followed by park management (includes conservation and preservation) and air/water quality.

Recommendations

Despite beliefs that money is a major barrier to participation, the survey revealed that the best predictors of very likely participation were *academic achievement*, *ease of incorporation*, and *positive environmental experiences*. Communications with teachers emphasizing that GRSM programs are fun, relevant learning experiences that can be easily incorporated into curricula to address academic requirements are likely to generate the greatest interests in teacher participation. Furthermore, interviews revealed that teachers are likely the most relevant point of contact for recruiting program participants.

Teachers indicated they would be more likely to participate in ranger visits to their classrooms than to come to the park. GRSM could use these in-school opportunities to spark both students' and teachers' interest in in-park opportunities. Both in-school programs and routine visits to the schools could serve as marketing opportunities to entice teachers to visit the park with students by explaining the available programs and the learning possibilities associated with them.

Barriers to and Motivations for Curriculum-Based Education Program Participation at Great Smoky Mountains National Park

Introduction

Great Smoky Mountains National Park (GRSM) provides a variety of curriculum-based education program opportunities to local schools surrounding the park, ranging from ranger-led field trips in the park to teachers using materials developed by the park in their classroom instruction. With current programs focusing on the elementary school level, GRSM wants to better understand how to expand current programs to reach more middle and high schools by understanding teachers' barriers and motivations to program participation. Through information gathered during a focus group and preliminary administrator interviews, teacher surveys were developed to determine what factors best predict whether teachers will participate or not in GRSM education programs. Fourteen schools from districts adjacent to the park participated. Additional administrative interviews were conducted after survey development to help better inform the study. Information collected from the teacher surveys provided insights into teachers' current knowledge and participation in GRSM education programs, factors that limit/enhance their likely participation, and the types of programs they would like to see offered by the park. Interviews with administrators explored structural issues that might prevent or encourage teachers from participating with their students in park programs. Research questions addressed included:

1. What are the current levels of teachers' awareness and participation in park education offerings?
2. What are teachers' opinions of park education offerings?
3. How are teachers receiving information about programs and what methods would be preferred for future communication?
4. What are teachers' and administrators' perceived barriers to participation in park educational programs?
5. What factors best predict teacher participation?
6. In what potential programs/topics are teachers most interested?
7. How can the park enhance program participation?

Literature Review

Benefits of Place-based Education

Numerous studies have revealed various benefits associated with place-based education for program participants, including increased enthusiasm for learning, improved academic performance in multiple subjects, enhanced problem-solving and critical thinking skills, and an increased sense of empowerment (Lieberman and Hoody 1998; Louv 2005; Ballantyne 2001; Bartosh et al. 2006). Moreover, education initiatives associated with national parks have been

linked to enhanced environmental stewardship, environmental attitudes, knowledge about the natural world, and positive attitudes toward the parks (Stern et al. 2008).

Barriers to Place-based Education

Teachers can face numerous barriers to participation in park-related education initiatives. These barriers may be structural, social, or psychological. Structural factors refer to constraints placed upon teachers by the administrative contexts in which they work. Gruenewald and Manteaw (2007), for example, note the negative impact of The No Child Left Behind Act's focus on standardized testing upon teachers' and administrators' attitudes toward place-based education and other nontraditional pedagogies. As a result, field trips that do not clearly address academic requirements may not be considered acceptable by school administrators.

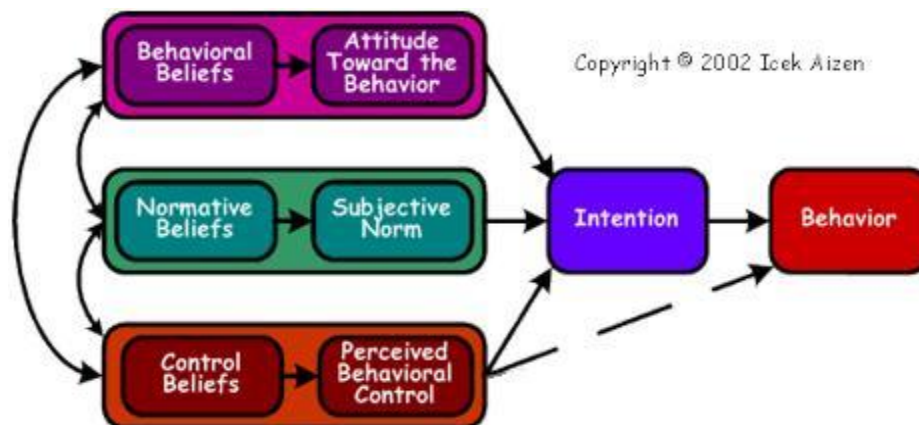
Social factors involve the perceptions of teachers and administrators about the appropriateness of interacting with GRSM. Cultural norms within schools as well as strained park-community relationships may have negative impacts on teachers' intentions to incorporate park-sponsored activities into their teaching (Stern 2008). The converse may also be true, as positive relationships may enhance teachers' intentions to participate or influence their perceptions of field trips in general.

Psychological factors refer to teachers' and administrators' personal attitudes regarding park-related education programs and can be impacted by both structural and social factors. Psychological factors are further explained below.

Theory of Planned Behavior

Ajzen's Theory of Planned Behavior (1991) suggests that people base their decisions to act upon three determinants of intention: *attitude toward the behavior*, *subjective norms*, and *perceived behavioral control*. These evaluations have associated beliefs that may simplistically be termed behavioral beliefs, normative beliefs, and control beliefs (Figure 1).

Figure 1. Diagram of Ajzen's Theory of Planned Behavior.



Behavioral beliefs are an individual's beliefs about the possible outcomes of a behavior. The evaluation of these outcomes (disadvantages vs. the advantages of participation) is termed the attitude toward the behavior. With regard to participation in park education programs, the attitude toward the behavior may be operationalized as teachers' and administrators' opinions

about the likely outcomes of participation for themselves and their students and their expectations of the quality and relevance of the programs with regard to their own goals.

Normative beliefs refer to an individual's perceptions of the judgments others will make if the individual were to perform a specific behavior. Subjective norms are the individual's evaluations of these likely judgments. The social factors discussed above are interpreted by individuals and may bear influence upon their decisions to engage in park programming. If interacting with the park is seen as abnormal or socially unpopular, teachers' intentions to participate may be diminished. While if others show enthusiasm for participation, teachers may follow suit.

Beliefs that focus on factors that may facilitate or impede an individual's decision to perform a behavior are called control beliefs. Perceived behavioral control refers to the level of difficulty and the locus of control an individual feels about carrying out a particular behavior. The structural factors discussed above may make it easier or more difficult to engage in park education programs. For example, transportation costs and obtaining administrative approval are two potential barriers that are not controlled by teachers. Furthermore, some teachers may simply not be comfortable incorporating EE programs into their instruction and thus resist taking on something that may seem unfamiliar or difficult (Powers 2004).

Once determined, these beliefs (behavioral, social, control) and their associated evaluations can be used to predict a behavioral intention (Ajzen 1991).

Methods

A mixed-methods study was conducted. Research methods included a preliminary focus group to help develop survey questions, a pilot test to verify question clarity, teacher surveys to determine why teachers participate or not in GRSM education programs, and administrator interviews to help develop teacher surveys and create a more complete picture of school involvement.

Sampling

Fourteen schools were selected by GRSM officials for the study. The schools were chosen based on the school systems' proximity to the park. Four systems were selected from North Carolina (Cherokee Central, Graham Co., Haywood Co., and Swain Co.) and three systems were selected from Tennessee (Blount Co., Cocke Co., and Sevier Co.). In each system, one high school and one of its feeder middle schools were selected (grades 6-12) to help better understand the needs of teachers for future program expansion. At each school, teachers in all disciplines were invited to complete the survey (N≈582)¹. This includes not only core subject teachers (math, science, English, and history/social studies), but also teachers of electives such as foreign languages, arts, etc.

¹ This number is an approximation based on schools' number of teachers provided by administrators.

Administrators at each school were contacted to determine how surveys could best be administered to teachers. At seven of the schools, the lead author administered the surveys during a called faculty meeting. At two schools, the lead author administered surveys during teacher planning periods. The remaining five schools' surveys were administered by a school administrator; three during faculty meetings and two during teacher planning periods. Prior to each administration, a script was read to the teachers explaining the purpose of the study and confidentiality measures that would be used.

Of approximately 582 teachers at the sample schools, 399 completed the survey. Twelve of the surveys (3% of those responding) failed validity checks, thus they were not included in the final analysis². The resulting overall response rate for the survey (n = 387) was 66.5%. Middle and high schools' response rates were 68% and 65%, respectively. North Carolina schools' response rate was 79%, and Tennessee schools' response rate was 48% (Tables 1a and 1b).

Table 1a. Breakdown of North Carolina survey completion rate by schools. Grades surveyed are in parentheses. Administration by researcher is indicated by “R” and administration by school official is indicated by “SO”.

<i>North Carolina</i>					
System	School	# Teachers	# Surveys	Completion Rate	Administration Method
Graham County	Robbinsville Middle School (6-8)	15	15	100%	Faculty Meeting - R
	Robbinsville High School (9-12)	32	27	84%	Faculty Meeting - R
Haywood County	Waynesville Middle School (6-8)	65	58	89%	Planning Period - SO
	Tuscola High School (9-12)	85	69	81%	Faculty Meeting - R
Swain County	Swain County Middle School (6-8)	30	13	43%	Faculty Meeting - SO
	Swain County High School (9-12)	55	47	85%	Faculty Meeting - R
Cherokee Central	Cherokee Middle (6-8)	20	10	50%	Planning Period - R
	Cherokee High (9-12)	41	33	80%	Planning Period - R
North Carolina Subtotal		343	272	79%	

Table 1b. Breakdown of Tennessee survey completion rate by schools. Grades surveyed are in parentheses. Administration by researcher is indicated by “R” and administration by school official is indicated by “SO”.

<i>Tennessee</i>					
System	School	# Teachers	# Surveys	Completion Rate	Administration Method
Blount County	Heritage Middle School (6-8)	49	31	63%	Faculty Meeting - SO
	Heritage High School (9-12)	98	22	22%	Faculty Meeting - SO
Cocke County	Cosby Elementary (6-8)	12	4	33%	Planning Period - SO
	Cosby High (9-12)	32	23	72%	Faculty Meeting - R
Sevier County	Wearwood Elementary (6-8)	8	5	63%	Faculty Meeting - R
	Gatlinburg-Pittman High School (9-12)	40	30	75%	Faculty Meeting - R
Tennessee Subtotal		239	115	48%	

² Validity checks involved comparing answers to survey items with inverse (opposite) wording.

Teachers not participating in the survey either were not present at scheduled faculty meetings, did not come during planning periods, or did not agree to participate (Table 2). Four schools had response rates below 50%. At Swain Co. Middle School, the researcher was unable to attend a rescheduled faculty meeting. Communication for scheduling survey administration at Cherokee Middle School was done through a teacher and not a school administrator. At Heritage High School, communication for scheduling survey administration was done through the school's administrative secretary with no direct communication between the researcher and the administrator administering survey. Surveys at Cosby Elementary School were given to teachers individually by a school administrator who asked that completed surveys be returned to the school office by the end of the school-day. Of all the variables in the study, only one statistically significant difference was observed between respondents of differentially administered surveys.³ As a result, we have no reason to believe that the different administration techniques introduced any systematic bias.

Table 2. Percentages of non-responses by administration method and of total survey respondents.

Administration Method	% of non-response	% of total surveys
Faculty Meeting – School Official	62.7%	19.1%
Faculty Meeting – Researcher	16.5%	7.6%
Planning Periods – Researcher	27.9%	2.9%
Planning Periods – School Official	14.3%	1.9%
Total Not Responding = 183		31.5%

Focus Group

A focus group of nine teachers, representing the three Tennessee school systems included in the study, was conducted to understand the most salient perceptions of teachers regarding their participation in park programs. The focus group occurred after an in-service training prior to survey development. Discussion was centered on the programs in which teachers had participated, what barriers they had experienced in coming to the park, and what had motivated them to participate. This focus group helped to identify key themes for discussion in interviews with administrators and for inclusion in the teacher surveys.

Administrator Interviews

Semi-structured interviews were conducted with eight administrators from the schools included; four were completed before teacher survey development. The foci of the interviews included the schools' current relationship and involvement with the park, administrator attitudes about future participation, their beliefs about teacher motivations, and their degree of control over teachers' ability to participate in any extra-curricular activity.

³ Teachers who responded to surveys administered by the researcher showed lesser agreement with the statement: "The National Park Service provides excellent programs for students" (t-statistic = 3.8; p < .001)

Teacher Surveys

Development

Using the Theory of Planned Behavior as the theoretical foundation for the survey, questions quantitatively measured teachers' perceptions of the likely outcomes of participation in park programs, the perceived benefits and disadvantages of participation, potential social influences on participation, teachers' perceptions about their degree of control over choosing to participate, and their perceived degree of difficulty of participation (modeled after Ajzen 1991; Francais et al. 2004; Ham et al. 2008). Additional information collected included gender, subject(s) and grade level(s) taught, and number of years at current school. Open-ended questions allowed teachers to suggest what methods would be best to relay information about programs, what barriers they believed were the biggest obstacles to participation, and what program topics they would most like to see offered by the park.

A needs assessment was also incorporated into the survey. GRSM developed a list of potential programs that could be offered to area schools. Teachers were asked to indicate their opinion of these programs and the likelihood of their participation.

Pilot-Test

A pilot-test of the survey was conducted with nine teachers from Pi Beta Phi Elementary School (Sevier Co., TN) prior to administration to the selected schools. Pi Beta Phi was selected because they are a partner school with GRSM and participate regularly in park offerings. This cognitive testing helped refine and validate measures for the survey and provided feedback on the general flow of questions (Conrad et al. 1999; Hughes 2003; Presser et al. 2004). Pi Beta Phi teachers identified questions that could possibly be misinterpreted. This resulted in minor revisions in question word choice, reducing possible misinterpretation errors from subsequent teacher surveys.

Analysis of Teacher Surveys

The teachers' surveys aimed to reveal the key motivations and barriers for teachers' participation in GRSM education programs, including their awareness, opinions, and levels of current and future potential participation in those programs. The explanatory variables in the study included teachers' perceptions of the advantages versus disadvantages associated with participation (associated with behavioral beliefs), other teachers' and students' parents' opinions of participating (associated with normative beliefs), and their role in the decision-making process (associated with control beliefs). These assessments were all measured using five-point scales. Three different response scales were used.

Response scales for survey items about attitudes towards GRSM and field trips used strongly disagree (1), disagree (2), neutral (3), agree (4), and strongly agree (5). Questions about norms (teacher and parent) towards field trips and GRSM used two anchor points: strongly disagree (1) and strongly agree (5). Nine survey items explored the importance of potential goals teachers could face when planning field trips. Teachers rated these items using three anchor points: not important (1), somewhat important (3), and extremely important (5). In addition, teachers were asked to rate how likely they felt GRSM programs would achieve each of these goals using three anchor points: not likely (1), somewhat likely (3), and extremely likely (5).

These two scales' (importance and likelihood of goal achievement) resulting values were combined to more accurately measure teachers' overall attitudes toward GRSM program participation by taking their mean. All negatively worded statements were re-coded as inverses for analysis (before any transformations were made).

In order to indentify underlying constructs and reduce the number of independent variables used in analysis, exploratory factor analysis (EFA) was conducted. This process evaluated the variance of responses to determine which statements covaried most strongly with one another. Indexes were created from the factors (groups of the most highly inter-related survey items). A reliability check was then performed (using Cronbach's alpha) to verify that the components of each construct measured the same latent variable (see Appendix A for EFA results). We labeled the resulting constructs *ease of incorporation*, *academic achievement*, *control*, *environmental affinity*, *positive environmental experiences*, *parent norms*, and *teacher norms (GRSM and field trips)* (Table 3). Two survey statements did not group together statistically with any others: *There is not enough money in the budget to allow me to engage in the park's educational programs with my students* and *The National Park Service provides excellent programs for students*. These items were evaluated separately.

Table 3. Constructs, their component survey items, and their associated response scales.

Construct	Survey Items	Response Scale
Environmental Affinity	I feel it is important to take good care of the environment.	Agree/Disagree
	I feel comfortable in the outdoors.	
	I love Great Smoky Mountains National Park.	
Ease of Incorporation	Educational Programs offered by the park are not relevant to the subject I teach. (inverse)	Agree/Disagree
	Participation in park programs is too much work. (inverse)	
	Field trips are a distraction from the curriculum. (inverse)	
	I feel confident that I could teach my students using the National Park as my classroom.	
Control	My school's administration discourages participation in the park's environmental education program. (inverse)	Agree/Disagree
	I am personally in control of deciding whether or not to take my students into the park.	
	Decisions about field trips are not made by teachers in this school. (inverse)	
Money	There is not enough money in the budget to allow me to engage in the park's educational programs with my students.	Agree/Disagree

	(inverse)	
Teacher Norms - Field Trips	Field trips are great.	Agree/Disagree
	Field trips are a distraction from the curriculum. (inverse)	
	Participating in park programs is a waste of time. (inverse)	
Teacher Norms - Great Smoky Mountains National Park	Great Smoky Mountains National Park is wonderful.	Agree/Disagree
	The park's educational programs are great.	
Parent Norms	Field trips are great.	Agree/Disagree
	Field trips are a distraction from the curriculum. (inverse)	
	Great Smoky Mountains National Park is wonderful.	
	The park's educational programs are great.	
	Participating in park programs is a waste of time. (inverse)	
Academic Achievement	Enhancing students' academic achievement.	Not Important/Extremely Important Not Likely/Extremely Likely
	Meeting standards of learning.	
	Improving standardized test scores.	
Positive Environmental Experiences	Providing fun and entertaining experiences for students.	Not Important/Extremely Important Not Likely/Extremely Likely
	A chance to learn something new.	
	Exposing students to environmental themes.	
	Enhancing students' appreciation for the national park.	
	Improving my relationship with my students.	
	A fun experience for myself.	

EFA using principal components analysis allowed us to reduce survey data collected into fewer latent factors for further analysis. Indexes were created by taking the mean of each of the statements included within each factor. This allowed for an equal weighting of each item within each index. We define each index below:

Academic achievement: This construct reflects the degree to which teachers believe that Park-provided programs will enhance students' academic achievement, meet necessary standards of learning, and improve standardized test scores. Items are added values of teachers' perceived importance of academic achievement goals and the likelihood of GRSM programs meeting these goals.

Control: Degree to which teachers feel in control of field trip participation decisions.

Ease of Incorporation: These items describe teachers' degree of comfort with relating park programs to the subject matter of their courses.

Environmental affinity: Appreciation for natural settings at Great Smoky Mountains National Park.

Positive environmental experiences: General positive experiences for teachers and students statistically linked to environmental themes and the National Park. Items are added values of teachers' perceived importance of positive environmental experiences goals and the likelihood of GRSM programs meeting these goals.

Parent norms: Teachers' perceptions of parents' opinions of field trips and Great Smoky Mountains National Park.

Teacher norms-field trips: Teachers' perceptions of other teachers' opinions of field trips.

Teacher norms-GRSM: Teachers' perceptions of other teachers' opinions of Great Smoky Mountains National Park.

These resulting constructs are each linked to the main constructs of the Theory of Planned Behavior. *Academic achievement* and *positive environmental experiences* reflect behavioral beliefs and attitudes toward the specific behavior of participating in park programs. The *control* construct is a control assessment, as the items included require teachers to think about how difficult overcoming the factors would be to participate. *Ease of incorporation* and *environmental affinity* primarily reflect behavioral beliefs; however, teachers' confidence in teaching students in the outdoors (*ease of incorporation*) and teachers' comfort in the outdoors (*environmental affinity*) may also reflect control beliefs to some degree. *Parent norms*, *teacher norms-field trips*, and *teacher norms-GRSM* are social norms as they measure teachers' perceptions of other teachers' and parents' opinions toward field trips and GRSM.

Teachers also rated their likelihood of future participation on a five-point scale with three anchor points: not at all likely (1), maybe/maybe not (3), and very likely (5). We believed teachers responding "very likely" to participate in potential programs, the most extreme positive measurement on the scale, would best reflect actual efforts to participate. This also provided a way to gauge the likelihood of participation in *any* program. If a teacher selected "very likely" for any potential program, they were scored as a "1"; otherwise, they received a score of zero. Using this binary dependent variable, we conducted binary logistic regression analysis to determine what constructs best predicted teachers' intentions to participate in a future program. To predict likely participation in specific individual programs, we conducted linear regression using the more nuanced 5-point scales as the dependent variables.

Independent-sample t-tests were also performed to determine any significant differences between the mean scores of responses of different groups, including females vs. males, teachers in North Carolina schools vs. Tennessee schools, middle school teachers vs. high school

teachers, those who had participated in a park program before vs. those who had not, and those who reported they would be very likely to participate in a future program vs. others.

If teachers had participated in a current program, they were asked to indicate their opinions as poor (1), fair (2), good (3), or excellent (4). For potential programs, teachers rated their opinions on a five-point scale with three anchor points: terrible idea (1), neutral (3), and great idea (5).

Results

Demographics

Females made up 62% of the respondents. Most teachers (27.1%) had been teaching at their current school between six and ten years, with an overall average of 8.5 years. The percentage of teachers with twenty or more years of service at their current school was 8.5% (See Table B-1).

Math was the most common reported core subject taught by the respondents (81), followed by English (73), Science (64), and History/Social Studies (58). Additional subjects reported included Special Education (including gifted), Business (computer, marketing), Physical Education/Health, Arts (art, music, band, chorus), Vocational (drafting, auto, family and consumer sciences, etc.), Foreign Languages, and other (careers, college, JROTC, drivers education) (Table 4). Some teachers (12%) reported teaching multiple subjects.

Table 4. Percentages of total respondents by subjects taught.

Subject	%
<i>Math (n=81)</i>	20.9%
<i>English (n=73)</i>	18.9%
<i>Science (n=64)</i>	16.5%
<i>History/S.S. (n=58)</i>	15.0%
<i>Special Ed. (n=34)</i>	8.8%
<i>P.E./Health (n=26)</i>	6.7%
<i>Business (n=26)</i>	6.7%
<i>Arts (n=22)</i>	5.7%
<i>Vocational (n=21)</i>	5.4%
<i>Foreign Language (n=12)</i>	3.1%
<i>Other (n=12)</i>	3.1%

Current Programs

Awareness

Almost three-fourths of the total respondents (73%) were aware of at least one education program currently offered by the park, while only 36% had actually participated in one. Science teachers exhibited the highest degrees of both awareness and participation (Table 5).

Table 5. Percentages of teachers by subjects who are aware and have participated in any current park program.

Subject	% Aware	% Participated
<i>Science (n=64)</i>	95.3%	68.8%
<i>Special Ed. (n=34)</i>	79.4%	58.8%
<i>Math (n=81)</i>	75.3%	54.3%
<i>Vocational (n=21)</i>	47.6%	33.3%
<i>History/S.S. (n=58)</i>	81.0%	32.8%
<i>English (n=73)</i>	72.6%	31.5%
<i>Foreign Language (n=12)</i>	83.3%	25.0%
<i>Business (n=26)</i>	73.1%	23.1%
<i>Arts (n=22)</i>	54.5%	18.2%
<i>Other (n=12)</i>	45.5%	8.3%
<i>P.E./Health (n=26)</i>	50.0%	7.7%

GRSM currently offers seven program areas in which teachers can participate with their students or on their own. Teachers were most aware of ranger-led programs in the park and least aware of park-led in-service trainings (Table 6).

Table 6. Percentages of total respondents who are aware of current park offerings.

Current Park Offerings Awareness	% of Total Respondents
<i>Ranger-led nature-based programs in the park (n=239)</i>	61.8%
<i>Ranger-led history-based programs in the park (n=178)</i>	46.0%
<i>Ranger visits to the classroom (n=154)</i>	39.8%
<i>Teacher-led nature-based visits to the park (without ranger) (n=148)</i>	38.2%
<i>Using materials developed by the park in the classroom (n=137)</i>	35.4%
<i>Teacher-led history-based visits to the park (without ranger) (n=104)</i>	26.9%
<i>Park-led in-service teacher trainings (n=97)</i>	25.1%

Participation

Teachers most commonly reported participating in ranger-led nature-based programs in the park. Teachers participated least often in teacher-led history-based visits to the park. Both ranger-led and teacher-led history-based programs had the lowest percentages of participation for those who were aware of their existence (Table 7).

Table 7. Percentages of total respondents that were aware and have participated in offerings and percentages of participation of all respondents.

Current Park Offerings Participation	% participation of those aware of program	% participation of all respondents
<i>Ranger-led nature-based programs in</i>	35.1%	21.7%

<i>the park (n=84)</i>		
<i>Using materials developed by the park in the classroom (n=61)</i>	44.5%	15.8%
<i>Ranger visits to the classroom (n=50)</i>	32.5%	12.9%
<i>Ranger-led history-based programs in the park (n=43)</i>	24.2%	11.1%
<i>Teacher-led nature-based visits to the park (without ranger) (n=38)</i>	25.7%	9.8%
<i>Park-led in-service teacher trainings (n=36)</i>	37.1%	9.3%
<i>Teacher-led history-based visits to the park (without ranger) (n=22)</i>	21.2%	5.7%

Opinions

Teachers who had participated in current programs were asked to indicate their opinion of those programs. These teachers reported that ranger-led programs (both at the park and at schools) were on average of better quality than teacher-led programs (Table 8). Materials developed by the park for classroom use fell in between the aforementioned programs, yet were believed to be of excellent quality by the majority of teachers responding. We ran t-tests to explore whether the opinions of different groupings of respondents (females vs. males, North Carolina vs. Tennessee teachers, and middle vs. high school teachers) were statistically different. The column at the far right of Table 8 displays groupings that showed statistically higher mean opinion scores than other groupings. See Table B-1 for complete t-test results.

Table 8. Percentages and means of opinions for current park programming.

Opinion of Current Park Offerings	% Poor	% Fair	% Good	% Excellent	Mean	Statistically Higher
<i>Ranger-led nature-based programs in the park (n=93)</i>	0%	1.1%	22.6%	76.3%	3.75	-----
<i>Ranger visits to the classroom (n=58)</i>	0%	3.4%	19.0%	77.6%	3.74	-----
<i>Park-led in-service teacher trainings (n=38)</i>	0%	2.6%	23.7%	73.7%	3.71	Tennessee teachers
<i>Ranger-led history-based programs in the park (n=53)</i>	0%	1.9%	26.4%	71.7%	3.70	-----
<i>Using materials developed by the park in the classroom (n=64)</i>	0%	3.1%	29.7%	67.2%	3.64	Females
<i>Teacher-led nature-based to the park (without ranger) (n=42)</i>	0%	4.8%	52.4%	42.9%	3.38	-----
<i>Teacher-led history-based visits to the park (without ranger) (n=27)</i>	0%	11.1%	48.1%	40.7%	3.30	-----

*Only teachers who indicated an opinion were included.

Communication Methods

GRSM education programs are currently communicated through several methods (Table 9). Most respondents learned about current offerings from other teachers. The least common source of information was their school administrators.

Table 9. Percentages of respondents who indicated the method(s) by which they currently receive information about park offerings. Some respondents selected multiple methods.

Current Communication	%
<i>Other teachers (n=146)</i>	37.7%
<i>Park brochure (n=93)</i>	24.0%
<i>Conversation with park employee (n=91)</i>	23.5%
<i>Word of mouth in community (n=72)</i>	18.6%
<i>Park website (n=44)</i>	11.4%
<i>Workshop/training (n=44)</i>	11.4%
<i>Newspaper (n=37)</i>	9.6%
<i>Other (n=21)</i>	5.4%
<i>School administrator (n=17)</i>	4.4%

In response to an open-ended question, 39.5% of teachers suggested that future information on programs be disseminated by email. Other desired communication methods are displayed in Table 10. “Print” includes brochures, fliers, posters, etc. that can be mailed or physically taken to schools. “Ranger visits” refer to visits to individual teachers’ classrooms. “Meetings” refer to rangers coming to scheduled faculty or subject-area meetings.

Table 10. Percentages of total respondents’ desired methods of future communication.

Desired Future Communication	%
<i>Email (n=153)</i>	39.5%
<i>Print (n=74)</i>	19.1%
<i>Ranger Visit (n=34)</i>	8.8%
<i>Meeting (n=30)</i>	7.8%
<i>In-service (n=21)</i>	5.4%
<i>Website (n=19)</i>	4.9%
<i>Administration (n=13)</i>	3.4%
<i>Phone (n=3)</i>	0.8%
<i>Liaison (n=1)</i>	0.3%

Behavioral Beliefs, Control Beliefs, and Social Norms

For each of the combined indexes and the individual survey items, we recorded frequencies and means, and ran t-tests for significant differences between groups (females vs.

males, North Carolina vs. Tennessee teachers, and middle vs. high school teachers). Table 11 shows the mean score for each of the indexes and also notes where t-tests revealed that one group was more positive (or exhibited a higher mean score) than the rest of the sample. No significant differences were found between compared groups for *environmental affinity*. Only meaningful significant differences for individual survey items will be noted; however, complete t-test statistics for all individual survey items are located in Appendix B.

Table 11. Mean scores for indexes and statistically higher groups.

Index	Mean	Statistically Higher
Environmental Affinity	4.63	-----
Ease of Incorporation	3.61	North Carolina teachers, Middle school teachers
Control	3.59	Females, North Carolina teachers
Teacher – Field Trips	3.85	Females, North Carolina teachers, Middle school teachers
Teacher – GRSM	4.08	Females
Parent	3.77	Females, North Carolina teachers
Academic Achievement	7.66	Females, Middle school teachers
Positive Environmental Experiences	8.35	Females, North Carolina teachers, Middle school teachers
Money	3.52	North Carolina teachers
Excellent NPS Programs	3.84	Females, Middle school teachers

Environmental Affinity

Over 90% of teachers responding agreed or strongly agreed (4 or 5 on 5-point scale) with all three of the statements comprising the *environmental affinity* construct (Table 12).

Table 12. Percentages of respondents’ level of agreement and mean for Environmental Affinity construct.

Environmental Affinity	% Strongly Disagree	% Disagree	% Neutral	% Agree	% Strongly Agree	Mean
I feel it is important to take good care of the environment (n=378)	1.3%	0.3%	2.4%	16.4%	79.6%	4.73
I love Great Smoky Mountains National Park (n=380)	0.8%	1.6%	3.4%	20.0%	74.2%	4.65
I feel comfortable in the outdoors (n=380)	1.1%	2.1%	4.5%	29.7%	62.6%	4.51

Ease of Incorporation

Statements pertaining to *ease of incorporation* revealed that less than half of teachers responding felt confident in teaching their students using GRSM as their classroom, but more

than half felt programs were relevant to the subject they teach. Most had favorable opinions of field trips and park programs in general (Table 13). Math and English teachers on average felt that GRSM programs were less relevant to their subjects than Science and History/Social Studies teachers. Two-thirds of science teachers who indicated that GRSM programs were not relevant were high school teachers (1 middle school teachers vs. 3 high school teachers: mean difference = .33, t-statistic = -2.802, $p = .005$).

Table 13. Percentages of respondents' level of agreement and mean for Ease of Incorporation construct.

Ease of Incorporation	% Strongly Disagree	% Disagree	% Neutral	% Agree	% Strongly Agree	Mean
I feel confident that I could teach my students using the National Park as my classroom (n=372)	3.5%	15.1%	34.7%	33.6%	13.2%	3.38
Educational programs offered by the park are not relevant to the subject I teach (n=369)	21.1%	30.0%	27.6%	15.2%	6.0%	2.56
Participation in park programs is too much work (n=369)	12.5%	40.1%	40.1%	5.4%	1.9%	2.44
Field trips are a distraction from the curriculum (n=372)	36.0%	42.2%	15.1%	4.6%	2.2%	1.95
The National Park Service provides excellent programs for students (n=361)	0.6%	1.1%	35.7%	39.1%	23.5%	3.85

Control/Money

Responses concerning teachers' role in extra-curricular decision making were variable. Only 13.9% reported that *decisions about field trips are not made by teachers in their school*. With regard to money being available to allow participation, just over half of the respondents believed their school budget would not provide adequate funds. Approximately one-fourth of these teachers indicated they would be very likely to participate in any potential program, however (Table 14). In Tennessee, high school teachers more often felt that decisions about field trips were not made by teachers than middle school teachers (t-statistic = -2.534, $p = .012$). With the exception of teachers at Cherokee Central schools (CCMS and CCHS), more than half of the teachers at the other North Carolina schools felt that money was not available in their school's budget to participate in GRSM programs (mean difference = .30, t-statistic = 2.798, $p = .005$).

Table 14. Percentages of respondents' level of agreement and mean for Control and Money constructs.

Control	% Strongly Disagree	% Disagree	% Neutral	% Agree	% Strongly Agree	Mean
I am personally in control of deciding whether or not to take my students into the park (n=373)	6.4%	23.1%	37.3%	25.7%	7.5%	3.05
Decisions about field trips are not made by teachers in this school (n=374)	15.0%	41.7%	29.4%	11.8%	2.1%	2.44
My school's administration discourages participation in the park's environmental education programs (n=373)	45.8%	25.7%	26.3%	1.6%	0.5%	1.85
There is not enough money in the budget to allow me to engage in the park's educational programs with my students (n=371)	2.7%	8.6%	37.5%	36.7%	14.6%	3.52

Teachers' Opinions

Almost all teachers (90.0%) reported that other teachers at their school think GRSM is wonderful; however, only 51.0% reported that their peers feel GRSM's education programs are great. This differs slightly from the 62.6% of teachers who believe that *the National Park Service provides excellent programs for students* (see Table 13). A majority also thought that their peers would say that field trips are neither a distraction from the curriculum nor a waste of time (Table 15). Teachers who did believe their peers felt that field trips are a distraction from the curriculum were primarily high school teachers (82% of high school teachers vs. 18% of middle school teachers: mean difference = .47, t-statistic = -4.510, $p < .001$).

Table 15. Percentages of respondents' level of agreement and mean for Teacher Norms construct.

Teachers' Perceptions of Other Teachers' Opinions	% Strongly Disagree	% Disagree	% Neutral	% Agree	% Strongly Agree	Mean
<i>Great Smoky Mountains National Park is wonderful</i> (n=371)	0.3%	0.5%	9.2%	32.3%	57.7%	4.47
<i>The park's educational programs are great</i> (n=363)	0.4%	2.2%	46.6%	29.8%	21.2%	3.69

<i>Field trips are great (n=371)</i>	2.2%	4.6%	29.6%	38.5%	25.1%	3.80
<i>Field trips are a distraction from the curriculum (n=368)</i>	21.5%	35.9%	27.2%	13.6%	1.9%	2.39
<i>Participating in park programs is a waste of time (n=366)</i>	37.7%	40.7%	18.3%	2.5%	0.8%	1.88

Parents' Opinions

Most teachers (72.2%) reported their belief that their students' parents' had positive attitudes toward GRSM and toward field trips in general. More than half (59.9%), however, were unsure of parents' opinions of the park's education programs (Table 16).

Table 16. Percentages of respondents' level of agreement and mean for Parent Norms construct.

Teachers' Perceptions of Parents' Opinions	% Strongly Disagree	% Disagree	% Neutral	% Agree	% Strongly Agree	Mean
<i>Great Smoky Mountains National Park is wonderful (n=334)</i>	0.6%	1.2%	26.1%	32.3%	39.8%	4.10
<i>Field trips are great (n=333)</i>	0.3%	0.9%	30.9%	44.4%	23.4%	3.90
<i>The park's educational programs are great (n=329)</i>	0.0%	2.4%	59.9%	22.2%	15.5%	3.51
<i>Field trips are a distraction from the curriculum (n=333)</i>	15.9%	36.3%	38.4%	8.4%	0.9%	2.42
<i>Participating in park programs is a waste of time (n=330)</i>	26.4%	36.4%	32.7%	3.9%	0.6%	2.16

Academic Achievement

A majority of teachers believed *enhancing students' academic achievement*, *meeting standards of learning*, and *improving standardized test scores* are extremely important when planning any field trip. Over half agreed that programs offered by the park would likely enhance students' academic achievement and meet learning standards; however, responses were more variable for park programs *improving standardized test scores* (Table 17). Teachers who disagreed that GRSM programs could enhance students' academic achievement or help meet academic standards were primarily high school teachers (89% of high school teachers vs. 11% of

middle school teachers: mean difference = .38, t-statistic = 3.952, $p < .001$; 79% of high school teachers vs. 21% of middle school teachers: mean difference = .37, t-statistic = 3.440, $p = .001$).

Table 17. Percentages of respondents' level of agreement and mean for Academic Achievement construct.

Academic Achievement	Importance				Likelihood			
	% Not Important	% Somewhat Important	% Extremely Important	Mean	% Disagree	% Neutral	% Agree	Mean
<i>Enhancing students' academic achievement (n=368)</i>	1.4%	11.4%	87.2%	4.42	7.8%	36.3%	55.8%	3.64
<i>Meeting standards of learning (n=366)</i>	2.7%	15.3%	82.0%	4.26	9.7%	30.6%	59.7%	3.69
<i>Improving standardized test scores (n=366)</i>	12.0%	28.1%	59.8%	3.73	23.0%	40.7%	36.3%	3.17

Positive environmental experiences

A majority of teachers also reported that goals pertaining to positive environmental experiences for both teachers and students are extremely important (Table 18). However, unlike academic achievement goals, a similar percentage of those rating the goals extremely important also agreed that park programs would likely achieve these goals.

Table 18. Percentages of respondents' level of agreement and mean for Positive environmental experiences construct.

Positive environmental experiences	Importance				Likelihood			
	% Not Important	% Somewhat Important	% Extremely Important	Mean	% Disagree	% Neutral	% Agree	Mean
<i>Exposing students to environmental themes (n=342)</i>	1.4%	10.4%	88.3%	4.36	2.0%	10.8%	87.1%	4.35
<i>Enhancing students' appreciation for the national park (n=337)</i>	1.6%	11.5%	86.8%	4.36	1.5%	13.3%	85.2%	4.30
<i>A chance for me to learn something new (n=341)</i>	2.7%	8.5%	88.7%	4.28	2.1%	16.1%	81.8%	4.21
<i>Providing fun and</i>	2.2%	14.8%	83.1%	4.18	1.5%	19.9%	78.7%	4.14

<i>entertaining experiences for students (n=342)</i>								
<i>A fun experience for myself (n=339)</i>	11.8%	21.9%	66.3%	3.82	4.1%	19.2%	76.7%	4.09
<i>Improving my relationship with my students (n=339)</i>	12.0%	28.1%	59.8%	3.73	7.7%	25.7%	66.7%	3.82

Barriers

When asked an open-ended question about “the biggest barrier(s)” to participating in park programs, teachers most commonly reported finances, followed by time and challenges associated with planning/logistics. Other barriers ranged from not having sufficient information about program offerings to accessibility concerns for disabled students (Table 19).

Table 19. Percentages of total respondents’ self-reported barriers.

Self-Reported Barrier	%
<i>Finances (n=128)</i>	33.1%
<i>Time (n=104)</i>	26.9%
<i>Logistics (planning) (n=39)</i>	10.1%
<i>Lack of Information (n=28)</i>	7.2%
<i>Irrelevant to Subject Area (n=28)</i>	7.2%
<i>Insufficient Material for Subject Area (n=22)</i>	5.7%
<i>State Required Learning Standards (n=20)</i>	5.2%
<i>Required Testing (n=17)</i>	4.4%
<i>Getting transportation/driver (n=16)</i>	4.1%
<i>Accessibility (n=6)</i>	1.6%
<i>Administration Approval (n=5)</i>	1.3%
<i>Distance (n=4)</i>	1.0%
<i>Choosing Most Beneficial Trip (n=3)</i>	0.8%
<i>No Barriers (n=3)</i>	0.8%
<i>Dislike of Outdoors (n=3)</i>	0.8%
<i>Behavior Issues (n=2)</i>	0.5%
<i>Don’t know (n=2)</i>	0.5%
<i>Interest in Participation (n=1)</i>	0.3%
<i>Liability (n=1)</i>	0.3%
<i>Insufficient Staff at Park (n=1)</i>	0.3%

Administrator Interviews

All eight administrators interviewed reported that their science teachers were the primary participants in current park programs while teacher participation at each school varied among the current programs offered. When asked about future participation, administrators again believed science teachers would be the most interested, with some possible interest from history teachers.

However, with further discussion or when prompted by the researcher, some administrators stated that other subjects could benefit from participation. All administrators agreed that they could encourage their teachers to utilize the park more to supplement curriculum instruction. Still, some administrators noted that information about programs was relayed only to certain teachers (typically science teachers).

Although teachers reported that finances were one of the biggest barriers to participation, administrators did not necessarily agree. While some administrators did indicate that money was a concern, two Tennessee administrators were aware that the park (or other sources) could provide monetary assistance to help with bus costs. A more commonly perceived barrier to participation was justifying that programs address teachers' curricula (relevance and learning standards). Only one middle school principal did not perceive this to be a barrier. Most administrators stated that if teachers could justify that participation would coincide with their curriculum, participation would be more easily granted. Yet, other barriers would need to be addressed as well.

One of these barriers is time constraints. With classroom time focused on state-mandated test preparation, some administrators do not allow field trips to be taken during certain times of the school-year. In addition, justifying the amount of time the program may take away from students' other classes is a possible concern. Some administrators believe that teachers may feel hesitant to pursue participation in programs, because they are worried that other teachers will not appreciate removing students from their classrooms. Thus, some schools want an entire grade level to participate on the same day as to minimize the time students and teachers are away from school.

Desired Topics for Park Programs

The individual potential topics in which teachers showed greatest interest for potential future participation with their students included history, park management (includes conservation and preservation), air/water quality, math, animals, general science, and careers. Table 20 shows the percentages of teachers by core subjects reporting interest in these topics. Teachers expressed interest in several natural history/science topics, including air/water quality, animals, general science, plants, data collection/analysis, environment, forestry, and many others. When grouped together, natural history-focused topics of interest outnumbered interests in cultural history topics. All self-reported topics of interest are listed in Table 21. Multiple topics on the same line indicate that an equal number listed each.

Table 20. Percentages of core subject teachers interested in top self-reported potential topics.

Subject	Top Self-Reported Potential Topics						
	History	Park Management	Air/Water Quality	Math	Animals	General Science	Careers
History/S.S.	42.6%	21.2%	7.7%	5.0%	13.3%	14.3%	0%
English	34.4%	15.2%	3.8%	15.0%	20.0%	21.4%	8.3%
Math	13.1%	21.2%	7.7%	95.0%	6.7%	21.4%	16.7%
Science	8.2%	45.5%	92.3%	0%	40%	7.1%	8.3%

*Percentages may total more than 100% as some teachers indicated teaching multiple subjects.

Table 21. Number of teachers self-reporting topics of interest for education programs.

61	History
33	Park Management
26	Air/Water Quality
20	Math
15	Animals
14	General Science
12	Careers
11	Plants
10	Data Collection/Analysis, Writing
9	Environment, Hiking, Survival
8	Forestry
6	Art, Geology, Literature, Ranger-led
5	Ecology, GPS, Recreation, Stream
4	Appalachian, Biology, Diversity, Finance, Habitats, NPS
3	Archaeology, CCC, Chemistry, Classification, Elk, Food, Maps, New Species, Soils
2	Bears, Construction, Crafts, Earth, Ecosystems, Fire, Marketing, Music, Physics, Public Relations, Safety, Technology, Weather
1	Architecture, Chestnut, Deep Creek, Endangered Species, Fishing, Follow-up in class, Grammar, Human Body, Leadership, Lichens, Leave No Trace, Microbiology, Problem Solving, Reading, Research, Salamanders, Spanish, Stewardship

Potential Programs

Although history was a topic of common interest, History/S.S. teachers were the least likely of the four core subjects to report they'd be "very likely" to participate in any potential program (Table 22).

Table 22. Percentages of teachers by core subjects very likely to participate in any potential program.

Core Subject	% Very likely to participate
Science	75.0%
English	54.8%
Math	49.4%
History/S.S.	37.9%

Over half of the teachers who indicated they had participated in a park program before also indicated that they would be very likely to participate in any potential program (Table 23). This was a statistically significant difference (Pearson chi-square statistic = 24.8; $p < 0.001$) A further breakdown of the relationship between prior participation and individual programs is displayed in Table C-2.

Table 23. Percentages of teachers who are very likely to participate in any potential program by previous participation.

Previously Participated?	% Very likely to participate in any potential program
Yes	65.5%
No	39.1%

Nine of the twelve potential programs were rated as great ideas by participants (mean=4.0 or above on 5-point scale). Ranger-led field trips to the park, ranger visits to the classroom, and park-developed materials for use in the classroom were believed to be the best ideas for potential programs. After-school and/or weekend volunteer service opportunities, podcasts, and teacher-led field trips were also generally considered good ideas (mean=3.00 to 3.99) (Table 24).

Table 24. Percentages of respondents' level of agreement and mean for opinions of potential programs.

Opinion of Potential Programs	% Terrible Idea	% Bad Idea	% Neutral	% Good Idea	% Great Idea	Mean	Statistically Higher
Ranger-led field trips to the park (n=366)	0.2%	0.8%	11.7%	34.4%	52.7%	4.39	Females, North Carolina teachers, Middle school teachers
Ranger visits to the classroom(n=366)	0.2%	11.0%	9.8%	38.3%	50.5%	4.38	-----
Park-developed materials for use by teachers in classroom (n=362)	0.6%	0.8%	15.5%	36.7%	46.4%	4.28	-----
In-person teacher workshops about park resources that tie to curriculum (n=366)	1.1%	0.8%	18.0%	34.7%	45.4%	4.22	Females
A class for students focused on park disciplines and careers (n=365)	0.5%	13.7%	19.2%	35.3%	43.6%	4.20	-----
Online lesson plans (n=365)	1.4%	2.7%	18.9%	35.9%	41.1%	4.13	Females, Middle school teachers
Schoolyard data collection relating to park research(n=361)	0.6%	1.9%	25.5%	31.3%	40.7%	4.10	Females, North Carolina teachers, Middle school

							teachers
5-day summer science camp for girls (n=365)	1.9%	2.5%	24.7%	25.8%	45.2%	4.10	Females, North Carolina teachers, Middle school teachers
Online trainings about park resources that tie to curriculum (n=364)	1.4%	4.1%	24.5%	33.0%	37.1%	4.00	-----
After-school and/or weekend volunteer service opportunities (n=365)	1.1%	3.8%	23.8%	38.4%	32.9%	3.98	-----
Podcasts (electronic broadcasts) of park programs (n=363)	1.7%	6.6%	33.9%	29.2%	28.7%	3.77	Females, Middle school teachers
Teacher-led field trips to the park (n=365)	3.3%	7.1%	30.4%	34.5%	24.7%	3.70	-----

Teachers were also asked to indicate their likelihood of participation in each of the potential programs. *Ranger visits to the classroom* were viewed the most favorably (Table 25).

Table 25. Percentages and means of respondents' level of likely participation for potential programs.

Likelihood of Participation in Potential Programs	% Not at all Likely	% Not Likely	% Maybe, Maybe Not	% Likely	% Very Likely	Mean	Statistically Higher
Ranger visits to the classroom (n=350)	10.3%	4.6%	26.0%	25.7%	33.4%	3.67	North Carolina teachers, Middle school teachers
Park-developed materials for use by teachers in classroom (n=350)	9.1%	5.4%	24.0%	33.1%	28.3%	3.66	Middle school teachers
In-person teacher workshops about park resources that tie to curriculum (n=352)	9.7%	5.7%	25.9%	31.0%	27.8%	3.62	Middle school teachers
Online lesson plans (n=351)	11.1%	6.3%	26.8%	29.9%	25.9%	3.53	Middle school teachers

Ranger-led field trips to the park (n=353)	11.9%	7.6%	30.6%	27.5%	22.4%	3.41	North Carolina teachers, Middle school teachers
Online trainings about park resources that tie to curriculum (n=349)	10.6%	10.0%	30.9%	26.4%	22.1%	3.39	Middle school teachers
A class for students focused on park disciplines and careers (n=350)	16.0%	7.1%	27.7%	24.3%	24.9%	3.35	Middle school teachers
Schoolyard data collection relating to park resources (n=346)	12.1%	10.1%	29.8%	29.2%	18.8%	3.32	Middle school teachers
Podcasts (electronic broadcasts) of park programs (n=347)	15.6%	11.0%	38.0%	20.7%	14.7%	3.08	-----
After-school and/or weekend volunteer service opportunities (n=349)	16.6%	13.8%	32.7%	24.4%	12.6%	3.03	Middle school teachers
Teacher-led field trips to the park (n=352)	19.3%	10.5%	37.5%	19.0%	13.6%	2.97	Males, North Carolina teachers, Middle school teachers
5-day summer science camp for girls (n=347)	26.5%	10.0%	30.8%	14.4%	18.2%	2.88	North Carolina teachers, Middle school teachers

Middle and high school teachers' likely participation in individual programs varied. Both groups of teachers reported that they would be most likely to participate in ranger visits to the classroom, however (Table 26). Middle school teachers reported a greater likelihood of participating in all programs.

Table 26. Percentages of middle and high school teachers who are very likely to participate in individual potential programs.

Potential Program	% of middle school teachers very likely to participate	% of high school teachers very likely to participate
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<i>Ranger visits to the classroom</i>	38.5%	30.7%
<i>Park-developed materials for use by teachers in classroom</i>	30.9%	26.9%
<i>In-person teacher workshops about park resources that tie to curriculum</i>	29.8%	26.8%
<i>Online lesson plans</i>	34.1%	21.5%
<i>A class for students focused on park disciplines and careers</i>	31.1%	21.5%
<i>Online trainings about park resources that tie to curriculum</i>	26.4%	19.7%
<i>Schoolyard data collection relating to park research</i>	22.3%	16.0%
<i>Ranger-led field trips in the park</i>	35.0%	15.7%
<i>5-day summer science camp for girls</i>	24.0%	15.0%
<i>After-school and/or weekend volunteer service opportunities</i>	13.0%	12.4%
<i>Podcasts (electronic broadcasts) of park programs</i>	20.5%	11.6%
<i>Teacher-led field trips in the park</i>	18.9%	10.9%

Of the 188 teachers who indicated they were very likely to participate in any potential program, 33.3% were science teachers. Seventy-five percent of science teachers and 55% of English teachers reported being “very likely” to participate in at least one program. In Table 27, Column 2 shows the percentage of teachers by subjects who reported being very likely to participate in any potential program. More specific breakdowns of interest in potential programs by subject areas and previous participation are included in Appendix C.

Table 27. Percentages of very likely participation of all respondents by subject.

Subject	% of given subject very likely to participate	% of all respondents very likely to participate
Science	75.0%	33.3%
English	54.8%	21.3%
Math	49.4%	21.3%
History/S.S.	38.0%	11.7%
Special Ed	47.1%	8.5%
Business	38.5%	5.3%
Vocational	42.9%	4.8%
Art	36.4%	4.3%
Health/P.E.	30.8%	4.3%
Other	50.0%	3.2%
Foreign Language	9.1%	1.1%

Breakdown of teachers' participation likelihood in individual program and teachers' desired program topics by schools can be found in Appendix D.

Best Predictors of Participation

To begin to understand which variables might predict teachers' intentions to participate in park education programs, we divided the sample into two groups: those who indicated they would be "very likely" to participate in any one of the listed future potential programs and those who did not. We conducted an independent sample t-test containing each of the key explanatory variables in the study and found that each was statistically significantly related to teachers' intentions except *Money* (Table 28). We then performed binary logistic regression (BLR) to determine which variables best predict teachers' intentions to participate in potential GRSM programs. The dependent variable in the regression analysis was binary. If a teacher selected "very likely" with regard to their future participation in any park program, they were scored as a one. If not, they were scored as a zero. This analysis evaluated which of the variables contained in Table 28 best predicted the selection of "very likely" to participate in any program.

Table 28. T-test results for independent variables (constructs) for teachers very likely to participate vs. teachers not very likely to participate.

Independent Variable	Very Likely	Means	t-statistic	Significance
Environmental Affinity	Yes	4.79	5.064	<i>p</i> <.001
	No	4.48		
Ease of Incorporation	Yes	3.95	9.795	<i>p</i> <.001
	No	3.27		
Control	Yes	3.69	2.741	<i>p</i> =.006
	No	3.49		
Teacher Norms-Field Trips	Yes	3.97	2.976	<i>p</i> =.003
	No	3.73		
Teacher Norms-GRSM	Yes	4.18	2.958	<i>p</i> =.003
	No	3.98		
Parent Norms	Yes	3.89	3.831	<i>p</i> <.001
	No	3.64		
Academic Achievement	Yes	8.13	7.357	<i>p</i> <.001
	No	7.12		
Positive Environmental Experiences	Yes	8.78	8.192	<i>p</i> <.001
	No	7.85		
Money	Yes	2.45	-.701	<i>NS</i>
	No	2.52		
Excellent NPS programs	Yes	4.02	4.338	<i>p</i> <.001
	No	3.66		

BLR revealed that the overall best predictors of whether or not teachers reported that they would be very likely to participate in at least one potential program were *ease of incorporation*, *academic achievement*, and *positive environmental experiences*. Using these variables, we can predict with 73.4% accuracy who within the sample reported the highest likelihood of future

participation (Table 29). This suggests that programs that can demonstrate that they are relevant to teachers' curricula, meet academic requirements, and are a fun learning experience for both teachers and students are most likely to generate interest.

Table 29. Binary logistic regression results for best predictors of all teachers' very likely participation in any potential program.

	Predicted Participation		Percentage Correct
	Not very likely to participate	Very likely to participate	
Observed High Likelihood of Participation			
Not very likely to participate	80	40	66.7%
Very likely to participate	31	116	78.9%
Overall Percentage			73.4%
Independent Variable		Significance	Exp (β)
Ease of Incorporation		$p < .001$	3.973
Academic Achievement		$p = .032$	1.355
Positive Environmental Experiences		$p = .033$	1.431

We performed additional analyses to determine if different variables might better predict the reported participation of specific groupings of teachers. BLR was performed to determine the best predictors of likely participation for subjects taught, gender, state, schools, and school levels (middle vs. high). Linear regression was performed to determine which independent variables most strongly influence teachers' reported likelihood of participation in each of the potential programs.

Positive environmental experiences was the best predictor of likely participation in any program for Science, Math, and English teachers. For history teachers, however, the best predictor was *ease of incorporation* (Table 30).

Table 30. Binary logistic regression results for best predictors of core subject teachers' very likely participation in any potential program.

Subject	Independent Variables	Significance	Exp (β)	% Correct
Science	Positive Environmental Experiences	$p = .028$	2.288	79.2%
Math	Positive Environmental Experiences	$p = .001$	2.915	73.2%
History	Ease of Incorporation	$p = .008$	9.799	76.3%
English	Positive Environmental Experiences	$p = .002$	3.374	70.2%

Table 31 presents the best predictors for each the schools sampled where at least 25 teachers responded to the survey. At least one of the three best predictors found in the initial BLR analysis was found for each of these schools.

Table 31. Binary logistic regression results for best predictors of individual school’s teachers’ very likely participation in any potential program. NS indicates that the model provided no statistically significant prediction.

School	Independent Variables	Significance	Exp (β)	% Correct
Gatlinburg-Pitman High School	Academic Achievement	$p=.035$	2.340	80.0%
Swain Co. High School	Ease of Incorporation	$p=.017$	11.012	77.8%
	Academic Achievement	$p=.052$	2.240	
Tuscola High School	Ease of Incorporation	$p=.030$	4.817	76.3%
	Academic Achievement	$p=.053$	2.198	
Waynesville Middle School	Ease of Incorporation	$p=.003$	11.036	71.8%
Robbinsville High School	Ease of Incorporation	$p=.043$	14.651	70.0%
Cherokee High School	-----	NS	----	-----
Heritage Middle School	-----	NS	----	-----

*Only schools with sample sizes $n > 25$ were included.

Best predictors varied for different groups of teachers (females vs. males, North Carolina vs. Tennessee teachers, middle vs. high school teachers). The opinions of other teachers and parents were better predictors for male teachers than for female teachers (Table 32).

Table 32. Binary logistic regression results for best predictors of gender, state, and school level’s very likely participation in any potential program.

	Independent Variables	Significance	Exp (β)	% Correct
Gender				
Female	Ease of Incorporation	$p<.001$	4.500	74.7%
	Academic Achievement	$p=.001$	1.773	
Male	Ease of Incorporation	$p=.001$	4.023	74.8%
	Positive Environmental Experiences	$p=.002$	2.637	
	Parent	$p=.007$	4.499	
	Teacher – GRSM	$p=.010$	.294	
State				
NC	Academic Achievement	$p<.001$	4.879	72.2%
	Positive Environmental Experiences	$p<.001$	2.085	
TN	Ease of Incorporation	$p=.001$	3.650	68.2%
	Environmental Affinity	$p=.044$	3.342	
School Level				
Middle School	Positive Environmental Experiences	$p=.002$	2.218	72.0%
	Ease of Incorporation	$p=.018$	2.896	
High School	Ease of Incorporation	$p<.001$	4.928	72.7%
	Academic Achievement	$p=.005$	1.528	

Table 33 shows the linear regression results for individual programs. Ease of incorporation again proved the most consistently effective predictor of teachers’ reported

likelihood of participation in any program, followed by positive environmental experiences and academic achievement, though other variables helped to predict reported likelihood of participation in specific programs.

We also grouped the programs based on their locations (at the park or at school) to further understand which variables might be most powerfully influencing teachers' interests in actually visiting the park. In-service workshops and 5-day summer science camps for girls were not included in this particular analysis, as their locations may be variable. The same three variables proved to be the best predictors of reported likelihood of participation in each program (ease of incorporation, positive environmental experiences, and academic achievement) (Table 34).

Table 33. Linear regression results for best predictors of teachers' participation in each individual potential program.

Program	Independent Variables	Significance	β	df	R²
Ranger-led field trip	Ease of Incorporation	$p < .001$.462	255	.386
	Positive Environmental Experiences	$p < .001$	.201	
	Parent Norms	$p = .005$	.150	
Teacher-led field trip	Ease of Incorporation	$p < .001$.307	254	.276
	Environmental Affinity	$p = .001$	.197	
	Teacher Norms - Field Trips	$p = .006$	.167	
	Positive Environmental Experiences	$p = .024$	.140	
	Control	$p = .032$	-.125		
Ranger visits to classroom	Ease of Incorporation	$p < .001$.394	254	.327
	Positive Environmental Experiences	$p = .001$	.192	
	Environmental Affinity	$p = .005$	.158	
A class for students focused on park disciplines and careers	Ease of Incorporation	$p < .001$.371	255	.265
	Academic Achievement	$p = .004$	.172	
	Parent Norms	$p = .009$	.148	
Schoolyard data collection	Ease of Incorporation	$p < .001$.289	253	.246
	Academic Achievement	$p = .013$	.177	
	Positive Environmental	$p = .022$	.162	

	Experiences				
After school/weekend volunteering	Ease of Incorporation	$p < .001$.300	253	.264
	Academic Achievement	$p < .001$	.251	
	Environmental Affinity	$p < .001$	.216	
	Excellent NPS Programs	$p = .007$	-.167		
Park-developed materials for classroom	Ease of Incorporation	$p < .001$.358	255	.316
	Environmental Affinity	$p = .036$	.117	
	Positive Environmental Experiences	$p = .037$	.141	
	Academic Achievement	$p = .045$	.135	
In-service workshops	Ease of Incorporation	$p < .001$.306	256	.292
	Positive Environmental Experiences	$p = .007$	.195	
	Teacher Norms – GRSM	$p = .013$	-.149		
	Academic Achievement	$p = .023$	.156	
	Environmental Affinity	$p = .029$	.125	
Online trainings	Academic Achievement	$p < .001$.292	256	.253
	Ease of Incorporation	$p < .001$	.224	
	Environmental Affinity	$p = .005$	.162	
Podcasts	Academic Achievement	$p < .001$.311	252	.249
	Ease of Incorporation	$p < .001$	.214	
	Environmental Affinity	$p = .016$	.141	
Online lesson plans	Ease of Incorporation	$p < .001$.306	256	.263
	Academic Achievement	$p = .007$	.186	
	Positive Environmental Experiences	$p = .025$	.156	

5-day summer science camp for girls	Academic Achievement	$p < .001$.263	255	.228
	Ease of Incorporation	$p < .001$	.255	
	Environmental Affinity	$p = .048$	.116	

Table 34. Binary logistic regression results for best predictors of teachers' very likely participation in potential programs based on program location.

Program Location	Independent Variables	Significance	Exp (β)	% Correct
In the park: Ranger-led and teacher-led field trips, volunteering	Ease of Incorporation	$p < .001$	4.424	76.1%
	Positive environmental experiences	$p < .001$	2.155	
	Environmental Affinity	$p = .027$	2.524	
At school: Ranger visits, materials, lesson plans, class, online trainings, schoolyard data collection, podcasts)	Ease of Incorporation	$p < .001$	3.340	72.3%
	Positive environmental experiences	$p = .003$	1.559	
	Environmental Affinity	$p = .036$	1.984	

Linear regression was also performed to determine which independent variables most strongly influenced teachers' reported likely participation for those teachers who had previously participated in a park program vs. teachers who had not (Table 35). The results suggest that teachers who had not participated before may be more skeptical about park programs' links to academic achievement than those who had participated.

Table 35. Linear regression results for best predictors of teachers' likely participation based on previous participation.

Previous Participation	Independent Variables	Significance	β	df	R^2
Yes	Ease of Incorporation	$p = .001$	.332	105	.231
	Positive Environmental Experiences	$p = .016$	.234		
No	Ease of Incorporation	$p < .001$	.336	158	.232
	Academic Achievement	$p < .001$	.262		

Discussion

Although most current educational programs at GRSM are for the elementary ages, almost two-thirds of the middle and high school teachers we surveyed were aware of at least one offering. Teachers who had participated in current programs believed that GRSM on average provides excellent programs to local schools. Ranger-led programs were believed to be of higher quality than other current offerings. The largest percentage of teachers learned about programs through other teachers at their school. The smallest percentage learned about programs from their school's administrators. This suggests that if administrators are receiving information from the park, they are not effectively disseminating the information to their teachers. GRSM could overcome this potential issue by directly communicating with both administrators and teachers.

Teachers reported that finances were the biggest barrier to their participation in GRSM programs. Administrators interviewed, however, did not feel this was the primary barrier to teachers participating. While budget limitations and logistical concerns may play a role in permission being granted by administrators, interviews with administrators revealed that teachers typically have the power to make decisions about field trips in which they would like their students to participate. Teachers, however, must justify that the field trip is directly linked to the curriculum goals they have for their students. Grants for bus costs were also noted by two of the administrators we interviewed as a reason for dismissing the significance of financial barriers.

Nine variables were found to be at least somewhat predictive of teachers' intentions to participate in future park programs. These variables were *ease of incorporation*, *environmental affinity*, *control*, *teacher norms – GRSM*, *teacher norms – field trips*, *parent norms*, *academic achievement*, *positive environmental experiences*, and *excellent NPS programs*. Binary logistic regression analysis revealed that teachers' intentions to participate were best predicted by three of these variables: *ease of incorporation*, *academic achievement*, and *positive environmental experiences*. Thus, communications with teachers should emphasize that GRSM programs incorporate a wide array of subject materials addressing required academic standards in a way that is fun for both their students and teachers and easy to incorporate into current curricula. Some teachers, primarily high school teachers, were doubtful that GRSM programs would meet academic standards or enhance academic achievement. Therefore, citing specific standards programs address may be especially valuable when communicating with high school teachers. The *academic achievement* variable did not remain in the most predictive regression equation for those who had already participated in a program when the sample was divided. This suggests that concerns about this issue may diminish after participation. Two explanations are plausible to explain this decreasing importance: (1) the programs have demonstrated clear achievement in this respect to those teachers or (2) after participation, other elements come to overpower the importance of academic achievement. In other words, other benefits of the programs come to outweigh this concern.

Although teachers perceived money to be one of the biggest barriers to participation, it was not statistically related to teachers' intentions to participate in park programs. This could be a result of teachers not taking money into consideration when indicating whether or not they would be likely to participate in potential programs. To help assure monetary issues are not a perceived barrier in the future, communications should clearly indicate that programs are free and monetary assistance may be available to help with bus costs. This is especially true for

communications with North Carolina teachers, as more than half believed that their school budget would not allow them to participate in GRSM programs.

Teachers reported that the best method for future communication was email. Sending an eye-catching summary of all the programs available could be an efficient, cost-effective method for GRSM to publicize offerings. As suggested for all future communications, the email should emphasize that programs incorporate a wide array of subject materials addressing required academic standards in a way that is fun for both their students and teachers and easy to incorporate into current curricula. To address teachers' paramount concerns about money, the park might consider including the word "free" in the subject line.

Teachers indicated that the potential programs they would most likely participate in were programs which take place off-site (at their school). Ranger visits to the classroom and curriculum materials created by the park allow students to experience park programming while meeting required academic standards at no monetary cost to the teacher/school. These programs thus eliminate the perceived budget barriers that many teachers reported.

Programs conducted at schools, however, do not give students a complete park experience. By participating in GRSM programs on-site (at park), students have an opportunity to understand and build connections with the environment around them, thus providing a platform for understanding of broader issues (Simmons, et al.2004). Farmer, et al. (2007) and Stern, et al. (2008) found that GRSM in-park programs not only taught students about the park, but cultivated a pro-environmental attitude in students. Numerous other authors have stressed the importance of experiences in nature for achieving desired outcomes of such programs (Lieberman and Hoody 1998; Louv 2005; Ballantyne 2001; Bartosh et al. 2006).

Getting teachers to bring their students to the park could be accomplished by enhancing face-to-face communication between GRSM and the targeted schools. Although communication through email and phone may be efficient, actively visiting schools may be more beneficial. This may be especially true for males as social beliefs were found to be among the best predictors of their likely participation. In light of teachers' preferences for ranger visits to the classroom, rangers could use these opportunities to show teachers and administrators that GRSM has many more learning opportunities available in the park, while at the same time providing students with a great learning experience in the classroom that supplements teachers' curricula.

Conducting teacher trainings/workshops may also improve the likelihood of teacher participation in other programs. Teachers who had participated in current programs were more likely to participate in future programs than teachers who have not participated. Holding teacher trainings/workshops would be a particularly efficient way to reach multiple teachers at one time. These trainings could simulate, or demonstrate in part, student programs, showing teachers that on-site programs can easily incorporate a wide array of subject materials addressing required academic standards in a way that is fun for both their students and themselves. At the same time, teachers would be able to familiarize themselves with the park and its resources.

Administrators could also be included in these trainings to help alleviate their concerns for involvement and foster better communication with their teachers about the Park. If teachers become interested in participating in on-site (at GRSM) programs as a result of these trainings or off-site (at school) programs, logistical concerns may still remain significant barriers. GRSM

could possibly help lessen some of the logistics barriers by being as flexible as possible when middle and high school teachers are willing to participate in any program, especially if GRSM wants to reach more middle and high school students. One suggestion would be to provide interdisciplinary programs, as administrators may be more willing to allow their teachers to participate if students are not “missing” other classes.

BLR analysis revealed no variation in the best predictors for on-site (at park) and off-site (at school) programs. GRSM can therefore reasonably rely on the same key variables found in this report to develop messaging for program offerings as a whole, but should note that key variables differ depending on target audience and program.

Best predictors varied for individual programs and different groups of teachers (by subject taught, school, females vs. males, North Carolina vs. Tennessee teachers, middle vs. high school teachers). Therefore, when potential programs are implemented, different “hooks” may need to be utilized for different programs and/or groups (see Tables 29-35). Significant differences in the perceptions of certain groups of teachers may call for stressing different aspects of programs in their marketing. For example, male teachers’ best predictors of very likely participation included their perceptions of the opinions of other teachers. The Park might consider incorporating quotes from previous teachers’ participation in communications or using prior participants as ambassadors to other teachers. If the Park could identify opinion leaders within schools to become advocates, it could enhance perceptions of participation (Rogers 1995). If the target audience includes Science, English, or Math teachers, communications may need to give examples of the activities that will be conducted during the program as these teachers’ likely participation was best predicted by GRSM programs being fun experiences for both teachers and students. This could be accomplished by having short video clips that show programs are fun learning experiences for both students and teachers.

Great Smoky Mountains National Park offers excellent programs to area schools. The research suggests that investing resources in classroom visits and emphasizing that all GRSM programs are fun, relevant learning experiences that address academic requirements for various subjects and are relatively easy to incorporate into pre-existing curricula, GRSM may be able to enhance program participation. Classroom visits may also help to better market in-park experiences.

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Appendix A: Expanded EFA Results

Table A-1. EFA results for survey items related to teachers' attitudes towards GRSM and field trips.

Agree or Disagree (5-point scale items)	Component (% of variance explained by component)			
	Environmental Affinity (20.6%)	Ease of Incorporation (18.8%)	Control (14.4%)	Money (9.3%)
I love Great Smoky Mountains National Park.	.886	.104	.028	.010
I feel comfortable in the outdoors.	.870	.134	.028	.025
I feel it is important to take good care of the environment.	.849	.108	.098	.014
I feel confident that I could teach my students using the National Park as my classroom.	.138	.731	-.080	-.188
Participation in park programs is too much work. (inverse)	.136	.691	.156	.244
Field trips are a distraction from the curriculum. (inverse)	.133	.668	.278	.005
Decisions about field trips are not made by teachers in this school. (inverse)	-.016	.002	.826	-.072
I am personally in control of deciding whether or not to take my students into the park.	.029	.074	.758	-.030
My school's administration discourages participation in the park's environmental education program. (inverse)	.194	.133	.545	.293
There is not enough money in the budget to allow me to engage in the park's educational programs with my students. (inverse)	-.057	-.121	-.054	.872
Cronbach's alpha	.858	.742	.578	---

Table A-2. EFA results in relation to teachers’ perceptions of other teachers’ opinions.

Agree or disagree that teachers at my school think... (5-point scale items)	Component (% of variance)	
	Field Trips (37.6%)	GRSM (31.3%)
Participating in park programs is a waste of time. (inverse)	.743	-.088
Field trips are great.	.742	-.357
Field trips are a distraction from the curriculum. (inverse)	.690	-.543
Great Smoky Mountains National Park is wonderful.	.579	.637
The park’s educational programs are great.	.659	.509
<i>Cronbach’s alpha</i>	.731	.627

Table A-3. EFA results in relation to teachers’ perceptions of parents’ opinions.

Agree or disagree that my students’ parents’ think... (5-point scale items)	Component (% of variance)
	Parent (53.7%)
Field trips are great.	.764
Field trips are a distraction from the curriculum. (inverse)	.616
Great Smoky Mountains National Park is wonderful.	.778
The park’s educational programs are great.	.686
Participating in park programs is a waste of time. (inverse)	.805
<i>Cronbach’s alpha</i>	.780

Table A-4. EFA results pertaining to the importance of given goals when planning field trips and the likelihood of GRSM programs meeting these goals.

Importance and Likelihood (5-point scale items combined)	Component (% of variance)	
	Positive Environmental Experiences (37.6%)	Academic Achievement (31.3%)
Enhancing students’ appreciation for the national park.	.806	.225
A fun experience for myself.	.776	.192
Providing fun and entertaining experiences for students.	.767	.250
A chance to learn something new.	.762	.326
Exposing students to environmental themes.	.761	.281
Improving my relationship with my students.	.663	.355
Improving standardized test scores.	.217	.842
Meeting standards of learning.	.330	.831
Enhancing students’ academic achievement.	.289	.769
<i>Cronbach’s alpha</i>	.883	.826

Appendix B: T-test Tables

Table B-1. T-test results for current park offerings opinions for different groups.

Current Park Offerings Opinion	Group	Means	t-statistic	Sig.
<i>Using materials developed by the park in the classroom)</i>	Female	3.76	2.250	$p=.032$
	Male	3.41		
<i>Park-led in-service teacher trainings</i>	NC	3.60	-2.329	$p=.026$
	TN	3.92		

*Only significant differences included. No significant differences were found for middle vs. high school teachers.

Table B-2. T-test results for environmental affinity construct for different groups.

Environmental Affinity	Group	Means	t-statistic	Sig.
I feel it is important to take good care of the environment	Female	4.79	2.094	$p=.037$
	Male	4.63		

*Only significant differences included. No significant differences were found for North Carolina vs. Tennessee or middle vs. high school teachers.

Table B-3. T-test results for ease of incorporation construct and *The National Park Service provides excellent programs for students* for different groups.

Ease of Incorporation	Group	Means	t-statistic	Sig.
Field trips are a distraction from the curriculum	Female	1.85	-2.573	$p=.010$
	Male	2.11		
Participation in park programs is too much work	NC	2.37	-2.353	$p=.019$
	TN	2.60		
Field trips are a distraction from the curriculum	NC	1.88	-2.173	$p=.030$
	TN	2.11		
Educational programs offered by the park are not relevant to the subject I teach	Middle	2.33	-2.802	$p=.005$
	High	2.66		
Participation in park programs is too much work	Middle	2.28	-2.816	$p=.005$
	High	2.53		
Field trips are a distraction from the curriculum	Middle	1.78	-2.614	$p=.009$
	High	2.03		
Excellent NPS Programs				
<i>The National Park Service provides excellent programs for students</i>	Female	3.92	2.537	$p=.012$
	Male	3.70		
	Middle	4.06	3.908	$p<.001$
	High	3.72		

*Only significant differences included. No significant differences were found for North Carolina vs. Tennessee teachers for *The National Park Service provides excellent programs for students*.

Table B-4. T-test results for control and money constructs for different groups.

Control/Money	Group	Means	t-statistic	Sig.
My school's administration discourages participation in the park's environmental education programs	Female	1.77	-2.313	p=.021
	Male	1.99		
Decisions about field trips are not made by teachers in this school	Female	2.35	-2.464	p=.014
	Male	2.60		
Decisions about field trips are not made by teachers in this school	NC	2.36	-2.534	p=.012
	TN	2.63		
My school's administration discourages participation in the park's environmental education programs	Middle	1.72	-2.226	p=.027
	High	1.93		
Money				
There is not enough money in the budget to allow me to engage in the park's educational programs with my students.	NC	3.61	2.798	p=.005
	TN	3.31		

*Only significant differences included. No significant differences were found for females vs. males or middle vs. high school teachers for money.

Table B-5. T-test results for teacher norms (field trips and GRSM) construct for different groups.

Teacher Norms	Group	Means	t-statistic	Sig.
<i>Field trips are great</i>	Female	3.91	2.927	p=.004
	Male	3.62		
<i>Great Smoky Mountains National Park is wonderful</i>	Female	4.53	2.339	p=.020
	Male	4.35		
<i>Field trips are great</i>	NC	3.90	3.049	p=.003
	TN	3.56		
<i>The park's educational programs are great</i>	NC	3.73	1.335	p=.183
	TN	3.61		
<i>Participating in park programs is a waste of time</i>	NC	1.80	-2.733	p=.007
	TN	2.06		
<i>Field trips are great</i>	Middle	4.03	3.738	p<.001
	High	3.67		
<i>Field trips are a distraction from the curriculum</i>	Middle	2.08	-4.510	p<.001
	High	2.55		
<i>The park's educational programs are great</i>	Middle	3.82	2.131	p=.034
	High	3.63		

<i>Participating in park programs is a waste of time</i>	Middle	1.68	-3.311	<i>p</i> =.001
	High	1.99		

*Only significant differences included.

Table B-6. T-test results for parent norms construct for different groups.

Parent Norms	Group	Means	t-statistic	Sig.
<i>Field trips are great</i>	Female	4.00	3.068	<i>p</i> =.002
	Male	3.74		
<i>Field trips are a distraction from the curriculum</i>	Female	2.34	-2.187	<i>p</i> =.030
	Male	2.55		
<i>Field trips are great</i>	NC	3.99	3.396	<i>p</i> =.001
	TN	3.68		
<i>Field trips are a distraction from the curriculum</i>	NC	2.35	-2.272	<i>p</i> =.024
	TN	2.58		
<i>Participating in park programs is a waste of time</i>	NC	2.08	-2.482	<i>p</i> =.014
	TN	2.34		
<i>The park's educational programs are great</i>	Middle	3.62	1.982	<i>p</i> =.049
	High	3.44		
<i>Participating in park programs is a waste of time</i>	Middle	2.02	-2.166	<i>p</i> =.031
	High	2.24		

*Only significant differences included.

Table B-7. T-test results for importance of goals when planning field trips (academic achievement construct) for different groups.

Importance (Academic Achievement)	Gender	Means	t-statistic	Sig.
<i>Enhancing students' academic achievement</i>	Female	4.54	4.051	<i>p</i> <.001
	Male	4.21		
<i>Meeting standards of learning</i>	Female	4.41	4.799	<i>p</i> <.001
	Male	3.99		
<i>Improving standardized test scores</i>	Female	3.93	4.560	<i>p</i> <.001
	Male	3.40		
<i>Meeting standards of learning</i>	Middle	4.43	3.002	<i>p</i> =.003
	High	4.17		

*Only significant differences included. No significant differences were found for North Carolina vs. Tennessee teachers.

Table B-8. T-test results for GRSM programs meeting given goals when planning field trips (academic achievement construct) for different groups.

Likelihood (Academic Achievement)	Gender	Means	t-statistic	Sig.
<i>Meeting standards of learning</i>	Female	3.78	2.170	$p=.031$
	Male	3.54		
<i>Enhancing students' academic achievement</i>	Middle	3.89	3.952	$p<.001$
	High	3.51		
<i>Meeting standards of learning</i>	Middle	3.93	3.440	$p=.001$
	High	3.56		

*Only significant differences included. No significant differences were found for North Carolina vs. Tennessee teachers.

Table B-9. T-test results for importance of goals when planning field trips (positive environmental experiences) for different groups.

Importance (Positive Environmental Experiences)	Gender	Means	t-statistic	Sig.
<i>Exposing students to environmental themes</i>	Female	4.44	2.758	$p=.006$
	Male	4.23		
<i>Enhancing students' appreciation for the national park</i>	Female	4.42	2.029	$p=.043$
	Male	4.25		
<i>Improving my relationship with my students</i>	Female	4.16	3.525	$p<.001$
	Male	3.81		
<i>Enhancing students' appreciation for the national park</i>	NC	4.41	2.179	$p=.031$
	TN	4.22		
<i>Providing fun and entertaining experiences for students</i>	Middle	4.35	3.065	$p=.002$
	High	4.09		
<i>A chance to learn something new</i>	Middle	4.44	2.899	$p=.004$
	High	4.20		
<i>Exposing students to environmental themes</i>	Middle	4.55	4.079	$p<.001$
	High	4.26		
<i>Enhancing students' appreciation for the national park</i>	Middle	4.51	2.885	$p=.004$
	High	4.28		
<i>Improving my relationship with my students</i>	Middle	4.16	1.986	$p=.048$
	High	3.96		

*Only significant differences included.

Table B-10. T-test results for GRSM programs meeting given goals when planning field trips (positive environmental experiences construct) for different groups.

Likelihood	Gender	Means	t-statistic	Sig.
<i>A chance to learn something new</i>	Female	4.28	2.077	<i>p</i> =.039
	Male	4.09		
<i>Exposing students to environmental themes</i>	Female	4.42	2.301	<i>p</i> =.022
	Male	4.22		
<i>A chance to learn something new</i>	NC	4.27	2.290	<i>p</i> =.023
	TN	4.06		
<i>A fun experience for myself</i>	NC	4.18	2.739	<i>p</i> =.006
	TN	3.89		
<i>Providing fun and entertaining experiences for students</i>	Middle	4.31	2.938	<i>p</i> =.004
	High	4.05		
<i>A chance to learn something new</i>	Middle	4.41	3.932	<i>p</i> <.001
	High	4.10		
<i>Exposing students to environmental themes</i>	Middle	4.51	3.130	<i>p</i> =.002
	High	4.26		
<i>Enhancing students' appreciation for the national park</i>	Middle	4.41	2.083	<i>p</i> =.038
	High	4.23		
<i>Improving my relationship with my students</i>	Middle	4.02	2.952	<i>p</i> =.003
	High	3.71		
<i>A fun experience for myself</i>	Middle	4.23	2.003	<i>p</i> =.046
	High	4.02		

*Only significant differences included.

Table B-11. T-test results for potential park offerings opinions for different groups.

Potential Park Offerings Opinion	Gender	Means	t-statistic	Sig.
Ranger-led field trips to the park	Female	4.48	3.260	<i>p</i> =.001
	Male	4.22		
Schoolyard data collection relating to park research	Female	4.18	2.237	<i>p</i> =.026
	Male	3.96		
In-person teacher workshops about park resources that tie to curriculum	Female	4.33	3.190	<i>p</i> =.002
	Male	4.04		
Podcasts (electronic broadcasts) of park programs	Female	3.87	2.517	<i>p</i> =.012
	Male	3.60		
Online lesson plans	Female	4.27	3.919	<i>p</i> <.001
	Male	3.89		
5-day summer science camp for girls	Female	4.24	3.627	<i>p</i> <.001
	Male	3.85		
Ranger-led field trips to the park	NC	4.45	2.289	<i>p</i> =.023
	TN	4.24		
Schoolyard data collection relating to park research	NC	4.16	2.137	<i>p</i> =.033
	TN	3.94		
5-day summer science camp for girls	NC	4.19	2.780	<i>p</i> =.006
	TN	3.87		
Ranger-led field trips to the park	Middle	4.55	3.276	<i>p</i> =.001
	High	4.30		
Schoolyard data collection relating to park research	Middle	4.25	2.477	<i>p</i> =.014
	High	4.02		
Podcasts (electronic broadcasts) of park programs	Middle	3.92	2.205	<i>p</i> =.028
	High	3.68		
Online lesson plans	Middle	4.24	1.722	<i>p</i> =.086
	High	4.07		
5-day summer science camp for girls	Middle	4.31	3.177	<i>p</i> =.002
	High	3.99		

*Only significant differences included.

Table B-12. T-test results for potential park offerings likelihood of participation for different groups.

Potential Park Offerings Likelihood	Group	Means	t-statistic	Sig.
Teacher-led field trips to the park	Female	2.83	-2.797	p=.005
	Male	3.21		
Ranger-led field trips to the park	NC	3.53	2.904	p=.004
	TN	3.11		
Teacher-led field trips to the park	NC	3.06	1.941	p=.053
	TN	2.77		
Ranger visits to the classroom	NC	3.79	2.565	p=.011
	TN	3.41		
5-day summer science camp for girls	NC	3.05	3.593	p<.001
	TN	2.47		
Ranger-led field trips to the park	Middle	3.80	4.586	p<.001
	High	3.20		
Teacher-led field trips to the park	Middle	3.28	3.441	p=.001
	High	2.81		
Ranger visits to the classroom	Middle	3.89	2.510	p=.013
	High	3.56		
A class for students focused on park disciplines and careers	Middle	3.62	2.939	p=.004
	High	3.20		
Schoolyard data collection relating to park research	Middle	3.61	3.360	p=.001
	High	3.17		
After-school and/or weekend volunteer service opportunities	Middle	3.14	1.289	p=.198
	High	2.96		
Park-developed materials for use by teachers in classroom	Middle	3.89	2.929	p=.004
	High	3.53		
In-person teacher workshops about park resources that tie to curriculum	Middle	3.81	2.295	p=.022
	High	3.51		
Online trainings about park resources that tie to curriculum	Middle	3.63	2.743	p=.006
	High	3.27		
Podcasts (electronic broadcasts) of park programs	Middle	3.42	3.820	p<.001
	High	2.90		
Online lesson plans	Middle	3.81	3.234	p=.001
	High	3.38		
5-day summer science camp for girls	Middle	3.15	2.665	p=.008
	High	2.73		

*Only significant differences included.

Table B-13. T-test results for independent variables (constructs) for teachers who have participated vs. teachers who have not participated.

Independent Variable	Previous Participation	Means	t-statistic	Significance
Environmental Affinity	Yes	4.72	2.100	$p=.037$
	No	4.58		
Ease of Incorporation	Yes	3.91	6.191	$p<.001$
	No	3.44		
Control	Yes	3.72	2.768	$p=.006$
	No	3.51		
Teacher Norms-Field Trips	Yes	3.97	2.254	$p=.025$
	No	3.78		
Teacher Norms-GRSM	Yes	4.29	4.622	$p<.001$
	No	3.96		
Parent Norms	Yes	3.87	2.205	$p=.028$
	No	3.71		
Academic Achievement	Yes	8.03	4.119	$p<.001$
	No	7.43		
Positive Environmental Experiences	Yes	8.66	3.980	$p<.001$
	No	8.16		
Money	Yes	2.47	-.245	NS
	No	2.49		
Excellent NPS programs	Yes	4.18	6.395	$p<.001$
	No	3.64		

Table B-14. T-test results for comfort and confidence based on teachers' participation in park-led in-service trainings.

	Participated in Park-led In-service Training	Means	t-statistic	Significance
Comfort	Yes	4.80	3.560	$p=001$
	No	4.48		
Confidence	Yes	3.88	3.069	$p=.002$
	No	3.33		

Appendix C: Additional Tables

Table C-1. Percentages of total respondents who have taught at their current school for each given range of years.

<i>Years</i>	<i>% of total respondents</i>
<i>0-2 (n=82)</i>	21.2%
<i>3-5 (n=89)</i>	23.0%
<i>6-10 (n=105)</i>	27.1%
<i>11-20 (n=73)</i>	18.9%
<i>20+ (n=33)</i>	8.5%
<i>Unknown (n=5)</i>	1.3%

Table C-2. Percentages of teachers who have and have not participated in current park programs that indicated they are very likely to participate in potential individual programs.

Program	% who have not participated but are very likely to participate	% who have participated and are very likely to participate again
Ranger visits to the classroom	24.0%	49.6%
Park-developed materials for use by teachers in classroom	17.2%	47.3%
In-person teacher workshops about park resources that tie to curriculum	19.4%	42.3%
Online lesson plans	16.7%	41.5%
Online trainings about park resources that tie to curriculum	14.5%	34.9%
A class for students focused on park disciplines and careers	19.8%	33.6%
Ranger-led field trips to the park	16.6%	32.3%
Schoolyard data collection relating to park research	11.8%	31.0%
5-day summer science camp for girls	13.8%	25.6%
Podcasts	9.1%	24.4%
Teacher-led field trips to the park	9.4%	20.9%
After-school and/or weekend volunteer service opportunities	10.5%	16.2%
Off-site	41.1%	64.5%
On-site	31.0%	59.4%

Table C-3. Percentages of science teachers very likely to participate in each potential program and of all teachers very likely to participate.

Program Name	% of science teachers very likely to participate	% of all teachers very likely to participate
Ranger visits to the classroom	61.0%	33.3%
Park-developed materials for use by teachers in classroom	54.7%	35.4%
In-person teacher workshops about park resources that tie to curriculum	48.4%	31.6%
Online lesson plans	43.8%	30.8%
Online trainings about park resources that tie to curriculum	42.2%	35.1%
Schoolyard data collection relating to park research	39.1%	38.5%
Ranger-led field trips to the park	34.4%	27.8%
A class for students focused on park disciplines and careers	31.3%	23.0%
Podcasts (electronic broadcasts) of park programs	23.4%	29.4%
5-day summer science camp for girls	23.4%	23.8%
Teacher-led field trips to the park	18.8%	25.0%
After-school and/or weekend volunteer service opportunities	15.6%	22.7%

Table C-4. Percentages of math teachers very likely to participate in each potential program and of all teachers very likely to participate.

Program Name	% of math teachers very likely to participate	% of all teachers very likely to participate
Park-developed materials for use by teachers in classroom	32.1%	26.3%
Ranger-led field trips to the park	30.9%	31.6%
Ranger visits to the classroom	29.6%	20.5%
Schoolyard data collection relating to park research	25.9%	32.3%
Online lesson plans	24.7%	22.0%
A class for students focused on park disciplines and careers	23.5%	21.8%
In-person teacher workshops about park resources that tie to curriculum	23.5%	19.4%
Online trainings about park resources that tie to curriculum	23.5%	24.7%
Teacher-led field trips to the park	22.2%	37.5%

5-day summer science camp for girls	18.5%	23.8%
After-school and/or weekend volunteer service opportunities	14.8%	27.3%
Podcasts (electronic broadcasts) of park programs	14.8%	21.1%

Table C-5. Percentages of history/S.S. teachers very likely to participate in each potential program and of all teachers very likely to participate.

Program Name	% of History/S.S. teachers very likely to participate	% of all teachers very likely to participate
Ranger visits to the classroom	19.0%	9.4%
Online trainings about park resources that tie to curriculum	19.0%	14.3%
In-person teacher workshops about park resources that tie to curriculum	17.2%	10.2%
Online lesson plans	17.2%	11.0%
5-day summer science camp for girls	15.5%	14.3%
Ranger-led field trips to the park	13.8%	10.1%
Park-developed materials for use by teachers in classroom	13.8%	8.1%
A class for students focused on park disciplines and careers	12.1%	8.0%
Podcasts (electronic broadcasts) of park programs	10.3%	10.5%
Teacher-led field trips to the park	8.6%	10.4%
Schoolyard data collection relating to park research	6.9%	6.2%
After-school and/or weekend volunteer service opportunities	6.9%	9.1%

Table C-6. Percentages of English teachers very likely to participate in each potential program and of all teachers very likely to participate.

Program Name	% of English teachers very likely to participate	% of all teachers very likely to participate
A class for students focused on park disciplines and careers	26.0%	21.8%
In-person teacher workshops about park resources that tie to curriculum	24.7%	18.4%
Ranger-led field trips to the park	23.3%	21.5%
Park-developed materials for use by teachers in	23.3%	17.2%

classroom		
Ranger visits to the classroom	19.2%	12.0%
After-school and/or weekend volunteer service opportunities	16.4%	27.3%
Schoolyard data collection relating to park research	13.7%	15.4%
Online trainings about park resources that tie to curriculum	13.7%	13.0%
Teacher-led field trips to the park	12.3%	18.8%
Podcasts (electronic broadcasts) of park programs	8.2%	10.5%
Online lesson plans	21.9%	17.6%
5-day summer science camp for girls	19.2%	22.2%

Appendix D: Needs Assessment

Table D-1. Breakdown of subject and grade levels taught, desired program topics, and very likely participation in potential programs for teachers at Robbinsville Middle School.

Robbinsville Middle School (n=15)							
Subjects		Grade Level		Topics Desired		Potential Programs	
Subject	#	Level	#	Topic	%	Program	% very likely to participate
Science	2	6 th	0	Conservation	13.3%	Teacher-led field trips to the park	53.3%
History/S.S.	3	7 th	10	Fire	13.3%	Ranger visits to the classroom	53.3%
English	4	8 th	10	Hiking	13.3%	A class for students focused on park disciplines and careers	53.3%
Math	3			Survival	13.3%	Ranger-led field trips to the park	46.7%
Arts	0			Bears	6.7%	In-person teacher workshops about park resources that tie to curriculum	46.7%
Business	1			Careers	6.7%	Online lesson plans	46.7%
Foreign Lang.	0			Ecosystems	6.7%	Online trainings about park resources that tie to curriculum	40%
P.E./Health	2			Elk	6.7%	Park-developed materials for use by teachers in the classroom	33.3%
Special Ed.	1			Environment	6.7%	Podcasts (electronic broadcasts) of park programs	33.3%
Vocational	0			Follow-ups	6.7%	Schoolyard data collection relating to park research	26.7%
Other	1			GPS	6.7%	After-school and/or weekend volunteer service opportunities	20%
				Habitats	6.7%	5-day summer science camp of girls	20%
				History	6.7%		
				Impacts	6.7%		
				Local history	6.7%		
				Maps	6.7%		

Table D-2. Breakdown of subject and grade levels taught, desired program topics, and very likely participation in potential programs for teachers at Robbinsville High School.

Robbinsville High School (n=27)							
Subjects		Grade Level		Topics Desired		Potential Programs	
Subject	#	Level	#	Topic	%	Program	% very likely to participate
Science	3	9 th	22	Water Quality	11.1%	Ranger visits to the classroom	40.7%
History/S.S.	1	10 th	24	Plants	11.1%	Park-developed materials for use by teachers in the classroom	25.9%
English	2	11 th	26	Air Quality	7.4%	In-person teacher workshops about park resources that tie to curriculum	25.9%
Math	3	12 th	25	Careers	7.4%	Online trainings about park resources that tie to curriculum	25.9%
Arts	2			History	7.4%	Ranger-led field trips to the park	22.2%
Business	3			Animals	3.7%	A class for students focused on park disciplines and careers	22.2%
Foreign Lang.	1			Appalachian	3.7%	Online lesson plans	22.2%
P.E./Health	3			Chemistry	3.7%	Teacher-led field trips to the park	18.5%
Special Ed.	3			Chestnuts	3.7%	5-day summer science camp of girls	18.5%
Vocational	4			Construction	3.7%	After-school and/or weekend volunteer service opportunities	14.8%
Other	1			Crafts	3.7%	Schoolyard data collection relating to park research	7.4%
				Data collection	3.7%	Podcasts (electronic broadcasts) of park programs	7.4%
				Finances	3.7%		
				Food	3.7%		
				Forestry	3.7%		
				Hiking	3.7%		
				Literature	3.7%		
				Local history	3.7%		
				Marketing	3.7%		
				Music	3.7%		
				Nature	3.7%		
				National Park	3.7%		
				Public Relations	3.7%		
				Writing	3.7%		

Table D-3. Breakdown of subject and grade levels taught, desired program topics, and very likely participation in potential programs for teachers at Waynesville Middle School.

Waynesville Middle School (n=58)							
Subjects		Grade Level		Topics Desired		Potential Programs	
Subject	#	Level	#	Topic	%	Program	% very likely to participate
Science	10	6 th	30	Math	10.3%	Ranger visits to the classroom	41.4%
History/S.S.	11	7 th	33	History	8.6%	Online lesson plans	37.9%
English	17	8 th	33	Careers	6.9%	Ranger-led field trips to the park	31%
Math	22			Conservation	6.9%	5-day summer science camp of girls	29.3%
Arts	4			Data collection	6.9%	A class for students focused on park disciplines and careers	25.9%
Business	1			Impacts	6.9%	In-person teacher workshops about park resources that tie to curriculum	25.9%
Foreign Lang.	0			Nature	6.9%	Online trainings about park resources that tie to curriculum	22.4%
P.E./Health	5			Recreation	6.9%	Park-developed materials for use by teachers in the classroom	17.9%
Special Ed.	4			Writing	6.9%	Podcasts (electronic broadcasts) of park programs	17.2%
Vocational	2			GPS	5.2%	Schoolyard data collection relating to park research	15.5%
Other	0			Water Quality	5.2%	Teacher-led field trips to the park	10.3%
				Hiking	5.2%	After-school and/or weekend volunteer service opportunities	10.3%
				Survival	5.2%		
				Air Quality	3.4%		
				Environment	3.4%		
				Geology	3.4%		
				Local history	3.4%		
				Soils	3.4%		
				Technology	3.4%		
				Appalachian	1.7%		
				Archaeology	1.7%		
				Art	1.7%		
				Biology	1.7%		
				Body	1.7%		
				CCC	1.7%		
				Diversity	1.7%		
				Elk	1.7%		
				Endangered species	1.7%		
				Fishing	1.7%		
				Habitats	1.7%		
				Maps	1.7%		
				Management	1.7%		
				Music	1.7%		
				Plants	1.7%		
				Physics	1.7%		
				Ranger-led	1.7%		
				Reading	1.7%		
				Safety	1.7%		
				Weather	1.7%		

Table D-4. Breakdown of subject and grade levels taught, desired program topics, and very likely participation in potential programs for teachers at Tuscola High School.

Tuscola High School (n=69)							
Subjects		Grade Level		Topics Desired		Potential Programs	
Subject	#	Level	#	Topic	%	Program	% very likely to participate
Science	14	9 th	47	History	10.1%	Ranger visits to the classroom	30.4%
History/S.S.	11	10 th	51	Animals	7.2%	In-person teacher workshops about park resources that tie to curriculum	29%
English	8	11 th	53	Conservation	4.3%	Park-developed materials for use by teachers in the classroom	24.3%
Math	9	12 th	46	Ranger-led	4.3%	A class for students focused on park disciplines and careers	20.3%
Arts	3			Careers	2.9%	Online trainings about park resources that tie to curriculum	20.3%
Business	7			Finances	2.9%	Online lesson plans	20.3%
Foreign Lang.	5			Forestry	2.9%	Schoolyard data collection relating to park research	17.4%
P.E./Health	6			Local history	2.9%	Ranger-led field trips to the park	15.9%
Special Ed.	8			National Parks	2.9%	5-day summer science camp of girls	14.5%
Vocational	6			Air Quality	1.4%	After-school and/or weekend volunteer service opportunities	13%
Other	3			Art	1.4%	Podcasts (electronic broadcasts) of park programs	13%
				Bears	1.4%	Teacher-led field trips to the park	8.7%
				Biology	1.4%		
				Biotechnology	1.4%		
				Chemistry	1.4%		
				Class	1.4%		
				Construction	1.4%		
				Diversity	1.4%		
				Earth	1.4%		
				Ecology	1.4%		
				Ecosystems	1.4%		
				Environment	1.4%		
				Water Quality	1.4%		
				Lichens	1.4%		
				Management	1.4%		
				Nature	1.4%		
				New species	1.4%		
				Plants	1.4%		
				Public relations	1.4%		
				Safety	1.4%		
				Salamanders	1.4%		
				Soils	1.4%		
				Streams	1.4%		
				Stewardship	1.4%		
				Survival	1.4%		

Table D-5. Breakdown of subject and grade levels taught, desired program topics, and very likely participation in potential programs for teachers at Swain County Middle School.

Swain County Middle School (n=13)							
Subjects		Grade Level		Topics Desired		Potential Programs	
Subject	#	Level	#	Topic	%	Program	% very likely to participate
Science	1	6 th	9	History	30.8%	Ranger visits to the classroom	38.5%
History/S.S.	2	7 th	6	Animals	15.4%	Schoolyard data collection relating to park research	23.1%
English	5	8 th	2	Literature	15.4%	Ranger-led field trips to the park	15.4%
Math	4			Local history	15.4%	A class for students focused on park disciplines and careers	15.4%
Arts	1			Nature	15.4%	After-school and/or weekend volunteer service opportunities	15.4%
Business	0			Art	7.8%	Park-developed materials for use by teachers in the classroom	15.4%
Foreign Lang.	0			Crafts	7.8%	Online trainings about park resources that tie to curriculum	15.4%
P.E./Health	0			Environment	7.8%	Online lesson plans	15.4%
Special Ed.	1			Math	7.8%	In-person teacher workshops about park resources that tie to curriculum	7.8%
Vocational	0			Plants	7.8%	Podcasts (electronic broadcasts) of park programs	7.8%
Other	0			Ranger-led	7.8%	5-day summer science camp for girls	7.8%
						Teacher-led field trips to the park	0%

Table D-6. Breakdown of subject and grade levels taught, desired program topics, and very likely participation in potential programs for teachers at Swain County High School.

Swain County High School (n=47)							
Subjects		Grade Level		Topics Desired		Potential Programs	
Subject	#	Level	#	Topic	%	Program	% very likely to participate
Science	7	9 th	34	Impacts	8.5%	Ranger visits to the classroom	36.2%
History/S.S.	4	10 th	39	Local history	8.5%	Park-developed materials for use by teachers in the classroom	29.8%
English	6	11 th	43	Air Quality	6.4%	A class for students focused on park disciplines and careers	25.5%
Math	6	12 th	39	History	6.4%	Online lesson plans	23.4%
Arts	2			Math	6.4%	In-person teacher workshops about park resources that tie to curriculum	21.3%
Business	3			Animals	4.3%	Ranger-led field trips to the park	19.1%
Foreign Lang.	2			Careers	4.3%	Schoolyard data collection relating to park research	17%
P.E./Health	3			Forestry	4.3%	Online trainings about park resources that tie to curriculum	17%
Special Ed.	5			Water Quality	4.3%	Teacher-led field trips to the park	14.9%
Vocational	3			Nature	4.3%	5-day summer science camp of girls	14.9%
Other	3			Relation	4.3%	After-school and/or weekend volunteer service opportunities	10.6%
				Streams	4.3%	Podcasts (electronic broadcasts) of park programs	10.6%
				Art	2.1%		
				CCC	2.1%		
				Class	2.1%		
				Data collection	2.1%		
				Diversity	2.1%		
				Elk	2.1%		
				Food	2.1%		
				Geology	2.1%		
				Leadership	2.1%		
				Literature	2.1%		
				New species	2.1%		
				National Park	2.1%		
				Plants	2.1%		
				Physics	2.1%		
				Weather	2.1%		

Table D-7. Breakdown of subject and grade levels taught, desired program topics, and very likely participation in potential programs for teachers at Cherokee Middle School.

Cherokee Middle School (n=10)							
Subjects		Grade Level		Topics Desired		Potential Programs	
Subject	#	Level	#	Topic	%	Program	% very likely to participate
Science	5	6 th	1	Chemistry	10%	A class for students focused on park disciplines and careers	80%
History/S.S.	3	7 th	6	Data collection	10%	In-person teacher workshops about park resources that tie to curriculum	80%
English	1	8 th	4	Deep Creek	10%	Teacher-led field trips to the park	70%
Math	4			Microbiology	10%	Schoolyard data collection relating to park research	70%
Arts	0			Water Quality	10%	Ranger-led field trips to the park	60%
Business	0					Ranger visits to the classroom	60%
Foreign Lang.	0					Park-developed materials for use by teachers in the classroom	60%
P.E./Health	0					Online trainings about park resources that tie to curriculum	60%
Special Ed.	1					Podcasts (electronic broadcasts) of park programs	50%
Vocational	0					Online lesson plans	50%
Other	0					After-school and/or weekend volunteer service opportunities	40%
						5-day summer science camp of girls	40%

Table D-8. Breakdown of subject and grade levels taught, desired program topics, and very likely participation in potential programs for teachers at Cherokee High School.

Cherokee High School (n=33)							
Subjects		Grade Level		Topics Desired		Potential Programs	
Subject	#	Level	#	Topic	%	Program	% very likely to participate
Science	7	9 th	23	History	18.2%	In-person teacher workshops about park resources that tie to curriculum	30.3%
History/S.S.	3	10 th	23	Plants	12.1%	Ranger visits to the classroom	24.2%
English	6	11 th	25	Air Quality	9.1%	Park-developed materials for use by teachers in the classroom	24.2%
Math	6	12 th	23	Animals	9.1%	Online lesson plans	24.2%
Arts	2			Impacts	9.1%	A class for students focused on park disciplines and careers	21.2%
Business	3			Local history	9.1%	Online trainings about park resources that tie to curriculum	18.2%
Foreign Lang.	1			Conservation	6.1%	5-day summer science camp of girls	18.2%
P.E./Health	3			Forestry	6.1%	Ranger-led field trips to the park	15.2%
Special Ed.	4			Water Quality	6.1%	Schoolyard data collection relating to park research	15.2%
Vocational	1			Math	6.1%	Teacher-led field trips to the park	9.1%
Other	2			Streams	6.1%	After-school and/or weekend volunteer service opportunities	9.1%
				Survival	6.1%	Podcasts (electronic broadcasts) of park programs	9.1%
				Writing	6.1%		
				Archaeology	3%		
				Biology	3%		
				Class	3%		
				Data collection	3%		
				Earth	3%		
				Finances	3%		
				Food	3%		
				GPS	3%		
				Habitats	3%		
				Hiking	3%		
				Literature	3%		
				Leave No Trace	3%		
				Maps	3%		
				Marketing	3%		
				Nature	3%		
				New species	3%		
				Problem solving	3%		

Table D-9. Breakdown of subject and grade levels taught, desired program topics, and very likely participation in potential programs for teachers at Heritage Middle School.

Heritage Middle School (n=31)							
Subjects		Grade Level		Topics Desired		Potential Programs	
Subject	#	Level	#	Topic	%	Program	% very likely to participate
Science	5	6 th	17	History	9.7%	Ranger-led field trips to the park	19.4%
History/S.S.	3	7 th	15	Careers	3.2%	Materials	19.4%
English	7	8 th	16	Geology	3.2%	Online lesson plans	16.1%
Math	7			Local history	3.2%	A class for students focused on park disciplines and careers	9.7%
Arts	3			Math	3.2%	In-person teacher workshops about park resources that tie to curriculum	9.7%
Business	1			Nature	3.2%	Online trainings about park resources that tie to curriculum	9.7%
Foreign Lang.	0			Writing	3.2%	Podcasts (electronic broadcasts) of park programs	9.7%
P.E./Health	0					5-day summer science camp of girls	9.7%
Special Ed.	2					Ranger visits to the classroom	6.5%
Vocational	1					Schoolyard data collection relating to park research	6.5%
Other	1					Teacher-led field trips to the park	3.2%
						After-school and/or weekend volunteer service opportunities	3.2%

Table D-10. Breakdown of subject and grade levels taught, desired program topics, and very likely participation in potential programs for teachers at Heritage High School.

Heritage High School (n=22)							
Subjects		Grade Level		Topics Desired		Potential Programs	
Subject	#	Level	#	Topic	%	Program	% very likely to participate
Science	3	9 th	15	Environment	13.6%	In-person teacher workshops about park resources that tie to curriculum	36.4%
History/S.S.	3	10 th	16	History	13.6%	Park-developed materials for use by teachers in the classroom	31.8%
English	3	11 th	16	Math	13.6%	Schoolyard data collection relating to park research	27.3%
Math	4	12 th	17	Conservation	9.1%	Ranger visits to the classroom	22.7%
Arts	0			Ecology	9.1%	Online trainings about park resources that tie to curriculum	22.7%
Business	3			Writing	9.1%	Podcasts (electronic broadcasts) of park programs	18.2%
Foreign Lang.	1			Animals	4.5%	Online lesson plans	18.2%
P.E./Health	2			Appalachian	4.5%	Ranger-led field trips to the park	13.6%
Special Ed.	2			Architecture	4.5%	A class for students focused on park disciplines and careers	13.6%
Vocational	2			Biology	4.5%	After-school and/or weekend volunteer service opportunities	13.6%
Other	0			Data collection	4.5%	Teacher-led field trips to the park	9.1%
				Diversity	4.5%	5-day summer science camp of girls	4.5%
				Forestry	4.5%		
				Geology	4.5%		
				Hiking	4.5%		
				Impacts	4.5%		
				Local history	4.5%		
				Research	4.5%		
				Survival	4.5%		

Table D-11. Breakdown of subject and grade levels taught, desired program topics, and very likely participation in potential programs for teachers at Cosby Elementary School.

Cosby Elementary School (n=4)							
Subjects		Grade Level		Topics Desired		Potential Programs	
Subject	#	Level	#	Topic	%	Program	% very likely to participate
Science	1	6 th	0	Math	50%	Ranger-led field trips to the park	75%
History/S.S.	2	7 th	1	Ecology	25%	Park-developed materials for use by teachers in the classroom	50%
English	3	8 th	2	Environment	25%	In-person teacher workshops about park resources that tie to curriculum	50%
Math	3			History	25%	Online trainings about park resources that tie to curriculum	50%
Arts	0					Ranger visits to the classroom	25%
Business	0					Schoolyard data collection relating to park research	25%
Foreign Lang.	0					Teacher-led field trips to the park	0%
P.E./Health	0					A class for students focused on park disciplines and careers	0%
Special Ed.	0					After-school and/or weekend volunteer service opportunities	0%
Vocational	0					Podcasts (electronic broadcasts) of park programs	0%
Other	0					Online lesson plans	0%
						5-day summer science camp of girls	0%

Table D-12. Breakdown of subject and grade levels taught, desired program topics, and very likely participation in potential programs for teachers at Cosby High School.

Cosby High School (n=23)							
Subjects		Grade Level		Topics Desired		Potential Programs	
Subject	#	Level	#	Topic	%	Program	% very likely to participate
Science	3	9 th	17	History	13%	Park-developed materials for use by teachers in the classroom	17.4%
History/S.S.	7	10 th	21	Nature	8.7%	5-day summer science camp of girls	17.4%
English	5	11 th	20	Air Quality	4.3%	Ranger visits to the classroom	13%
Math	4	12 th	20	Art	4.3%	A class for students focused on park disciplines and careers	13%
Arts	2			CCC	4.3%	Schoolyard data collection relating to park research	13%
Business	1			Conservation	4.3%	In-person teacher workshops about park resources that tie to curriculum	13%
Foreign Lang.	1			Water Quality	4.3%	Online lesson plans	13%
P.E./Health	1			Hiking	4.3%	After-school and/or weekend volunteer service opportunities	8.7%
Special Ed.	2			Local history	4.3%	Ranger-led field trips to the park	4.3%
Vocational	1			Math	4.3%	Teacher-led field trips to the park	4.3%
Other	0			Ranger-led	4.3%	Online trainings about park resources that tie to curriculum	4.3%
				Recreation	4.3%	Podcasts (electronic broadcasts) of park programs	0%
				Spanish	4.3%		

Table D-13. Breakdown of subject and grade levels taught, desired program topics, and very likely participation in potential programs for teachers at Wearwood Elementary School.

Wearwood Elementary School (n=5)							
Subjects		Grade Level		Topics Desired		Potential Programs	
Subject	#	Level	#	Topic	% of n	Program	% very likely to participate
Science	1	6 th	5	Art	20%	A class for students focused on park disciplines and careers	40%
History/S.S.	1	7 th	5	Geology	20%	Ranger-led field trips to the park	20%
English	2	8 th	5	Grammar	20%	Teacher-led field trips to the park	20%
Math	1			History	20%	Ranger visits to the classroom	20%
Arts	1					Schoolyard data collection relating to park research	20%
Business	0					Park-developed materials for use by teachers in the classroom	20%
Foreign Lang.	0					In-person teacher workshops about park resources that tie to curriculum	20%
P.E./Health	0					Podcasts (electronic broadcasts) of park programs	20%
Special Ed.	0					Online lesson plans	20%
Vocational	0					5-day summer science camp of girls	20%
Other	0					After-school and/or weekend volunteer service opportunities	0%
						Online trainings about park resources that tie to curriculum	0%

Table D-14. Breakdown of subject and grade levels taught, desired program topics, and very likely participation in potential programs for teachers at Gatlinburg-Pitman High School.

Gatlinburg-Pitman High School (n=30)							
Subjects		Grade Level		Topics Desired		Potential Programs	
Subject	#	Level	#	Topic	%	Program	% very likely to participate
Science	5	9 th	27	Animals	13.3%	Ranger visits to the classroom	30%
History/S.S.	4	10 th	28	History	13.3%	Park-developed materials for use by teachers in the classroom	23.3%
English	4	11 th	29	Conservation	10%	Online trainings about park resources that tie to curriculum	23.3%
Math	5	12 th	28	Ecology	6.7%	A class for students focused on park disciplines and careers	20%
Arts	3			Local history	6.7%	In-person teacher workshops about park resources that tie to curriculum	20%
Business	5			Air Quality	3.3%	Online lesson plans	20%
Foreign Lang.	1			Appalachian	3.3%	Podcasts (electronic broadcasts) of park programs	16.7%
P.E./Health	3			Archaeology	3.3%	Schoolyard data collection relating to park research	13.3%
Special Ed.	2			Art	3.3%	After-school and/or weekend volunteer service opportunities	13.3%
Vocational	1			Bears	3.3%	Ranger-led field trips to the park	6.7%
Other	2			Careers	3.3%	5-day summer science camp of girls	6.7%
				Class	3.3%	Teacher-led field trips to the park	3.3%
				Data collection	3.3%		
				Finances	3.3%		
				Habitats	3.3%		
				Impacts	3.3%		
				Lichens	3.3%		
				Literature	3.3%		
				Math	3.3%		
				New species	3.3%		
				Plants	3.3%		
				Public relations	3.3%		
				Safety	3.3%		
				Salamanders	3.3%		
				Streams	3.3%		

Appendix E: Teacher Survey



Great Smoky Mountains National Park Education Program Survey

Instructions: This survey is part of a study geared toward improving the programs offered to local schools by Great Smoky Mountains National Park. The survey assumes no pre-existing knowledge of these programs. There are no right or wrong answers. We are seeking only your honest opinions to help us understand what needs teachers have for educational programs and services. Your participation is voluntary. Your responses will be kept confidential.

1. Are you female or male? *Please circle one.* Female Male
2. What grade level(s) do you teach? _____
3. What subject(s) do you teach? _____
4. How long have you worked at this school (please answer in years)? _____

Questions 5-12. A number of potential park educational offerings are listed below. In the first two columns, indicate whether or not you have heard of the program prior to taking this survey and whether or not you have participated in the program by circling yes or no. If you have participated, circle the response that best reflects your opinion of the program in terms of its overall quality in the third column.

	Awareness		Participation		Opinion of overall quality				
	know about it?		have you participated?		(answer only if you have participated)				
	yes	no	yes	no	poor	fair	good	excellent	no opinion
5. Ranger-led nature-based programs in the park.									
6. Ranger-led history-based programs in the park.									
7. Ranger visits to the classroom.									
8. Teacher-led nature-based visits to the park (without ranger).									
9. Teacher-led history-based visits to the park (without ranger).									
10. Using materials developed by the park in the classroom.									
11. Park-led in-service teacher trainings.									
12. Other: _____ <i>(Please write in)</i>									

13. If you know about any park educational programs, how did you find out about them? *Please check all that apply.*

<input type="checkbox"/> Conversation with someone who works for the park	<input type="checkbox"/> School administrator
<input type="checkbox"/> Park brochure	<input type="checkbox"/> Park website
<input type="checkbox"/> Other teachers	<input type="checkbox"/> Workshop/training
<input type="checkbox"/> Word of mouth in community	<input type="checkbox"/> Newspaper
<input type="checkbox"/> Other source (please write in _____)	

14. What would be the best way for the park to communicate with teachers about its offerings?

Questions 15 – 26: To what extent do you agree or disagree with each of the following statements? Circle the number corresponding with the best answer.

	strongly disagree	disagree	neutral	agree	strongly agree
15. Educational programs offered by the park are not relevant to the subject I teach.	1	2	3	4	5
16. The National Park Service provides excellent programs for students.	1	2	3	4	5
17. I feel it is important to take good care of the environment.	1	2	3	4	5
18. I feel comfortable in the outdoors.	1	2	3	4	5
19. I love Great Smoky Mountains National Park.	1	2	3	4	5
20. My school's administration discourages participation in the park's environmental education programs.	1	2	3	4	5
21. I am personally in control of deciding whether or not to take my students into the park.	1	2	3	4	5
22. There is not enough money in the budget to allow me to engage in the park's educational programs with my students.	1	2	3	4	5
23. Participation in park programs is too much work.	1	2	3	4	5
24. Field trips are a distraction from the curriculum.	1	2	3	4	5
25. I feel confident that I could teach my students using the National Park as my classroom.	1	2	3	4	5
26. Decisions about field trips are not made by teachers in this school.	1	2	3	4	5

Questions 27-31. In the first column, please indicate the extent to which you think most other teachers at your school agree with each statement. In the second column, please indicate how you think most of your students' parents feel about each statement.

	Teachers at my school...					My students' parents...				
	strongly disagree				strongly agree	strongly disagree				strongly agree
27. Field trips are great.	1	2	3	4	5	1	2	3	4	5
28. Field trips are a distraction from the curriculum.	1	2	3	4	5	1	2	3	4	5
29. Great Smoky Mountains National Park is wonderful.	1	2	3	4	5	1	2	3	4	5
30. The park's educational programs are great.	1	2	3	4	5	1	2	3	4	5
31. Participating in park programs is a waste of time.	1	2	3	4	5	1	2	3	4	5

Questions 32-40. In the first column below, please indicate how important each of the following goals are to you when planning field trips or special events for your classes. In the second column, indicate the degree to which you believe park-provided programs would likely achieve each item.

	Importance					Likelihood of achievement by park-provided programs				
	not important	→	somewhat important	→	extremely important	not at all likely	→	somewhat likely	→	extremely likely
32. Enhancing students' academic achievement	1	2	3	4	5	1	2	3	4	5
33. Providing fun and entertaining experiences for students	1	2	3	4	5	1	2	3	4	5
34. A chance for me to learn something new	1	2	3	4	5	1	2	3	4	5
35. Exposing students to environmental themes	1	2	3	4	5	1	2	3	4	5
36. Meeting standards of learning	1	2	3	4	5	1	2	3	4	5
37. Improving standardized test scores	1	2	3	4	5	1	2	3	4	5
38. Enhancing students' appreciation for the national park	1	2	3	4	5	1	2	3	4	5
39. Improving my relationship with my students	1	2	3	4	5	1	2	3	4	5
40. A fun experience for myself	1	2	3	4	5	1	2	3	4	5

41. In what potential topics for park educational programs would you be most interested in participating with your class(es)?

42. What do you consider to be the biggest barrier(s) to participating with your class(es) in park educational programs?

Questions 43-54. In the first column, please indicate the degree to which you feel offering the following programs would be a good or bad idea at your school (regardless of your own participation). In the second column please indicate how likely you would be to become involved in each of the potential offerings.

	Opinion					Likelihood of your involvement				
	terrible idea	→	neutral	→	great idea	not at all likely	→	maybe, maybe not	→	very likely
43. Ranger-led field trips in the park	1	2	3	4	5	1	2	3	4	5
44. Teacher-led field trips into the park	1	2	3	4	5	1	2	3	4	5
45. Ranger visits to the classroom	1	2	3	4	5	1	2	3	4	5
46. A class for students focused on park disciplines and careers	1	2	3	4	5	1	2	3	4	5
47. Schoolyard data collection relating to park research	1	2	3	4	5	1	2	3	4	5
48. After-school and/or weekend volunteer service opportunities	1	2	3	4	5	1	2	3	4	5
49. Park-developed materials for use by teachers in classroom	1	2	3	4	5	1	2	3	4	5
50. In-person teacher workshops about park resources that tie to curriculum	1	2	3	4	5	1	2	3	4	5
51. Online trainings about park resources that tie to curriculum	1	2	3	4	5	1	2	3	4	5
52. Podcasts (electronic broadcasts) of park programs	1	2	3	4	5	1	2	3	4	5
53. Online lesson plans	1	2	3	4	5	1	2	3	4	5
54. 5-day summer science camp for girls	1	2	3	4	5	1	2	3	4	5

Please use the space below to share any additional comments with the research team.

If you are interested in receiving additional information about the park's educational offerings or would be willing to be contacted again by the researchers to discuss potential park offerings further, please let us know your preferred contact information on the separate sheet provided.

If you have any questions or comments about this study, please contact Beth Wright at bcw80@vt.edu.