Advisory Board

Cem Basman
Principal
Turquoise Planet Consulting
Bloomington, Indiana

Ted Cable
Dept of Horticulture, Forestry, and Recreation Resources
Kansas State University
Manhattan, Kansas

Sam Ham
Professor Emeritus
Department of Conservation Social Sciences
College of Natural Resources
University of Idaho
Moscow, Idaho

Gary Machlis
Professor of Forest Resources and Sociology, National Coordinator for the CESU
College of Natural Resources
Department of Forest Resources
University of Idaho
Moscow, Idaho

Joseph Roggenbuck
Professor
Natural Resource Recreation
Virginia Polytechnic Institute and State University
Department of Forestry
Blacksburg, Virginia

Sam Vaughn
Associate Manager, Interpretive Planning
Harpers Ferry Center
Denver Service Center
Denver, Colorado

Betty Weiler
Professor of Tourism
Department of Management
Berwick Campus
Monash University
Narre Warren, Australia

NAI Staff

Margo Carlock
Executive Director

Paul Caputo
Deputy Director

Jamie King
Membership Manager

Emily Jacobs
Certification & Training Program Manager

Michele Farmer
Events Manager

Kathy Evans
Certification & Training Program Office Administrator

Jean Fleury
Shipping Clerk

Copyright ©2018
ISSN 1092–5872

A Part of the EBSCO Information Services Group. EBSCO Publishing/EBSCOhost is the registered trademark of EBSCO Publishing.
1  A Note from the Editor
   Carolyn C. Ward

Research
5  Every Kid in the Woods: The Outdoor Education Experience of Diverse Youth
   Aracely C. Montero, Nina S. Roberts, Jackson Wilson

27  Measuring Elaboration and Evaluating Its Influence on Behavioral Intentions
    Zachary D. Miller, Wayne Freimund, Robert B. Powell

In Short
47  Can interpretive graphics influence visitor behavior in an exhibit space?
    Allison M. Price, Jessica C. Monahan, Rachel Bergren

57  Learning in the HJ Andrews Forest: Experiences and Outcomes at a Science
    Education Event
    Lauren Remenick

Appendix
71  Submission Guidelines for Authors
This issue of *JIR* brings the reader on a journey exploring the impacts of taking kids into public lands, examining the relationship between elaboration and behavioral intentions, and understanding how interpretive graphics can alter visitor behavior. The techniques and methods used to conduct the research are different, the theoretical underpinnings are varied, and the impacts and implications are at disparate scales. However, each article in its own right moves the collective needle forward.

As varied as this issue of the *Journal* is, so too is our own philosophy, position, and ability to advance the profession of interpretation. It is the collective responsibility of the tribe, all of us, to advance the field by approaching everything we do in a systematic fashion. Whether you are conducting rigorous research or reflecting on your evening campfire program, it is critical to ask questions—to think critically about your programs.

Wanting to know what works, when, how, and for whom is a fundamental element of advancing the practice of interpretation. I look forward to future developments through your submissions to the *Journal of Interpretation Research*.

—C
RESEARCH
Every Kid in the Woods: The Outdoor Education Experience of Diverse Youth

Aracely C. Montero
Nina S. Roberts
Jackson Wilson
San Francisco State University

Lynn Fonfa
Golden Gate National Recreation Area

Author Note
This study was made possible by the wonderful support of the education and interpretation staff at Golden Gate National Recreation Area, especially Education Specialist Lynn Fonfa. Thank you to the Department of Recreation, Parks, and Tourism at San Francisco State University, specifically Dr. Nina Roberts and Dr. Jackson Wilson. Finally, thank you to all the teachers who assisted in making this study possible—their help has been greatly appreciated. This paper is based on Montero’s graduate Applied Research Project. For more information contact Aracely Montero, Aracely_Montero@nps.gov; (415) 289-1832.

Abstract
The purpose of this qualitative study was to evaluate the experience of underserved fourth-grade students participating in the National Park Service’s Every Kid in a Park (EKIP) initiative through the Into the Redwood Forest (IRF) education program at Muir Woods National Monument. The project’s aim was to understand the experience of underserved diverse students (i.e., race and ethnicity, gender, and Title I schools) participating during the 2015–2016 school year. The study included six teacher interviews and document review procedure of 60 student journals. The findings reveal that the EKIP exposed students to parks, the inquiry-based learning proved effective for outdoor learning, and the impact of the nature experience encouraged environmental stewardship. Implications and recommendations for further implementation of both the EKIP initiative and IRF at Muir Woods are discussed.
Keywords
Every Kid in a Park, Muir Woods, experience, diversity, education

Every Kid in the Woods: The Outdoor Education Experience of Diverse Youth

Mature trees are growing in the woods
All trees are growing tall and growing cones
Tall trees drop cones, cones drop and drop seeds
Up in the sky sun shines to the trees
Running water through streams
Each person pass through pick up trash that they see

Tall old trees fall knock down other trees
Rain starts to fall, small flower grow in the green ground
Each tree drops seeds
Every tree is happy in Muir Woods

—Haiku poem by fourth-grade student, Class 6, Journal 7

Youth of color traditionally have been underserved in natural spaces, such as national parks (Outley & Witt, 2006). The limited presence of racial and ethnic minority populations in national parks prevents youth of different backgrounds from having meaningful and powerful experiences in nature. The U.S. Census Bureau claims by 2020 more than half of children in the nation are anticipated to be non-white (U.S. Census Bureau, 2015). According to Jarvis (2016), the future of protected natural spaces is dependent on the growing diverse population; national parks will not continue to thrive and garner public support if underserved youth remain without meaningful experiences in nature. Outdoor education programs, such as Parks as Classrooms programs within national parks, have been around for decades working towards engaging diverse youth through hands-on outdoor learning (Kiernan, 2012). The expected growth in the number of youth of color will require an increase in services and programs, and a rethinking of how they are designed and presented (Outley & Witt, 2006). For the new generation to experience America’s great outdoors, the Every Kid in a Park (EKIP) initiative was established for fourth graders and their families to experience national parks free of cost (White House, 2015).

In 2015, President Obama asked for a $45 million budget increase from Congress for youth engagement across the Department of the Interior; $20 million was dedicated for bringing one million fourth graders from underserved communities to their local parks and waters (McGrady, 2015). The EKIP initiative committed to giving every fourth-grade student from a diverse background a free pass to federal lands and waters for one year from September 2015 to August 2016. According to the White House (2015), the goal of the EKIP program was to connect youth of all backgrounds with the great outdoors. National parks play an important role in supporting EKIP through their Parks as Classrooms curriculum-based outdoor education programs.

Established in fall 2015, EKIP is a relatively new initiative. Therefore, gaps exist in research about the program’s outcomes, especially the experience of underserved youth participating in Parks as Classrooms programs. While the National Park Foundation has taken the initiative to collect and evaluate quantitative evidence to support their 2015–
2016 Park Field Trip Grant Program, there has been no qualitative evidence reported about the experience of underserved youth participating in EKIP. This current study, with multiple sources of qualitative data, was conducted to understand the experience of diverse fourth-grade students participating in EKIP (i.e., race, ethnicity, gender, and Title I schools). The data reveal information about the experience of students and impact of the IRF program at Muir Woods National Monument.

Muir Woods National Monument (Muir Woods), a unit of the Golden Gate National Recreation Area (GGNRA), supports Every Kid in a Park through a Parks as Classrooms grant-funded program, Into the Redwood Forest (IRF). Muir Woods was established in 1908 and is home to one of the last remaining old-growth redwood forests near San Francisco (GGNRA, 2016). The Coast Miwok indigenous tribe resided in the San Francisco Bay Area near Muir Woods for over 10,000 years and used the land for hunting, fishing, and gathering (GGNRA, 2017). Today, Muir Woods is a distinct national monument visited by hundreds of thousands of people each year (Auwaerter & Sears, 2006).

In 1992, the National Park Foundation (NPF) and the National Park Service (NPS) jointly launched a national education initiative called Parks as Classrooms (U.S. National Park Service, 2003). The NPS-funded initiative was a call to action to raise awareness of the intrinsic value of national parks to student learning through interdisciplinary hands-on programs and stewardship-based project learning (U.S. National Park Service, 2003). Parks as Classrooms also shifted program focus from traditional environmental education to curriculum inquiry-based programs embedded in the natural and cultural resources of national parks (National Park Foundation, 2001). Parks as Classrooms at GGNRA uses an inquiry-based curriculum that includes the Understanding by Design framework, California Common Core Standards, Next Generation Science Standards, and History-Social Science Content Standards.

IRF is a curriculum-based outdoor education program that welcomes approximately 1,000 students from Title I schools in San Francisco, Marin, Contra Costa, and Alameda counties (L. Fonfa, personal communication, September 25, 2014). IRF is made possible by the collaboration of three organizations: Muir Woods National Monument, Save the Redwoods League, and The Golden Gate National Parks Conservancy (L. Fonfa, personal communication, September 25, 2014). In 2015, the NPF also provided considerable support for the implementation of EKIP at Muir Woods through the Every Kid in a Park Transportation Grant, which aims to remove this barrier for underserved and urban communities to accessing public lands and waters (National Park Foundation, 2017).

The IRF program concentrates on the relationship between culture and lands of the redwood forest. The program’s inquiry (e.g., guiding) question is: How do living things thrive in their habitat? Furthermore, IRF includes the following three elements: 1) Pre-visit lessons facilitated by the classroom teacher and NPS staff—emphasizing redwood ecology and the cultural history of Coast Miwok, 2) A three-hour field session in the woods led by NPS staff, and, 3) Post-visit lessons in which students demonstrate their understanding of what they learned. Students carefully document the classroom lessons and field sessions in the IRF student journal, a hard copy booklet supplied by the NPS. Overall, students delve into approximately 12 hours of redwood-focused activity, with an additional four hours of study for teachers that attend a preparatory workshop. At the end of every IRF field session, each participating fourth grader receives an EKIP voucher they can exchange for an EKIP pass at the national park of their choice. NPS staff distributes a voucher to each student, explains the intent of the EKIP, and
encourages students to return to Muir Woods and/or other national parks to deepen their experience.

Literature Review
Outdoor education programs deliver opportunities for youth to experience nature in a personally meaningful way. Participation in outdoor education programs nurtures curiosity, improves motivation and attitudes, and engages youth through participation and social interactions (Brody, 2005). Spending less time outdoors can lead youth to experience negative effects on their life. For example, Louv (2008), who coined the term nature-deficit disorder, claimed that modern youths’ lack of time spent outdoors resulted in a wide range of behavioral, health, cognitive, developmental, and spiritual problems. The EKIP helps mitigate this nature-deficit disorder by “ensuring every (underserved) American has an opportunity to visit and enjoy outdoor spaces” because “more than 80 percent...live in urban areas...and many lack easy access to safe outdoor spaces” (National Park Service, 2015).

Experiences of Youth in Outdoor Education Programs
Learning in nature teaches about environmental problems, biodiversity, and environmental action as manifested in environmentally sound behaviors, and helps develop ecological appreciation in nature (Brody, 2005). Furthermore, Scott, Boyd, and Colquhoun (2013) identified that participants experienced elevated levels of motivation and interest in learning about nature, developed and improved relationships with nature, and reinforced positive attitudes towards environmental issues.

The need for more structured nature-based learning experience is partially caused by increases in urbanization and less than half of racial and ethnic minority youth who live in urbanized areas have not had prior experiences in nature (Aaron & Witt, 2011). They identified the following student perceptions toward nature: freedom, excitement to be in nature, fear, perception that nature increased healthy behaviors, and increased intentions for stewardship (Aaron & Witt, 2011). Previous research supports the thesis that outdoor education programs can facilitate positive learning outcomes for youth, and such organized educational experiences may be especially critical for urban youth (Aaron & Witt, 2011; Brody, 2005; Scott, Boyd, & Colquhoun, 2013).

Underrepresented Youth in Outdoor Education Programs
Outdoor education experiences are often costly and difficult to access, especially for racially and ethnically diverse students with fewer economic resources (Larson, Castleberry, & Green, 2010; Paisley, Jostad, Pohja, Gookin, & Rajagopal-Durbin, 2014; Tardona, Bozeman, & Pierson, 2014). Economic barriers, misogyny, and race have contributed to outdoor spaces in America being primarily for the recreation and education of white, economically privileged, masculine, and able-bodied individuals (Paisley et al., 2014; Warren, Roberts, Breunig, & Alvarez, 2014). Despite findings that diverse youth benefit from outdoor education (e.g., Paisley et al. 2014; Tardona, Bozeman, & Pierson 2014), youth of color often have fewer opportunities to learn environmental concepts through primary experience in nature (Larson et al., 2010). Additionally, research shows experiences in outdoor adventure education do not include a diversity of students and can be profoundly isolating at times (Paisley et al, 2014).
Inquiry-Based Learning in Outdoor Educating

Inquiry-based learning is defined as a “question-driven learning process involving conducting scientific investigations, documenting and interpreting narrative or numerical data, and summarizing and communicating findings” (Wu & Hsieh, 2006, p. 1290). The learning process highlights active participation and responsibility to discover new knowledge (Pedaste, Mäeots, Siiman, de Jong, van Riesen, et al., 2015). The inclusion of inquiry-based learning in outdoor education is important because it allows students to experience meaningful learning in nature while creating awareness of the natural environment around them (Rozenszayn & Assaraf, 2011). According to Marx, Blumenfeld, Krajcik, Fishman, Soloway, Geier, and Tal (2004), inquiry education can be successful among urban students as long as it includes culturally relevant knowledge and relates to beliefs held by youth from diverse backgrounds. Coupled with inquiry-based learning, culturally relevant pedagogy offers an effective approach in outdoor education because the students’ prior knowledge and prior experiences help frame the program design and delivery.

Evaluation of Curriculum-Based Outdoor Education Programs

Evaluation is essential to measure the value and quality of the EKIP programs, especially for undeserved communities. According to Thomson, Hoffman, and Staniforth (2003) the evaluation of outdoor education programs is critical because “a good evaluation program can improve program quality, improve student learning, and ultimately assist the program to achieve its goals, which may include such things as a higher degree of student involvement and benefits to the environment” (p.16). Furthermore, Monroe (2010) maintained that the goal of most outdoor program evaluation is to make judgments about the value of programs to decide improvements, marketing, expansions, and changes for the program. According to Monroe (2010) evaluations need to answer the difficult questions of: Why is the program successful? and, what factors describe the success? Evaluation is fundamental to understand further how to implement curriculum that is inclusive and relevant for students of color who participate in EKIP.

Purpose of Study

The purpose of this study was to evaluate the experience of the fourth-grade students who participated in Every Kid in a Park through the Into the Redwood Forest education program at Muir Woods National Monument. The primary research question was: What are the experiences of underserved fourth-grade students who participate in the EKIP program? The experience of traditionally underserved diverse students (i.e., race and ethnicity, gender, Title I schools) was investigated during the 2015–2016 school year. Specifically, the study included seeking responses to: What were the value, meaning, and impact of youth experiences in Muir Woods? What were the learning outcomes during their experiences?

Methods

A qualitative design with multiple sources of data was used for this study. Data included individual interviews with fourth-grade teachers, as well as entries from student journals. First, teachers were interviewed to elicit their perceptions of students’ experiences and learning outcomes. The interviewer used an open-ended approach, opening the door for a holistic view from the educators of their perception of student experience and
learning outcomes gained from IRF (Brannen, 2005). Their altruistic assessment is central to the study since teachers are the adults with the most ongoing contact with the students through facilitation of the curriculum, observations of students in the field, and coordination of post-visit demonstrations of learning. Subsequently, an analysis of student journals more directly assessed the students’ experience.

Sample
The fourth-grade teachers and students that participated in this study were from local Bay Area elementary schools in the cities of San Francisco, San Rafael, Richmond, Vallejo, and Hayward (see Table 1). Six individual teacher interviews were conducted. Teachers were purposively selected by using the following criteria: classes from Title I schools and/or at least 80 percent free and reduced lunch, new and experienced IRF classroom educators, English Language Learners (ELL) educators and non-ELL educators, schools from different geographic areas within the Bay Area, and schools that already had an established relationship with Muir Woods.

The Title I program provides financial assistance to schools with the highest numbers of students from low-income families (U.S. Department of Education, 2015). The educators interviewed teach in five school districts: two from San Francisco Unified School District, two from West Contra Costa Unified School District, one from Vallejo City Unified School District; and one from Hayward Unified School District.

A total of 151 student journals were collected from six independent classes associated with the interviewed teachers and within the same school districts as previously noted. The one exception was the student journals from a San Rafael city school were obtained in place of the journals from Vallejo City Unified School District because Vallejo programs occurred before journal collection began for the study.

Journals were selected as follows: Each journal was reviewed for completeness of content; the student name was intentionally omitted from the analysis to avoid gender bias; and from 151 journals, a sample of 60 journals that were considered complete (i.e., legible, pages not left blank) were randomly selected.

Demographics of the student journals were 53% female and 47% male; 69% Latinx/Hispanic, 10% Black or African American, 13% Asian, 2% Filipinx, 4% Caucasian/White, and 2% Other. Ten student journals were selected from each class for analysis for a total of 60 student journals reviewed for analysis. Each set of student journals was labeled Class 1 through 8 (see Table 1).

Although journals from Class 7 and 8 were reviewed, the teachers of these classes did not participate in interviews. Those two teachers did not respond to multiple attempts to contact them via phone and email so they were omitted from the interview process. Despite lack of participation by two teachers, student journals from San Rafael City Schools from these classes was included due to their active participation in the education programs at Muir Woods and their geographic location. This is one of the only school districts in Marin County that includes Title I schools.

Conversely, instructors from Class 2 and 3 participated in interviews but did not supply any student journals for review because their program occurred before journal collection began for the study. Journals were collected for research purposes between December 2015 and June 2016 and Class 2 and 3 attended programs from September 2016 to November 2015. It was originally intended that 10 journals would be selected from each class for review; however, Class 5 only returned seven student journals with sufficient
content (i.e., journals that were not legible or pages left blank). Therefore, additional journals from two other classes (11 journals from Class 4, and 12 journals from Class 7) were selected to maintain the total of 60 student journals for review and analysis.

**Procedure**

During the first phase of data collection, individual teacher interviews were conducted at six elementary schools from October 2016 to December 2016. The purpose of these interviews was to gather data about teachers’ perceptions of students’ experiences and learning outcomes. An open-ended teacher interview guide was designed based on Thomson, Hoffman, and Staniforth (2003). Two scripted interview questions included: “What do you think was the most and least enriching part of your students’ experience during the education program?” and “After completing the reflections and post-site activity, what do you think students gained from participating in the program?” It’s important to note that teachers were not asked if students “lost” anything due to participation in the program. This was debated by the authors in the design of the study; however, it was decided that it was unlikely there would be any loss associated with participation. To partially address this issue, the primary researcher was sensitized to this concern and followed up on both positive as well as negative outcomes mentioned by the teachers during the interview.

Five interviews were conducted in person at each school location and one was conducted over the phone. Each interview was 30 to 45 minutes in duration. At the conclusion, teachers were given time to ask questions and invited to contact the primary author if they had any further information or insights to share. As participant incentive, teachers received a token of appreciation from the Muir Woods gift shop.

The teacher interviews were conducted one year following their class’ participation in the program (at the beginning of the 2016–2017 school year). This time frame was
intentional including goals of reflection yet this may have affected the results of the interviews. For instance, some teachers had a difficult time remembering everything about their students’ experience from the previous year, yet many did have clarity due to the uniqueness of the program.

Student journals were collected from fourth graders who attended IRF between December 2015 and June 2016. Students were unaware there was a study being conducted and therefore unaware their student journals would be returned to Muir Woods. The journals included pre-lessons, field lessons, and post-lessons. Towards the end of each field visit at Muir Woods, students were tasked to write reflections regarding what they learned and experienced during their visit. After each visit, teachers conducted one of two post-site lessons to reinforce student learning: 1) Students completed the following statement in their journal: After my visit, I think I can…in a redwood forest, because…, or, 2) Students wrote and illustrated a poem that shows the life cycle of a redwood tree. Educators were provided with pre-stamped envelopes to return completed IRF student journals and post-site lessons to the primary author.

Data Analysis
The teacher interviews were audio-taped, transcribed verbatim, and then analyzed. A thematic-based content analysis was utilized to code and determine common themes and patterns of the interviews and journals to deduce replicable and valid inferences from the text (Krippendorff, 2004). The text was read and re-read a second time and research memos were developed. Based on these memos, emergent codes were developed (Braun & Clarke, 2006).

The memos and emergent codes were debriefed with the GGNRA education specialist. Although both the primary author and the education specialist were part of the GGNRA educational program, the education specialist was not directly involved in the program delivery nor the data collection. Therefore, the coding process included perspective of the primary author directly involved in programming and data collection, as well as an ancillary perspective based on program knowledge yet less involvement in the program delivery and research process.

The modified emergent codes then were compared to the research questions and grouped into major themes. This coding structure was then applied to the texts to connect the words and images of the teachers and students back to the questions (Elo & Kyngäs, 2008).

Results
The results derive from two sources of qualitative data, teacher interviews (TI) and student journals (SJ). Five themes emerged: 1) Exposure to National Parks and Nature (TI&SJ), 2) Impact of Experience in Nature and Stewardship (TI&SJ), 3) Learning in Nature (TI), 4) Program Enhancements (TI), and 5) Feelings about Nature (SJ). A description of each common and specific theme, and a representative quote or image, is presented to further illustrate the themes.

Common Themes
Two common themes emerged from both sources of data. Although the results focus on the commonalities between the two sources, there were some issues within each theme that were unique to the interviews or student journals.
Exposure to National Parks and Nature. All six teachers claimed that one of the most enriching parts of the education program was bringing students to their national park for the first time. Teachers stated that for many of the students, joining an IRF was an introduction to places outside of their community. The exposure to a natural place like Muir Woods was especially unique for many students. Teachers expressed that traveling to national parks outside their immediate community is nearly impossible for many of their students’ families. It was only their participation in IRF that made Muir Woods an attainable destination for the students and the adult chaperones who accompanied them.

Another reason why this field trip is really special for a lot of students, especially with our demographics. Our school is in the heart of Chinatown, and it’s really hard for their parents to travel or take them to a place like Muir Woods—across the Bay. So, having this experience, I think that just itself is icing on the cake for a lot of the students. —Teacher, Class 1

The results from student journals corroborated with the interview data. When students were asked to write reflections about what they learned and experienced, many students conveyed it was their first time at Muir Woods and/or “it was my first time to see the redwood trees” (Journal #6, Class 1). They also communicated this as being the “first time going into the wild” (Journal #3, Class 1), suggesting that this was their first time in a relatively pristine environment outside their community.

Students were exposed to hands-on knowledge about redwood ecology and cultural history that otherwise would have not occurred without their participation in IRF. Students’ description of what they learned during their experience at Muir Woods, included concepts related to redwood ecology and the cultural history of Muir Woods. When asked to journal about park aspects they were exposed to during their first visit to
Muir Woods, they described “bugs, fish, trees, plants, banana slugs, [and] fungus.” Forty percent of the student journals described their pleasure in experiencing the forest for the first time as reflected in the student quote below:

Today I learned things that I would have never learned in my life! I would never known that new redwood trees can grow out burls. I also seen many things that I have never seen in my life such as the tannic acid from a redwood tree. Thank you so much! I hope I’ll see you again! —Journal #4, Class 1

Students also typically explained learning about how redwood trees thrived (e.g., tannic acid or burls) and/or expressed how Coast Miwok people connected with the land using natural resources. The reflections completed at the Muir Woods at the end of the program included students writing or drawing what they learned. The post-site lesson (completed back in their classroom) for which students composed a poem encouraged them to creatively give voice to what they had learned by writing acrostic or haiku poems and drawing pictures. Figure 1 is an example of a student drawing (completed at Muir Woods at the end of the program) illustrating what the student learned about how the Coast Miwok people thrived in the redwood forest by using the buckeye nut to fish in creeks.

Teachers and students also confirmed IRF contributed to their awareness of the EKIP initiative. When teachers were queried of their awareness of the EKIP, four out of six teachers replied that they did not learn about EKIP until their students participated in IRF. All six teachers verified the education program helped make students more aware of EKIP and the park system; for example, “…the awareness of what the park system is, where it is, where the different locations are, and some of the programs that are there, you know…that sense of belonging” (Teacher, Class 6).

All six teachers substantiate the notion that if it weren’t for IRF, students would not have been informed about EKIP, and would not have known to pursue a free voucher. One hundred percent of the students who participated in IRF received a printed EKIP voucher and were encouraged to return to Muir Woods to exchange their vouchers for an official EKIP pass. Students wrote about how they wanted to return to the park because they now had passes. Their involvement in IRF produced a sense of belonging in the park since they realized that they could return free of cost with their special EKIP pass. Teachers shared that they hoped the vouchers would inspire students to tell their families and friends to return to Muir Woods or other national parks. All six teachers relayed that they knew of at least one student in each class returned to get their official pass. Parks that teachers reported students visited with their EKIP pass included Muir Woods, Yosemite, Yellowstone, Fort Point, and other unnamed national parks.

Impact of Experience in Nature and Stewardship. The data suggest that students’ stewardship attitudes may have resulted from their experience at Muir Woods. The sample of teachers interviewed proclaimed the visit to Muir Woods impacted students desire to have future experiences in nature. Educators proposed that the inquiry-based learning at Muir Woods motivated students to be more curious about nature at school and in their community. Three of six teachers expressed that students brought their redwood curiosity back to the classroom. For instance, students proceeded to want to research the redwood ecology and the cultural history of Muir Woods, or made connections between what they learned in the program to other science lessons in their
classroom. Furthermore, teachers claimed the visit to Muir Woods invigorated students to have more interest in science and even realize they liked science, in general.

Some of them realized that they like science more, I mean by being out there (Muir Woods). I noticed on the bus ride back…he’s (referring to a student) looking around and it seemed like he enjoyed it out there…. I was in the group with him too (at Muir Woods), and he never raises his hand and he raised his hand in class to share (about Muir Woods). So, it was just nice to see that they got that experience and that it’s perking their academic interest. —Teacher, Class 4

Data from both teachers and students suggest that, for at least some students, as they become more revitalized in the nature setting, they started to lose their fear of nature. Teachers articulated that before the trip to Muir Woods, they noticed some students displayed fear about interacting with nature but, after the visit, they observed students were more comfortable. Consequently, students indicated feelings of overcoming their fears of nature in the student journals.

Students outlined conquering their fears through descriptive phases such as: “I can be brave in the woods” (Journal #3, Class 7); “banana slugs are not gross [anymore]…” (Journal #6, Class 7); and “I am strong! I am Tarzan!” (Journal #3, Class 4). The design of this study does not allow these comments about courage to be directly connected to those students that were more fearful before the experience. However, it does suggest that overcoming fears of perceived danger from the natural world was part of the experience of at least some of the students. All students who proclaimed conquering their fears, also described wanting to care for the environment around Muir Woods. Hence, hinting at the beginning of stewardship principles became clear.

Today I learned to hug trees and more about redwoods trees! I learned not to touch bad things because I want to stay safe and carefree. I learned about to not keep trash on the floor, because if we do then animals will probably die. Help other animals! —Journal #2, Class 4

When teachers were asked to formulate what they thought students gained from their experience at Muir Woods, many answered with ideas related to stewardship. Teachers expressed that students left Muir Woods with a deeper understanding of why and how to care for nature. A couple of teachers suggested that students left the forest with more insights as to why it was important to have natural places like Muir Woods. Similarly, when students were asked by rangers to share what they learned at the end of their visit to Muir Woods, many wrote about how they learned to care for nature. Words used in response to this final writing prompt included “respect,” “protect,” “important,” “special,” and “take care” of elements of or a more generalized concept of nature.

Some students responded to this final writing prompt by describing the importance of minimizing anthropogenic pollution that negatively impacts the health of animals and degrades the environment. Students came up with the following descriptive phrases to report how they could care for the environment: “Today I learned, how animals are important…when people throw trash they come out and eat the trash, they are not supposed to…they can die (Journal #7, Class 4). Furthermore, some even discussed their thoughts about the human impact on nature and the value of redwood trees, “After
my visit, I think I can make a change in the redwood forest and I can make my life and animal’s life better. Play and treat others the way you want to be!” (Journal #11, Class 4); “Today I learned that humans need to take care of the forest and national parks” (Journal #10, Class 7); “After my visit, I think I can take care of the trees because I want more green plants living” (Journal #2, Class 6). These quotes, and other data from journals, suggest that at least 50 percent of students left the forest expressing empathy for nature and/or understood some ways how humans could impact nature. This suggests that students’ attitudes towards stewardship and knowledge of some conservation behaviors were developed as part of the IRF program.

Furthermore, the journals demonstrated that multiple students wanted to share their knowledge about the forest with others. For example, “After my visit, I think I can teach my brother about what I learned because I learned it in my field trip” (Journal #12, Class 7).

**Specific Teacher Interview Themes**

Two themes were unique to the teacher interviews: Learning in Nature and Program Enhancements. These themes offer insight into the effectiveness of EKIP through the IRF curricula and teacher recommendations for program enhancements.

**Learning in Nature.** The teachers discussed the effectiveness of learning in nature through their students’ involvement with the IRF education program. Learning in nature was the focal point for many of the educators. They pointed to the ability of learning in nature as the most effective way for students to comprehend science and experience a natural setting through a new lens. All six teachers stated that nature education gave students an opportunity for hands-on experiences. Four out of six teachers proposed that the IRF curriculum was effective due to the direct relevance with the California State Content Standards. They also stated that IRF provided Title I students with an important opportunity for applied natural science, because many times natural science was the subject they are forced to overlook due to state testing:

> That the opportunity to have science because in all honesty the pressure’s so much on language arts and math of our schedule although it’s written into our schedule - It’s science and social science...the first thing that gets pushed away.
> —Teacher, Class 4

Three of six interviewed taught students who were English Language Learners (ELL), students who are unable to communicate or learn easily in English. ELL teachers declared that IRF was enriching for their students because of the bilingual curriculum, bilingual student materials, and bilingual park rangers who taught the program in different languages (Spanish and English). A fourth-grade ELL teacher asserted the following: “having the bilingual rangers and curriculum was very great that I put that as a high priority for making the program enriching” (Teacher, Class 6).

The teacher interviews also revealed that learning in nature was most enriching due to the program’s focus on interactive student engagement throughout the program. The IRF program supports inquiry-based learning and stimulates students to engage in place-based inquiry science and historic investigation of the cultural history of Muir Woods. During the interviews, teachers repeatedly acclaimed the importance of inquiry for students.
Going into the forest… the questions that came out of them (students), which just really amazed me and it kind of carried over back to the classroom and other areas as well. They got more curious…but just that spirit of wanting to investigate and having interest and being active with finding things out.

—Teacher, Class 3

The inquiry-based learning sparked curiosity and motivated students to want to take part in future inquiry at school. Additionally, teachers mentioned it was beneficial for students to take part in nature through a sensory experience. During the Muir Woods visit, students were engaged in learning by writing or illustrating what they saw, heard, felt, smelled, and tasted. They were encouraged to ask questions throughout the field lessons (see Figure 2).

Teachers expressed that the sensory experience helped students connect more with nature. For example, using their hands to feel the leaves, trees, and bugs allowed students to directly engage with the environment. Teacher interviews suggested that this was specifically helpful for the ELL students whose first language was not English, and the special education students who had a difficult time reading and writing.

**Program Enhancements.** When educators were asked to determine the least enriching aspect of the IRF program, they suggested one pre-site change and two changes to the forest immersion experience. One of the most common areas for improvement was the vocabulary lesson. That is, teachers are asked to review vocabulary words prior to the NPS classroom visit and Muir Woods field trip. They stated the vocabulary lesson was
confusing and not interactive enough for students. Teachers advised for the lessons to be more visual and hands-on by including illustrations of each vocabulary word or including lessons that have students act out the vocabulary word. Second, the Coast Miwok culture lesson also was identified as needing enhancement. Teachers confirmed it was difficult for students to forge a connection between the cultural history and ecology of the park by stating the following, “the connection between what we learned about the Coast Miwok should be more evident in their (forest) experience” (Teacher, Class 6). Finally, teachers expressed that more time in the forest would allow students to engage in a longer outdoor/nature experience and, therefore, form a closer connection with the environment of Muir Woods.

Specific Student Journal Themes: Feelings about Nature
There was only one common theme that emerged from the student journals: Feelings about Nature. Students aired positive feelings about their experiences in the redwood forest. Common words students used to express positivity included “fun,” “awesome,” “good,” “wonderful,” “beautiful,” “safe,” “carefree,” “cool,” “love,” “special,” “calming,” and “stress-free.” Students wrote and illustrated poems that conveyed happiness while learning in the forest, “Muir Woods Nature (title of haiku poem); Muir Woods is peaceful; It is calm and wonderful; It is beautiful” (Journal #3, Class 7).

Many of the poem words and illustrations students put in their journals describe a high level of comfort during the novel experience in an old-growth redwood forest. However, it was not surprising to learn that some students brought an internalized fear of nature. Although students confirmed overcoming their fears, many still pointed to being scared. Students affirmed their fears by using the following language in their student journals: “a little scared,” “the forest felt really scary,” and “the forest is a dark and creepy place.” Findings indicated that students who harbored fears also described uncomfortable thoughts: “it was cold” and “being in the forest makes me feel worried and nervous.” A student even indicated being uncomfortable because of what they think they might encounter in the forest: “After my visit, I think going to the woods was fun because there’s a lot of exploring and a little scary because I think there are clowns in the woods” (Journal #6, Class 4). However, although students expressed fear of the forest, most students expressed positive feelings about their experience in Muir Woods.

Twenty percent of students communicated wanting to return to Muir Woods. After the experience in the redwood forest, students were asked to write about what they could do at Muir Woods. Some recorded phrases such as, “After my visit, I think I can come back to Muir Woods again, because I got a pass for a whole year” (Journal #7, Class 7). One of the main reasons some students of color wrote about a desire to return was because they received their EKIP vouchers to visit free of cost. They used reinforcing language to express their feelings of wanting to return to the park, “I hope I can return” (Journal #7, Class 7) and “I felt that I wanted to go back” (Journal #6, Class 6). Data from journals suggest that receiving EKIP vouchers made students feel welcomed to the national park and stimulated a desire to return to Muir Woods.

Discussion
The purpose of this study was to understand the experience of underserved fourth graders participating in an Every Kid in a Park (EKIP) program through the Into the Redwood Forest (IRF) education program at Muir Woods. One of the primary goals of
EKIP was to bring youth of color to their local national parks and waters. This is the first qualitative research focusing on the experience of racial and ethnic minority students participating in EKIP programs nationwide. The data from the student journals and teacher interviews suggest that these diverse students who participated in EKIP through IRF had authentic natural experiences appearing to increase their knowledge of natural places and national parks. Additionally, teacher interviews suggest that using natural places effectively enhances student learning about natural science and cultural history.

**Affective Learning Coupled with Inquiry**

Learning in nature contributed to the meaningful experience students formed during their participation in the IRF program. Teachers claimed the IRF curriculum effective because it was also inquiry-based pedagogy that satisfied the California State Standards. The access to quality hands-on natural and social science lessons were perceived as especially valuable because science is sometimes considered sidelined due to incentives for schools to focus on increasing or maintaining student scores on standardized exams. The process of inquiry-based learning offers students an opportunity to “…develop meaningful understandings and construct scientific explanations by exploring the natural and scientific phenomenon” (Wu & Hsieh, 2006, p. 1289). Overall, teachers were satisfied with the hands-on learning that took place in nature and confirmed it allowed their students to have meaningful, inclusive learning experiences in the redwood forest.

**Intersection of Cultural History and Natural Science Curriculum**

The IRF Parks as Classroom program includes both the cultural history of indigenous Coast Miwok and the natural science of Muir Woods. Coupling these two disciplines with open-ended questions is a characteristic of inquiry-based learning that allowed students to connect their experiences in the program with previous knowledge. This intersection differs from other outdoor education programs that focus solely on natural science and fail to equate the subject to students’ everyday reality.

While acknowledging the existing strength of the program to help students connect the learning in the program to other areas of their life, interviews with teachers suggest this aspect could be further extended. Teachers recommended more culturally relevant lessons that stimulated students to think about their own traditions to develop a deeper understanding and historic empathy for Coast Miwok. According to Patchen and Cox-Peterson (2008) culturally relevant pedagogy (CRP) is contingent upon respect for student thinking, prior understandings, and active learning. Furthermore, Patchen and Cox-Peterson (2008) stated that CRP “depends not only upon recognizing students’ experiences (Nieto, 1994) but also upon teaching to and through those experiences, while connecting them to broader social contexts” (p. 997). Including more culturally relevant curricula would strengthen student connection with the natural science of Muir Woods.

**Student Knowledge and Attitudes about Nature.** Students expressed both feelings of comfort and fear towards their experience in the redwood forest. The data suggest that positive feelings helped students shape a promising steward ethic toward nature. For instance, multiple teacher interviews confirmed that some students’ stewardship attitudes and behaviors increased after their experience. According to Brody (2005), learning in nature inspires “environmentally sound behaviors” (p. 605). The perceptions of insecurity some students expressed towards spending time in the redwood forest
may have been related to having prior “scary” images or an ignorance of what to expect (Aaron & Witt, 2011).

The positive valence expressed by students further illustrated a desire to spend more time in nature. Students expressed feelings of wanting to return to Muir Woods. This intention was supported by a desire to use their “free pass.” It is outside of the design of this study to know how many acted on their desire to use their free pass and acquire a “free pass”; however, it is known that 1,391 fourth graders did acquire a free pass in the 2015–2016 period as obtained from the Muir Woods database. Further research is needed to know what the rate of acquisition is for students similar to those in this study, communities that have traditionally been underserved by the National Park Service.

**Intentions of Every Kid in a Park.** EKIP at Muir Woods exposed underserved youth, specifically racial/ethnic and low-resourced youth to nature (e.g., from Title I schools). This helped fulfill the goal of EKIP to connect youth from underserved and low-income communities to national parks (National Park Service, 2015). Teachers recognize that the majority of their students would not have enjoyed an opportunity to visit their national parks without participating in IRF. The EKIP pass only removed one economic barrier that discourages these students and their families from visiting national parks and other wild areas.

During the interviews, multiple teachers claimed that although the IRF program exposed students of color to national parks and made students aware of EKIP (e.g., voucher), transportation, food, and other costs associated with visiting national parks were likely to continue to prevent many families from using the passes.

> They get to the (EKIP) card, you can go anywhere (parks), but for a lot of our parents and families, how do you get to these places? Well, you know it’s good to get in there (parks), but I (the students’ families) also have to consider…to have to eat somewhere. You have to pay for gas, etc. —Teacher, Class 2

Therefore, further research is needed if students from diverse communities, such as the ones in this study, acquire their passes at lower rates than students from more affluent communities. Yet beyond just knowing if there is a difference, new research must result in greater understanding of the strength and pervasiveness of the constraints causing students from such communities to acquire their passes at a lower rate. Additional programs to increase access to national parks and other public lands, such as the EKIP program, need to consider how to ameliorate transportation, or other constraints, that reduce participants from using “free passes.” Otherwise, such programs may simply provide a benefit to families that would have already visited the parks and merely provided an incentive for a small portion of non-visitors to visit natural spaces.

Results from this study reveal experiences in the IRF program were overwhelmingly positive. However, it is possible that such short-term experiences simply expose these students to what could potentially be difficult for them to experience later on. This phenomenon could theoretically lead to a level of dissatisfaction yet, again, further research is needed.
Limitations
The researcher’s direct involvement with implementation of the IRF education program may have had a direct influence on the study results. The first author is the lead park ranger of the IRF education program and the education programs manager at Muir Woods National Monument. Emergent codes were developed and, subsequently to help mitigate bias, professional feedback was obtained from the GGNRA education specialist to determine reliability of coding categories and themes. Second, the lead researcher had prior relationships with all the teachers who participated in the interviews. Because of this, participants may have answered questions based on social desirability. However, this limitation was addressed prior to the interview by stressing to the teachers that their answers would not affect future participation in IRF education programs. The teacher interviews were not conducted right after their students’ participation in IRF; instead they were conducted between a few months to one year after (at the beginning of the 2016–2017 school year). This may have affected the results of the interviews because some teachers had a difficult time remembering the prior experience of their students. Nonetheless, many others conveyed great clarity and recollections because of the unique experience of the program.

This study included only six teacher interviews to comply with the NPS Office of Management and Budget (OMB) federal regulations. The OBM limits the number of people (including teachers) who can be asked the same questions to 10 people or fewer, unless they are park visitors (U.S. National Park Service, 2006). Also, the number of student journals utilized for the study (n=60) was low in size due to the lack of content in student journals. That is, only completed journals with writing and/or illustrations were selected for analysis. Several students from the Title I classes participating in the research had low reading and writing comprehension, therefore less ability to use their journals to write or draw their experiences.

Conclusions
Understanding the nature experience and learning outcomes of fourth-grade students is deemed important to evaluate the effectiveness of the EKIP initiative. More specifically, this helped begin the process of measuring the effectiveness of the Muir Woods Parks as Classrooms goal of providing an authentic park experience for underserved students of color from low-resourced communities. This study also added to the limited qualitative evidence, to-date, of the impact of the EKIP initiative.

Into the Redwood Forest
Teacher interviews indicated that park educators and practitioners need to consider ways to make the IRF classroom lessons more interactive for students to attain a greater connection with nature. Moreover, the results suggest the IRF program can further incorporate culturally relevant lessons in the inquiry-based curriculum that encourage students to connect with the natural environment of Muir Woods (Marx et al., 2004).

Future research about prior forest fears connected to students of color could also offer greater insight for NPS staff regarding how to design a relevant and more welcoming program. Evidence illustrates those with less direct experiences can be most frightened of nature (Bixler & Floyd, 1997), for a variety of reasons that differ across cultures (Warren et. al., 2014). According to Bixler and Floyd (1997), those with few direct nature experiences associate fears based on messages from parents, peers, negative media images, or ignorance.
Their research suggests that outdoor youth programs should demonstrate the rewards of being in nature to help apprehensive youth make fitting perceptions of unpleasant fears. This present study could potentially assist underserved students of color in clarifying their fears, thus shaping greater connections with park environments.

Outdoor Education Programs for Underserved Youth

Connecting underserved youth of color to national parks is critical for the survival of public lands and waters because more than half of children in the nation are anticipated to be of different race and ethnicity by the year 2020 (U.S. Census Bureau, 2015). As Outley and Witt (2006) affirmed, many racially diverse youth have historically been considered “underserved” in experiencing and learning about the natural environment. Subsequently, through this first adventure into a redwood forest, students in this present study were exposed to new concepts of nature and the cultural traditions of the first/indigenous people of Muir Woods through inquiry-based learning. For these youth, nature generated positive feelings of happiness, excitement, and wonder, which prompted them to lessen their fear of nature, and even to champion an emerging environmental stewardship ethic. Students communicated the experience also developed empathy for nature and led them to discover reasons to value and care for the environment. Youth from different racial and cultural backgrounds felt welcomed by discovering many aspects of comfort displayed by the NPS rangers along with the fact they could return to the park with their EKIP passes. However, to successfully provide students of color with programs that are more relevant to them, park professionals need to design programs that are modeled on the appropriate cultural framework and connect to students’ lived realities (Outley & Witt, 2006). IRF attempts to reflect a cultural framework and the Muir Woods park staff has already identified areas of improvement based on this study. This current investigation also demonstrates how and why other national parks might analyze their programs to integrate an interdisciplinary approach rooted in the culture of the park’s audience.

Every Kid In a Park. The goal of the EKIP program was to connect underserved youth of all backgrounds with the great outdoors (The White House, 2015). The National Park Foundation committed to providing transportation grants to schools in need to help remove barriers for underserved youth to access public lands and waters (National Park Foundation, 2017). However, transportation funds for one-time visits may not be enough for underserved students of color and their families to access parks in the future. The National Park Foundation (2017) established EKIP with a purpose of helping “engage and create our next generation of park visitors, supporters and advocates” (About Every Kid In a Park section, para. 2).

Underserved youth should have more than one opportunity to visit their national parks to create long-term meaningful relationships with these crown jewels and these spectacular environments. Thus, understanding how many students used their EKIP vouchers to return to Muir Woods or other national parks is an important way to track the value and success of the program. Although, EKIP passes were tracked at each national park site, they were not individually tracked by program, such as Parks as Classrooms programs. EKIP should be aware of these challenges and develop ways to actively mitigate these barriers with underserved and low-resourced communities.

Muir Woods offers profound experiences for the young eyes that look up at the
majestic trees. The forest extends incredible opportunities for underserved youth to experience their senses, curiosity, joy, and empathy towards one of the last remaining old-growth forests proximal to an urban center (i.e., San Francisco Bay Area). Programs like EKIP empower youth, in general, to be present in natural places that are sometimes rarely entered by many underserved youth of color, specifically.

The EKIP initiative is another step towards reducing certain barriers that discourage youth of color and their family from visiting national parks and other wild areas; however, the National Park Service and other interested agencies must think critically of new ways to reduce or remove other constraints to participation. This, and other research (e.g., Aaron & Witt, 2011; Brody, 2001), suggests that authentic primary experiences lead youth to enjoy natural spaces, and therefore encourage appreciation of nature. Without formulating such positive attitudes, underserved youth are unlikely to develop the behaviors needed to conserve these areas (Outley & Witt, 2006; Paisley et al., 2014; Warren et al., 2014). And, such failure would limit the future of both this growing demographic across America and potentially predict a bleak future for citizens’ support of national parks and other wild spaces. The consequences could be devastating for all people.

References


Measuring Elaboration and Evaluating Its Influence on Behavioral Intentions

Zachary D. Miller, Ph.D.
806 Donald H. Ford Building
Pennsylvania State University
University Park, PA 16802
(916) 622-0636
zdm9@psu.edu

Wayne Freimund, Ph.D.
Department of Parks, Recreation, and Tourism Management
Clemson University

Robert B. Powell, Ph.D.
Department of Parks, Recreation, and Tourism Management
Department of Forestry and Environmental Conservation
Clemson University

Abstract
The focus of this study is on developing a scale that measures elaboration as originally conceptualized by Vezeau et al. (2015), and then tests whether the elaboration scale is able to predict a variety of related behaviors. Confirmatory factor analysis was used to investigate the validity and reliability of the scale. The results suggest that the scale was successful in improving upon previous research in that all theoretical constructs were present in the second-order model of elaboration. Additionally, structural equation modeling was used to examine the predictive validity of the elaboration scale, which was successful in predicting a variety of related behaviors. This research advances the theoretical understanding and measurement of elaboration. Results can be used for evaluating interpretation efforts, including the assessment of programs and materials. Additionally, the results provide further evidence of elaboration as a measured construct and opens a variety of new avenues for research in environmental interpretation and informal education. Practitioners can use this research to reinforce or change attitudes and behaviors of visitors to those more consistent with an agency or organization mission by promoting interest, awareness, and cognitive engagement (collectively termed elaboration) in their interpretive products.
Introduction

Interpretation, or informal education, is an important management strategy for protecting valuable resources, reducing environmental impact, and keeping visitors safe in parks and protected areas around the world. With a recent surge in visitation to national parks in the US, developing effective interpretation programs has perhaps never been more important. For instance, in 2015, 51 national parks in the US broke their visitation records, and the national park system as a whole saw record-breaking levels of visitation with over 300,000,000 recreation visits (NPS, 2017a). With such high levels of visitation in national parks, managers need to be able to develop effective interpretation strategies to help them achieve their management goals. Interpretation is a valuable management tool for a variety of different reasons. For instance, in many large wilderness parks it is often impractical to have more direct means of management, like enforcement, due to limited staff and funding. Additionally, many visitors prefer interpretation-based management strategies over more direct management approaches, such as permitting or restrictions (Manning, 2011). Lastly, over-regulation may infringe on some of the social values associated with wilderness settings (Manning, 2003). For these reasons, interpretation is likely to remain a cornerstone of the management techniques used in park and protected areas.

Research suggests that interpretation, when applied appropriately, can be highly successful at influencing visitor behaviors to address management issues in parks and protected areas (Brown, Ham, & Hughes, 2010; Ham, 2013). Part of the success of interpretation depends on how much visitors “elaborate” on a message (Petty & Cacioppo, 1986; Ham, 2013). Elaboration, a thoughtful processing of information defined as raised levels of interest, awareness, and cognitive engagement, is a crucial antecedent to behavior change or pro-social behavior (Petty & Cacioppo, 1986; Vezeau et al., 2015). However, scales that measure the concept of elaboration are lacking. This is important because an operationalization of elaboration would allow us to evaluate if different interpretation methods are effective in promoting elaboration and ultimately influencing visitors’ behaviors. Only one research project has attempted to construct an elaboration scale, but measurement challenges presented themselves and ultimately rendered the scale incomplete (Vezeau et al., 2015). Therefore, this current research focuses on improving the measurement of elaboration first proposed by Vezeau et al. (2015) and examining if the scale has practical use in predicting a variety of related behaviors. In doing so, this research provides a better understanding of elaboration in the context of interpretation.

Theoretical Framework

Interpretation generally has three desired outcomes; it can enhance experiences, impact attitudes, and change negative behavior (Ham, 2013). The elaboration likelihood model (ELM) is a useful theoretical framework for understanding the last two outcomes (e.g., impacting attitudes and changing negative behavior), which are related. The elaboration likelihood model is concerned with impacting attitudes, and attitude change can also lead to behavior change (Ajzen, 1991; Petty & Cacioppo, 1986). Collectively, this type of interpretation that tries to reinforce or change attitudes and behaviors to those more consistent with an agency or organization mission is called persuasion.

According to ELM, there are two routes to persuasion: the central and the peripheral routes (Petty & Cacioppo, 1986; Figure 1). The central route is taken by people who are motivated and able to process a message and results in logical, careful consideration, the source of the term elaboration (Petty & Cacioppo, 1986). However, if people
are unmotivated, unable, or unwilling to engage in such careful consideration and thoughtful processing, the peripheral route of persuasion may be more likely to impact attitudes (Petty & Cacioppo, 1986). In the central route, the content of a message plays a major role in persuasion (Petty & Cacioppo, 1986). However, the peripheral route of persuasion relies on subtle and often subconscious cues. For instance, the number of arguments in a persuasive message, the authority from which the message comes, and the conditions under which the message is presented are more important for the peripheral route to persuasion (Petty & Cacioppo, 1986). Although the routes are presented as a dichotomy, it is likely that people use both (in varying levels) to process a message (Petty, Wegener, & Fabrigar, 1997). For instance, both the number of arguments and the strength of the message may simultaneously work together in persuasion.

Although persuasion can occur through either route, there are some notable differences. For instance, although peripheral routes to persuasion can be effective for a short period of time, attitude changes that result from this route tend to be less salient and less enduring, and are easily affected by future messages (Petty, McMichael, & Brannon, 1992). Attitude changes acquired through the central route of persuasion tend to be more salient, durable over time, indicative of behavior, and resistant to future messages due to higher levels of elaboration (Petty et al., 1992). For these reasons, the central route to persuasion is generally preferred (Petty et al., 1992).

Research by Vezeau et al. (2015) at Great Smoky Mountain National Park provided an early attempt at scale development in measuring elaboration. Vezeau et al. (2015) proposed the concept of elaboration as a quantifiable, multi-dimensional concept consisting of interest, awareness, and cognitive engagement as suggested by theory (Petty & Cacioppo, 1986). The results provided substantial evidence that elaboration can be quantified. In addition, the elaboration scale was highly predictive of behavioral intentions, making it a useful framework for evaluating interpretation efforts. Removing the dichotomy of the ELM and replacing it with a continuous variable creates a more realistic elaboration concept by changing the question from if elaboration occurred to how much elaboration occurred (Petty et al., 1997).

This current research is designed to construct a more theoretically complete elaboration scale by adapting concepts (e.g., interest, awareness, cognitive engagement) from Vezeau et al.’s (2015) research. In Vezeau et al.’s (2015) research, the awareness
construct displayed low variance. Because variance is necessary for scale development, awareness was dropped from the full model, leaving cognitive engagement and interest as the only factors of elaboration. Although still predictive of intended behaviors, elaboration as measured in the study was missing an important theoretical component (awareness) as originally conceptualized. This current research seeks to confirm the model originally proposed by Vezeau et al. (2015) and test its predictive validity.

Study site and context
To further explore the concept of elaboration and its impacts on behaviors, this research uses bear safety as a frame of reference. This includes the development of a bear safety elaboration scale, a bear safety behavioral intentions scale, and an evaluation of the relationship between bear safety elaboration and its impact on behavioral intentions. Bear safety behaviors are actions that visitors can adopt to increase their physical safety from bears while hiking.

This research was conducted in Yellowstone National Park (YNP). Yellowstone National Park is one of the most visited national parks in the US, receiving more than four million visitors annually (NPS, 2017b). Well-known for its geological uniqueness and numerous species of large, charismatic wildlife, YNP also offers a multitude of recreation opportunities, including hiking. However, with millions of visitors and large, free-roaming wildlife, conflicts do occur. This includes conflicts with bears. Yellowstone National Park is one of the few places left in the contiguous US that is inhabited by both grizzly and black bears. Although both species can be a threat to people, it is the grizzly bear that poses the most risk to humans (NPS, 2017c). Hiking in grizzly bear country should be done with special precautions that are unique when compared to hiking in areas where only black bears are present. For instance, while carrying and knowing how to use bear spray is recommended in areas where grizzly bears are present (NPS, 2015d), this is usually not recommended in areas where only black bears are present. In fact, in some areas where black bear and human interactions are common (like Yosemite National Park in the Sierra Nevada mountains of California), it is illegal to carry bear spray (NPS, 2015e). For this reason, the bear safety messaging at YNP focuses on behaviors more specific to grizzly bears. However, many of the bear safety behaviors overlap with regard to species of bear.

Of all the wildlife in YNP, the grizzly bear tends to be the species about which people are most concerned (Olliff & Caslick, 2003). There is good reason for this, as incidents with grizzly bears are more likely to result in human death than with any other wildlife species in the park. Incidents with grizzly bears (defined as physical contact between a person and a bear) occur at a rate of about one per year in YNP, and happen almost exclusively in backcountry (undeveloped) areas, such as hiking trails (NPS, 2017c). Deaths from bear attacks are rare in YNP, with only three deaths occurring between 1963 and 2010 (NPS, 2017c). However, between 2011 and 2015, three visitors were killed by grizzly bears inside the park in separate incidents (NPS, 2017c). With the recent spike in deaths from bear incidents and growing numbers of visitors, this research focused on understanding how interpretation is influencing visitors’ bear safety behaviors. This research is part of a broader project that examined how interpretation influences visitors’ bear safety behaviors. This paper focuses only on scale construction and predictive validity.
Methods

Conceptualization and measurement
An onsite intercept questionnaire administered via tablet collected data from respondents for the broader study. The portions of the questionnaire that pertain to this research involved two sections: an elaboration section and a bear safety behavioral intentions section.

Bear safety behaviors
Using information provided by YNP, including the YNP website, signs, brochures, maps, and other forms of communication, researchers identified six different bear safety behaviors of interest. Because it is often difficult to measure actual behaviors, this research conceptualized the measures as behavioral intentions, which are an antecedent to actual behavior (Ajzen, 1991). To measure behavioral intentions, hikers were asked, “How likely are you to do the following things while hiking in Yellowstone National Park?” The six items were: 1) make noise by clapping or shouting, 2) personally carry bear spray, 3) look for signs of bears, like scat and tracks, 4) hike in a group of three or more people, 5) carry bear spray in an accessible place, like a hip holster, and 6) run if you see a bear (item was reverse coded). Responses were measured on a 7-point Likert-type scale, where 1=highly unlikely, 2=unlikely, 3=slightly unlikely, 4=neither, 5=slightly likely, 6=likely, and 7=highly likely.

Elaboration
The conceptualization of elaboration on the questionnaire was guided by Vezeau et al. (2015) and was divided into three different portions: interest, awareness, and cognitive engagement. In this research, we sought to reduce skewness and increase variance to overcome previous issues in Vezeau et al.’s (2015) research using a variety of techniques. These included using extreme values/strong wording and unidirectional scaling (DeVellis, 2003; Klockars & Hancock, 1993; Munshi, 2014; Peterson & Wilson, 1992). All the measures for interest, awareness, and cognitive engagement were conceptualized using information provided by YNP to visitors from a variety of communication sources (e.g., the YNP website, signs, brochures, maps, etc.).

Awareness
Awareness is defined in this research as a general, rather than specific, cognizance of different concepts relating to bear safety in YNP (Vezeau et al., 2015). This is similar to other research using awareness as a construct (Kollmuss & Agyeman, 2002; Vezeau, 2015). Previous research found that awareness is a different concept than knowledge, is predictive of behaviors, and has been used to evaluate a variety of programs (Musser & Malkus, 1994; Schultz 2000, 2001; Stern, Powell, & Ardoin, 2008; Stone, Barnes, & Montgomery, 1995; Vezeau et al., 2015). To measure awareness, visitors were asked, “How aware are you of the following items?” Five different items were developed to measure awareness of bear safety. The items were: 1) ways to increase your safety while hiking in bear country, 2) techniques that can help you avoid negative encounters with bears, 3) how hiking in grizzly bear country is different than hiking in other areas, 4) resources you can use to keep you safe while hiking in bear country, and 5) things you can do to decrease your risk of a bear attack while hiking. Responses were recorded on a 5-point Likert-type scale, where 1=not at all aware, 2=somewhat aware, 3=very aware, 4=extremely aware, and 5=completely aware.
Interest
This study defines interest as wanting to learn about items related to bear safety (Vezeau et al., 2015). Interest in learning has previously been used in the evaluation of environmental programs and is associated with behavior change (Lück, 2015; Stern et al., 2008; Vezeau et al., 2015; Werner, 1999). To measure interest, visitors were asked, “How interested are you in learning about the following items?” Six different items were developed to measure day hikers’ interest in learning about bear safety. These items were: 1) staying safe while hiking in the presence of bears, 2) knowing how to act if you see a bear, 3) proper equipment while hiking in areas where bears may be present, 4) how to increase your alertness to bears in an area, 5) how to avoid bear encounters while hiking, and 6) how to interpret bear behaviors. Responses were recorded on a 5-point Likert-type scale, where 1 = not at all interested, 2 = somewhat interested, 3 = very interested, 4 = extremely interested, and 5 = completely interested.

Cognitive engagement
In this study, cognitive engagement is defined as the amount someone spent thinking about aspects of bear safety, and is only the second study to measure this concept (Vezeau et al., 2015). Visitors were asked, “How much have you thought about the following items?” Six different items were developed to measure cognitive engagement for day hikers. These items were: 1) appropriate behaviors while hiking in the presence of bears, 2) what hikers can do to stay safe from bears while hiking, 3) how to have an enjoyable experience while hiking in bear country, 4) the benefits of taking safety precautions while hiking in bear country, 5) encountering bears while hiking, and 6) how hikers can avoid bears while hiking. Responses were recorded on a 5-point Likert-type scale, where 1 = not at all, 2 = somewhat, 3 = a moderate amount, 4 = very much, and 5 = a great deal.

Data collection
Day hikers (as opposed to overnight backpackers, or bicyclists on one trail) were of specific interest in this research because they have no point of mandatory contact and are likely less experienced than overnight backpackers. Additionally, the last three deaths from bears in YNP were all day hikers. Intercept survey techniques were used to collect data from day hikers on two trails in YNP. The two trails were selected in conjunction with park managers and served as a sampling frame. Trained university researchers systematically sampled day hikers and asked them to participate in the research by completing the survey on a tablet. If groups of hikers were intercepted, the person with the most recent birthday (not date of birth) in the group was asked to participate in the research. Data collection represented all days of the week during daylight hours from July 1 to August 15. Researchers intercepted 777 day hiker groups, in which 14 (1.8%) did not speak enough English to complete the survey. From the remaining 763 groups, 647 individuals agreed to participate in the survey (response rate = 85%). Two variables were used to evaluate non-response bias: age and U.S. residency/citizenship. There were no significant differences ($p < 0.05$) between respondents and non-respondents regarding these variables.

Analysis
SPSS and AMOS were used to perform statistical analyses. During data cleaning, attention was paid to univariate outliers, missing data, and skewness of variables. Three different approaches were used during the analysis. These include confirmatory factor analysis.
(CFA), principal axis factoring (PAF), and structural equation modeling (SEM). AMOS was used for all SEM and CFA procedures, and SPSS was used for all other procedures. Maximum likelihood (ML) estimation was used for all SEM and CFA procedures.

During data screening, it was found that most variables had one or two missing data points. To determine if there was a pattern to the missing data, Little’s missing completely at random (MCAR) test was used. Results indicated that there was no pattern to the missing data ($\chi^2=566.79, df=585, p=0.698$). To be as conservative as possible, cases with missing data were deleted listwise instead of imputed. This left a final sample size of $n=600$.

Figure 2: Second-order CFA of elaboration. All loadings are standardized and statistically significant ($p<0.01$). Fit statistics: $\chi^2 =331.041, df=116, p<0.001$; BSboot, $p=0.002$; RMSEA=0.052, $p$-close=0.091; SRMR=0.0267; CFI=0.975; TLI=0.977. See Table 1 for corresponding variable codes.
Confirmatory factor analysis is a form of SEM used to test an a priori specified structure of the relationship among observed variables and latent variables (Kline, 2011). This research used CFA to examine a second-order model of elaboration using raw data, where interest, awareness, and cognitive engagement were first-order latent variables that are reflective of an underlying elaboration factor (Figure 2). Maximum likelihood estimation assumes a multivariate normal distribution of the data, and there were some indications that this assumption was violated (i.e., univariate skewness, Mardia’s coefficient = 108.478, critical ratio = 52.272). To correct for this, bootstrapping (a resampling method that creates a pseudo-population from the sample) was applied to all CFA and SEM procedures, and bias-corrected confidence intervals (95%) were used when reporting significance to reduce the chance of Type I errors (Byrne, 2001). Generally, standardized loadings of variables measuring a factor should be statistically significant and >.30, with values >0.60 considered “high” (Kline, 1994). Additionally, goodness-of-fit (GOF) statistics allow researchers to examine how well the data matches the specified model in CFA and SEM. In this research, we provide several GOF statistics for each model, including both relative and absolute fit measures.

Absolute fit statistics examine the relationship between the implied and hypothesized covariance matrices and include $\chi^2$, the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). As is customary, the $\chi^2$ statistic is reported for the model. In addition, the Bollen-Stine bootstrap $\chi^2$ (BSboot; a $\chi^2$ test that accounts for the bootstrapping procedure) is reported. It is interpreted in the same way as the normal $\chi^2$. However, because $\chi^2$ is essentially a test of statistical significance, larger samples ($n > 200$) make it likely that it will be rejected due to greater statistical power (Hooper, Coughlin, & Mullen, 2008). Therefore, other fit statistics are generally more relied upon for assessing model fit. RMSEA is a “badness of fit” index where values closer to 0 indicate a better fit (Kline, 2011, p. 205). RMSEA values less than 0.10 are considered acceptable, with RMSEA < 0.05 indicative of an excellent fit (Brown & Cudeck, 1993; Kline, 2011). With RMSEA, a p-close test along with the 90% confidence interval is provided. The p-close test evaluates whether the RMSEA has a high likelihood of actually being less than 0.05, with values of $p > 0.05$ concluding that the model is “close fitting” (Kline, 2011). SRMR transforms the covariance matrices of the hypothesized and independence models into correlation matrices. The difference between these matrices is the mean absolute correlation residual, which is essentially what SRMR reflects (Kline, 2011). Generally, values of <0.08 are considered acceptable for SRMR, with values closer to 0 indicative of a better fit (Hu & Bentler, 1999).

Relative fit statistics (also called comparative fit statistics) examine how much the hypothesized model differs from an independence model (one where there is no relationship among variables). These fit statistics include the comparative fit index (CFI) and the Tucker-Lewis index (TLI). CFI compares the independence model to the hypothesize model (Kline, 2011). Values closer to 1 indicate a better fit, with values >0.90 indicating an acceptable fit, and >0.95 indicative of an excellent fit (Hu & Bentler, 1998). TLI is fairly similar to CFI, except it compares the $\chi^2$ value of the hypothesized model to the independence model, while also incorporating degrees of freedom (Kline, 2011). TLI is interpreted in a similar way to CFI. Invariance testing is used to further examine the validity of the elaboration scale (Byrne, 2001; Kline 2011).

The Rho coefficient (or Raykov’s composite reliability) was used to determine the reliability of multidimensional measures for all models and was calculated as per
Graham (2006) in AMOS. Rho has numerous advantages over Cronbach’s alpha when evaluating scale reliability in CFA and SEM. Most important is the fact that Cronbach’s alpha assumes that the items measuring a latent variable are tau-equivalent, or have equal loadings. Violating this assumption tends to incorrectly estimate the actual reliability of items (Graham, 2006; Miller, 1995). Rho accounts for differential loadings among observed variables of a latent variable and is interpreted in a similar fashion to Cronbach’s alpha, where Rho>0.60 is considered acceptable (Gay, 1991; Graham, 2006). Lastly, invariance testing, an additional check on validity, is used to examine the structure of the model across independent groups.

Principal axis factoring was used to identify the underlying structure of the bear safety behavioral intentions. We used a PAF over a CFA because the items in the scale had never been developed before, and no explicit structure was determined a priori. Assumptions about the appropriateness of using PAF were checked using the Keiser-Meyer-Olkin (KMO) statistic (KMO>0.50) and Bartlett’s test of sphericity (p<0.05). A scree plot was used to determine how many factors to maintain. Varimax rotation was applied to the PAF to help interpret the results. Along with face validity, loadings of >0.30 were used to determine the factor that each item belonged to (Kline, 1994). Reliability for the items that loaded onto the same factor was assessed using Cronbach’s alpha, as Rho could not be calculated using exploratory factor analysis. A Cronbach’s alpha ->0.60 was considered acceptable (Gay, 1991). The PAF was conducted to inform the structure in the SEM model to keep the SEM in the “spirit” of a confirmatory, not exploratory, process.

The last step in analysis involved a SEM that merged both the elaboration scale and the bear safety behavioral intentions. This was done to ensure the predictive validity of the elaboration scale, which is in line with the theoretical concepts of the ELM (Petty & Cacioppo, 1986). Bootstrapping was also applied to the SEM procedures. Like the CFA, fit indices and factor loadings are reported. Lastly, standardized path coefficients are reported, along with their statistical significance (using bias-corrected confidence intervals [95%] to report significance), between elaboration and bear safety behavioral intentions.

Results

Sample characteristics

Overall, respondents were about evenly split regarding gender, with 47.5% being female and 52.5% being male. The age of respondents ranged from 18 to 83 years of age. The mean age of respondents was 40.8 years, and the median was 40 years. Over 91% of respondents reported being white, which is similar to other research conducted in national parks. Asians were the next largest group and consisted of about 6.4% of the sample, followed by people who reported being of more than one race (1.6%). People who identified as Hispanic or Latino made up 3.4% of the sample. In terms of education, the sample was highly educated, with 39.1% of respondents possessing a graduate degree and 40.4% possessing a Bachelor’s degree. Over 90% of respondents had at least some college. Eighty-one percent of respondents were permanent residents or citizens of the United States. Forty-seven out of the 50 states in the US were represented, as was the District of Columbia. Respondents came from five of the seven continents on the globe (Antarctica and Africa were not represented in the sample). The most common non-US countries where respondents lived were Canada (2.1%), France (2%), Germany (1.8%), Switzerland (1.7%), and the Netherlands (1.2%).
Table 1: Descriptive statistics and reliability for elaboration measures

<table>
<thead>
<tr>
<th>Component</th>
<th>Model code</th>
<th>Variable</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interest&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Rho=0.95</td>
<td>V1  Staying safe while hiking in the presence of bears.</td>
<td>3.4 (1.13)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V2  Knowing how to act if you see a bear.</td>
<td>3.6 (1.08)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V3  Proper equipment while hiking in areas where bears may be present.</td>
<td>3.4 (1.12)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V4  How to increase your alertness to bears in an area.</td>
<td>3.5 (1.06)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V5  How to avoid bear encounters while hiking.</td>
<td>3.5 (1.13)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V6  How to interpret bear behaviors</td>
<td>3.8 (1.08)</td>
</tr>
<tr>
<td>Awareness&lt;sup&gt;4&lt;/sup&gt;</td>
<td>Rho=0.92</td>
<td>V7  Things you can do to decrease your risk of a bear attack while hiking.</td>
<td>2.9 (0.92)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V8  Resources you can use to keep you safe while hiking in bear country.</td>
<td>2.9 (0.93)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V9  How hiking in grizzly bear country is different than hiking in other areas.</td>
<td>2.8 (1.05)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V10 Techniques that can help you avoid negative encounters with bears.</td>
<td>2.8 (0.92)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V11 Ways to increase your safety while hiking in bear country.</td>
<td>2.9 (0.92)</td>
</tr>
<tr>
<td>Cognitive engagement&lt;sup&gt;5&lt;/sup&gt;</td>
<td>Rho=0.93</td>
<td>V12 How hikers can avoid bears while hiking.</td>
<td>3.6 (1.03)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V13 Encountering bears while hiking.</td>
<td>3.8 (1.03)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V14 The benefits of taking safety precautions while hiking in bear country.</td>
<td>3.9 (0.93)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V15 How to have an enjoyable experience while hiking in bear country.</td>
<td>3.7 (0.96)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V16 What hikers can do to stay safe from bears while hiking.</td>
<td>3.7 (0.94)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>V17 Appropriate behaviors while hiking in the presence of bears.</td>
<td>3.6 (0.98)</td>
</tr>
</tbody>
</table>

<sup>3</sup>Responses measured on a 5-point Likert-type scale where 1=not at all interested and 5=completely interested.

<sup>4</sup>Responses measured on a 5-point Likert-type scale where 1=not at all aware and 5=completely aware.

<sup>5</sup>Responses measured on a 5-point Likert-type scale where 1=not at all and 5=a great deal.
Measurement model for elaboration

Descriptive statistics and variable codes for the observed variables in the model, as well as Rho reliability for first-order factors, are provided in Table 1. Rho (0.92 to 0.95) indicated that the first-order factors were reliably measuring their underlying constructs. The second-order CFA provided ample evidence that the variables measured their intended first-order factors (interest, awareness, cognitive engagement) and that these first-order factors measured the concept of elaboration (Figure 2). The data had good fit to the model. Both $\chi^2$ ($\chi^2 =331.041, df=116, p<0.001$) and BSboot ($p=0.002$) were significant, as was expected with a large sample size. All other fit statistics indicated a good to excellent fit for the model (RMSEA=0.052, p-close=0.091; SRMR=0.0267; CFI=0.975; TLI=0.977), and all loadings were statistically significant ($p<0.01$) and above the generally accepted levels. Rho reliability for constructs measuring elaboration also supported that the items reliably measured the elaboration construct (Rho=0.68).

Invariance testing. Invariance testing is used to examine how a scale functions across independent groups and is an additional validity check in scale development (Kline, 2011). For this process, the sample was randomly divided via SPSS command into two independent and roughly equal groups (group 1, $n=317$; group 2, $n=283$) (Kyle, Graefe, & Manning, 2005). In this research, two types of invariance testing are used: configural and metric invariance. Configural invariance ensures that the model structure is equivalent across multiple groups and is tested by simultaneously comparing the two groups in a multi-group CFA (Byrne, 2001; Vezeau et al., 2015). Results from the configural invariance test indicated that the structure of the model was the same.

Table 2: Principal axis factoring for bear safety behavioral intentions

<table>
<thead>
<tr>
<th>Factor</th>
<th>Model code</th>
<th>Variable</th>
<th>Loading</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bear spray $\alpha=0.96$</td>
<td>V18</td>
<td>Personally carry bear spray.</td>
<td>.938</td>
<td>5.4 (2.14)</td>
</tr>
<tr>
<td></td>
<td>V19</td>
<td>Carry bear spray in an accessible place, like a hip holster.</td>
<td>.956</td>
<td>5.3 (2.17)</td>
</tr>
<tr>
<td>Single item measures$^3$</td>
<td>V20</td>
<td>Make noise by clapping or shouting.</td>
<td>--</td>
<td>5.3 (1.75)</td>
</tr>
<tr>
<td></td>
<td>V21</td>
<td>Look for signs of bears, like scat and tracks.</td>
<td>--</td>
<td>5.6 (1.48)</td>
</tr>
<tr>
<td></td>
<td>V22</td>
<td>Hike in a group of three or more people.</td>
<td>--</td>
<td>4.8 (2.14)</td>
</tr>
<tr>
<td></td>
<td>V23</td>
<td>Run if you see a bear$^4$.</td>
<td>--</td>
<td>6.0 (1.48)</td>
</tr>
</tbody>
</table>

$^1$KMO=0.553, Bartlett’s test of sphericity $p<0.001$.
$^2$Items were measured on a 7-point Likert-type scale where 1=highly unlikely and 7=highly likely.
$^3$Items did not load on the single factor, and are treated as stand-alone measures.
$^4$Item was reverse coded.
Figure 3: SEM of the relationship between elaboration and bear safety behaviors. Fit statistics: $\chi^2 = 331.041$, df=116, $p<0.001$; BSboot, $p=0.002$; RMSEA=0.050, $p$-close=0.531; SRMR=0.0413; CFI=0.967; TLI=0.963. All loadings and paths were statistically significant ($p<0.01$). See Tables 1 and 2 for corresponding variable codes.

Table 3: Effect of elaboration on bear safety behavioral intentions

<table>
<thead>
<tr>
<th>Bear safety behavioral intention</th>
<th>Standardized path coefficient</th>
<th>Variance explained</th>
<th>Effect size$^2$</th>
<th>$p$-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bear spray.</td>
<td>0.52</td>
<td>27.2%</td>
<td>Large</td>
<td>0.005</td>
</tr>
<tr>
<td>Make noise by clapping or shouting.</td>
<td>0.34</td>
<td>11.2%</td>
<td>Medium</td>
<td>0.006</td>
</tr>
<tr>
<td>Look for signs of bears, like scat and tracks.</td>
<td>0.49</td>
<td>24%</td>
<td>Medium-large</td>
<td>0.002</td>
</tr>
<tr>
<td>Hike in a group of three or more people.</td>
<td>0.15</td>
<td>2.1%</td>
<td>Small</td>
<td>0.003</td>
</tr>
<tr>
<td>Run if you see a bear$^3$.</td>
<td>0.19</td>
<td>3.7%</td>
<td>Small-medium</td>
<td>0.005</td>
</tr>
</tbody>
</table>

$^1$See Figure 3 for full SEM.
$^3$Item was reverse coded.
between the two groups ($\chi^2 = 485.376, df = 232, p < 0.001; BS_{boot}, p = 0.002; RMSEA = 0.043, p-close = 0.988; SRMR = 0.031; CFI = 0.97; TLI = 0.965$). Metric invariance is a more rigorous validity check and examines the equality of unstandardized factor loadings across groups (Kline, 2011; Vezeau, 2015). This is done by comparing multiple models: one in which factor loadings are unconstrained among the groups (reported above) and one in which factor loadings are constrained to be equal among the groups (constrained model: $\chi^2 = 493.704, df = 249, p < 0.001; BS_{boot}, p = 0.002; RMSEA = 0.041, p-close = 0.999; SRMR = 0.036; CFI = 0.971; TLI = 0.969$). A Chi-square difference test indicated that there was no significant different between the two models ($\chi^2$ difference $= 8.328, df = 17, p = 0.96$). Further analysis showed that there was no significant difference ($p < 0.05$) among any of the factor loadings between the two groups. In summary, the bear safety elaboration scale displayed both configural and metric invariance.

**Principal axis factoring for bear safety behavioral intentions**

The assumptions for using PAF were met (KMO $= 0.553$ and Bartlett’s test of sphericity $p < 0.001$). Examination of the scree plot showed that only one factor could be identified from the data. No rotation could be applied since there was only one factor. Table 2 shows the results of the PAF as well as descriptive statistics for all bear safety behavioral intentions measures. Three of the bear safety behavioral intention variables loaded on the factor: “personally carry bear spray” (loading $= 0.938$), “carry bear spray in an accessible place, like a hip holster” (loading $= 0.956$), and “Look for signs of bears like scat and tracks” (loading $= 0.34$). The last variable (“Look for signs of bears, like scat and tracks”) was removed from the factor due to face validity issues (i.e., the other two factors are clearly related to bear spray) and its comparatively low factor loading. Additional support for the two-item factor (“personally carry bear spray” and “carry bear spray in an accessible place, like a hip holster) came from the high Cronbach’s alpha ($\alpha = 0.96$). This factor was named “bear spray,” and all other items were treated as stand-alone measures of bear safety behavioral intentions during further analysis.

**Structural model of elaboration and bear safety behavioral intentions**

Using the results from the CFA and the PAF, a SEM was designed to test the predictive validity of the elaboration construct on the bear safety behavioral intentions identified in the PAF (Figure 3). Fit statistics supported that there was a good to excellent fit between the model and the data. Like the CFA, both the $\chi^2$ ($\chi^2 = 559.910, df = 226, p < 0.001$) and BSboot ($p = 0.002$) were significant. All other fit statistics supported the model (RMSEA $= 0.050, p-close = 0.531; SRMR = 0.0413; CFI = 0.967; TLI = 0.963$). Elaboration had a significant, positive effect on all bear safety behavioral intentions (Table 3). The largest effects were found in the latent bear spray factor and looking for signs of bears, like scat and tracks. A medium effect was found on making noise by clapping or shouting. Small to medium effects were found for hiking in a group of three or more people and running if you see a bear.

**Discussion**

The purpose of this research was to develop an elaboration scale in which all theorized constructs (interest, awareness, and cognitive engagement) were present, and to test the elaboration scale’s predictive validity. In doing so, the research investigates the relationship between elaboration and behavioral intentions, and provides a way to evaluate the influence of future interpretation efforts.
The CFA and reliability of the bear safety elaboration measures indicated a good to excellent fit. Additionally, all three theorized constructs (interest, awareness, and cognitive engagement) measured the concept of elaboration. This was an improvement over Vezeau et al.’s (2015) model, in which awareness was not included in the model due to variance issues. The interest dimensions in the bear safety elaboration scale had a lower loading (0.37) when compared to other first-order factors. This indicates that, at least for bear safety elaboration, interest is likely a less important indicator of elaboration than either cognitive engagement or awareness. From an overarching theoretical view, this does not mean that interest is not as important as awareness or cognitive engagement to elaboration (Vezeau et al., 2015). Indeed, Vezeau et al.’s (2015) model found both interest and cognitive engagement had relatively high factor loadings. Instead, it is likely that in this empirical case, interest was not as important to bear safety elaboration (Vezeau et al., 2015). Although the reasons for this are not clear, it may simply be that awareness and cognitive engagement are relatively more important for bear safety elaboration. Considering the results from the bear safety elaboration scale, the inclusion of all first-order elaboration factors (interest, awareness, and cognitive engagement) is likely a sounder way of measuring elaboration than previously done. At this nascent stage, any future research that develops scales for measuring elaboration in different contexts and populations will continue to help researchers understand the components of elaboration measurement.

The PAF of bear safety behavioral intentions identified only one factor (bear spray behavioral intentions). The results from this suggest that bear safety behaviors are mostly separate behaviors. For instance, hiking in a group of three or more people is a distinct behavior from making noise by clapping or shouting. This is likely useful to future research. For instance, theoretical frameworks, such as the theory of planned behavior (Ajzen, 1991), need to be applied separately to each type of bear safety behavior. This means that bear spray behaviors may have different influences (e.g., attitudes, subjective norms, perceived behavioral control) than hiking in a group of three or more people.

From both a theoretical and applied perspective, elaboration should be able to predict behavioral intentions (Ajzen, 1991; Ham, 2013; Petty & Cacioppo, 1986). Results indicated that elaboration significantly predicted all measured bear safety behavioral intentions. However, it should also be acknowledged that there is a considerable amount of unexplained variance remaining for several bear safety behavioral intentions. Even with this acknowledgement, this research provides further evidence that the elaboration construct, as measured by interest, awareness, and cognitive engagement, is conceptually valid. Additionally, although bear safety behaviors may have different influences, it appears that interpretation strategies based on raising levels of elaboration can influence multiple, related behaviors, such as sustainability (see Vezeau et al., 2015) or, in this instance, bear safety. This has an important implication for interpretation programs. If the goal is to make a difference by impacting behaviors, then focusing on factual knowledge alone is unlikely to be successful (Miller, Freimund, Metcalf, & Nickerson, 2017; Schultz, 2011). Instead, these programs should focus on increasing interest, awareness, and cognitive engagement (i.e., elaboration) related to their topics.

Research needs to continue to develop elaboration scales in a variety of contexts to continue to refine our understanding of elaboration as a measured concept. Currently, we are unaware of how elaboration scales generalize to other concepts, or even how this bear safety elaboration scale generalizes to non-Yellowstone National Park populations.
Both this study and Vezeau et al.’s (2015) research were conducted in national parks in the US. Developing elaboration measures for populations outside of national parks and the US may be particularly insightful. Additionally, although elaboration influences behavioral intentions, it is yet to be revealed how it is doing so. Empirically modeling elaboration with other theories about behavior, like the theory of planned behavior (Ajzen, 1991), can help further understand the relationship between interpretation strategies and behaviors. Lastly, elaboration scales need to be used to assess the impact of different interpretation strategies, likely in a pre-and-post design. In these studies, close attention should be paid to the change not only of the second-order elaboration factor, but also among the first-order factors (interest, awareness, and cognitive engagement). Along with this, an assessment of the long-term effects of elaboration needs to be conducted. Lastly, research should continue to explore the link between behavioral intentions and actual behavior (Miller, 2017).

Conclusion
This research provided further evidence of elaboration as a measured concept by constructing a more theoretically complete elaboration scale. In this research, higher levels of elaboration were found to have a positive impact on a variety of related behavioral intentions. The insights from this study indicate that when trying to impact attitudes or change behaviors through interpretation, creating a strategy designed around the concept of elaboration can be highly effective. Specifically, creating strategies that raise interest, awareness, and cognitive engagement are likely to be useful. Additionally, the elaboration scale developed in this research can provide future opportunities to researchers that would further our understanding of how interpretation impacts behaviors.

References


IN SHORT
Can interpretive graphics influence visitor behavior in an exhibit space?

Allison M. Price, M.S.
Director of Learning Experiences
Lincoln Park Zoo
2001 N. Clark Street
Chicago, IL 60614
312-742-2056
aprice@lpzoo.org

Jessica C. Monahan, M.S.
Lincoln Park Zoo (formerly)
California Association of Museums (currently)

Rachel Bergren, M.S.
Lincoln Park Zoo (formerly)
The Marine Mammal Center (currently)

Keywords
signs, evaluation, visitor engagement, graphics, visitors, interactive

Abstract
Exhibit signage and graphics projects are most successful when they involve collaborative planning and formative evaluation throughout the process. Lincoln Park Zoo set out to combine interpretive best practices and visitor evaluation methods for the newly renovated eastern black rhinoceros yard in 2010. Evaluation methods included prototyping, visitor tracking, and informal interviews. After installation of the new graphics, visitor time spent looking at both the signs and the exhibit increased. Results were most significant among male visitors. The study indicates that hands-on non-personal media of this nature can have a significant effect on visitor behavior in an exhibit space. It also provides a model for making data-informed decisions regardless of limited budgets or resources.
Introduction

The purpose of interpretive elements at informal learning centers such as museums and zoos is to contribute to the overall visitor experience in a positive, enlightening, provocative, and meaningful way. As Beverly Serrell put it, “Good labels can attract, communicate, inspire, and help visitors get what they are seeking” (Serrell 1996). Interpretive graphics can be used to tell stories, contrast points of view, present interesting issues, or positively influence attitudes. Because they can sometimes be the only “educator” a guest encounters during their visit, it is important that exhibit signs be correct, compelling, respectful of both visitor and animal, and educational (Fogelberg 2014). They must also directly relate to the needs and desires of the learners in the space; signs that share what institutions want to tell rather than what guests want to know may fail to make any kind of meaningful connection between visitors and the exhibit in question (Screven, 1992). Beyond answering basic questions, Packer and Ballantyne note that signs that “reinforce visitors’ sense of wonder, awe, excitement,” and that encourage imagination, empathy, and reflection can enhance the long-term impact of visiting a zoo or aquarium (Packer & Ballantyne, 2010).

Of course, not all visitors read all signs. The content and form of labels and other interpretive graphics can influence visitors’ decisions to read and levels of comprehension; interactive interpretive signage can be more successful than simple flat panels at attracting visitors, holding their attention, and increasing learning (Bishop, Benusa, Screven, & Arndt 1993). Further, studies have shown that visitors will forgo reading a traditional, text-only opportunity if there is a competing opportunity to touch an object (Lindemann-Matthies & Kamer, 2006). However, interpretive professionals must not assume that visitors never read signs, as is so often casually stated. Although some research (and interpretation of said research) suggests that visitors do not spend much time reading labels, John Falk and Lynn Dierking contend that the research as a whole indicates that all visitors read at least some labels, emphasizing that location within the museum, stage in the visit when the label is encountered, and interest in the exhibit may all influence a visitor’s decision to read a particular sign (Falk & Dierking, 2013). Thus, given the potential value of interpretive signs in meeting an educational mission, it is critical that interpretive sites like zoos make their signs as compelling and relevant as possible, and strive to match the impact we often see from personal interpretation (Leftridge, 2006).

In 2010, Lincoln Park Zoo, a free, 49-acre zoo in the heart of Chicago, launched a new approach to exhibit signs, in terms of both the process and the content. The goal was to create compelling interpretive graphics that took visitors beyond species identification and empowered them to connect to the zoo’s “living exhibits” on an intellectual and emotional level. Past exhibit graphics were mostly uniform in appearance and content, and were designed by communications staff with input from curatorial staff. Having been through various signs and designs over the years, there was skepticism among some staff that exhibit signage could alter how visitors behaved in the exhibit space – i.e. how much time they spent in the space, how long visitors observed the animals, etc. The new process was initiated soon after the redesign of our eastern black rhinoceros (rhino) habitat into the Harris Family Foundation Black Rhinoceros Exhibit. As a result of strategic planning and organizational restructuring, new interpretive plans had been set in place that involved a greater level of institutional commitment and resources. Prior to the change in process and design, graphics in this space presented basic information
about rhinos (i.e. scientific name, habitat, natural history, and distribution), but did not provide zoo visitors with an opportunity to experience the story of the black rhino and its uncertain future. The signs provided no tactile or hands-on interpretive components and offered no compelling conservation story (Figure 1).

The rhino exhibit itself consists of three separate habitats spanning half an acre total. Habitats two and three are designed with a hydraulic gate separating them so that when opened the two habitats become one. The exhibit is located at the northern most end of the zoo, and is accessed via a path that borders the habitat fence. Additionally, one of the zoo’s six visitor entrances (and thus first impressions) is directly adjacent to the rhino exhibit. Visitors can approach the exhibit from the east or west, as well as from the south when exiting the Regenstein African Journey exhibit. The resident rhinos are housed separately to mimic their natural socialization patterns, with the exception of a mother-offspring pair, and are typically visible to visitors unless they choose to go indoors to their off-exhibit holding space. (Note, at the time of this study, Lincoln Park Zoo’s collection included three adult rhinos.)

The goal for redesigning both the process and the signage in this space was to provoke a change in visitor behavior, namely that visitors would engage more with the signs and the animals, and that their overall stay time at the exhibit would increase as a result. This would indicate not only that the updated signs were more effective than their predecessors (and thus could inform future exhibit sign decisions) but might also suggest that signs of this nature have the ability to connect visitors to animals in a new way.

Figure 1: Original graphic panels at the rhino exhibit included no hands-on elements and did not offer visitors any information on conservation status or research.
A New Approach to Content

The first step in the signage project was the development of a cross-departmental team, consisting of the vice president of education, the director and manager of guest engagement (interpretation), the vice president of animal care, the general curator, the zoological manager responsible for rhino care, the director of the Davee Center for Epidemiology and Endocrinology (who studies rhinos both in situ and ex situ, or in the wild and in zoo settings), the senior director of design and communications, and a staff writer. Together, this team created several possible key messages for the space. Six possible key messages emerged from early brainstorm meetings.

1. Rhinos are tough (physically) but populations are fragile (their status and future).
2. By visiting the zoo today, you can be a rhino ambassador. Share something you learned with a friend.
3. Support your zoo. They can help rhinos today by supporting field research.
4. Nonnative species can have a negative impact on wild populations when improperly introduced (in the case of rhinos it can mean competition for land and resources).
5. Responsible consumers make a positive impact on wild animals like rhinos.
6. Purchasing products that support sustainable/alternative forms of income in developing countries can reduce the demand for wildlife as a form of income.

These messages were shared with other zoo and aquarium professionals via the Association of Zoos and Aquariums (AZA) education listserv, where feedback and suggestions were encouraged. Individuals from nine organizations that exhibit rhinos replied, with overwhelming favorability towards message number one. Respondents also liked the ideas of supporting one’s local zoo and empowering guests to make change in their own lives that benefit rhinos.

The team also tested messages with an internal focus group of teen interns (high school sophomores through college freshmen) to determine if the messages resonated with them. Teen interns were part of a job training program where they were on zoo grounds during part of their internship. Therefore, their experience interacting with guests and being immersed in the zoo provided a unique testing audience. Eight teens worked in small groups to do some basic concept mapping about the questions they had about rhinos, as well as experiences they had with guests on zoo grounds prior to the draft message being shared. The teens expressed that the first questions asked by guests related specifically to the zoo’s rhinos and the care provided to them. According to the teens, guests expressed wanting to know how much the animals weighed and whether they were dangerous.

The possible key messages and the teen concept maps were compared to see what gaps existed. The message “rhinos are tough but populations are fragile” most resonated with the teens as demonstrating the fate of rhinos to be uncertain. The teens also suggested that they were unclear how members of the general public could help these animals. This revelation suggested the value of building an interactive to let zoo visitors know they could be a meaningful part of the solution.

As a final part of the prototyping and message testing, the team constructed a temporary rhino silhouette made of foam core and placed it near the exhibit to gauge
Figure 2: Schematic of new rhino signage, which highlights animal care techniques and tools.

Figure 3: Close-up of animal care messaging at the new rhino sign. Clockwise from top center: a bucket full of lotion, a nail file, a scrub brush, and vitamins are essential tools of the trade; a dinner plate graphic describes rhinoceros diets; rhinos enjoy mud and other features of their habitats; rhino horn shapes and sizes help keepers and researchers identify individual rhinos; a shovel handle simulates the weight of a rhino’s entire day of fecal waste; keepers and rhinos work together in daily training sessions to maintain the health and well-being of the animals. Photo courtesy of Rich Faron.
visitor interest. Visitors flocked to the prototype and asked questions about the size and care of the rhinos. These questions helped further refine the content that was utilized in the final version. We also used the foam prototype as a way to test whether it was a recognizable silhouette; would people know that it was a rhino and thus draw their attention to the exhibit? This could be significant, since previously many people walked by the habitat without ever stopping to notice the animals in the space.

After all this brainstorming and testing, the team landed on the content and physical look for the new signage. A life-size rhino silhouette was constructed that focused on the unique aspects of caring for rhinoceroses in a zoological setting. This also enabled the zoo to demonstrate its commitment to world-class care overall. Interactive components built into the design highlighted common questions, such as diet and nutrition (What do rhinos eat?), behavioral enrichment (What do rhinos like to do?), and health care (How do you trim a rhino’s toenails?) (Figures 2 and 3).

The team also felt confident incorporating conservation messaging into the signage, since that resonated with other zoo professionals as well as the teen focus group. Indeed, research also supports the idea that zoo visitors want to better understand conservation challenges affecting threatened species and what their local zoo is doing to help (Fraser, Bicknell, Sickler, & Taylor, 2009). Thus, in addition to the rhino silhouette, two complementary reading rails were designed and installed. The first reading rail shares the story of wildlife conservation with the message “Rhinoceroses are tough, but populations are fragile.” It highlights challenges and successes for wild rhino populations, focusing on personal relevancy and creating a sense of empathy (Figure 4).

The second reading rail presents the story of conservation science at Lincoln Park Zoo, specifically highlighting the zoo’s research interests in endocrinology and its contributions to understanding rhinoceroses in the wild and in zoological settings. This graphic introduces zoo visitors to Lincoln Park Zoo endocrinologist Dr. Rachel Santymire and her unique work...
studying rhino hormone levels through fecal samples, which supports better animal care at the zoo and more successful conservation efforts. This graphic also invites zoo visitors to take personal action for rhino conservation (Figure 5).

**Visitor Tracking**
The team felt confident that the messages and methods deployed in the new signage would resonate with zoo visitors, but it remained to be seen whether the new signs would impact how guests behaved in the exhibit space. To evaluate the design, holding power, and engagement level of the old and new graphics, visitor tracking was conducted during two four-week periods: one in August 2010 with the old graphics, and another in July 2011 after the new graphics were installed. A total of 104 subjects (58 pre- and 46 post-installation) were observed; every third party entering a predetermined area of the exhibit was observed without their knowledge and data was collected via handheld devices. The subject’s gender, approximate age, and group make-up (visiting alone, with adults, or with children) was noted, and evaluators timed four different variables of their behavior (Ross & Gillespie, 2009):

- Visit duration (how long visitors stayed in the rhino exhibit area)
- Graphics look duration (how long visitors looked at graphics)
- Exhibit look duration (how long visitors looked at rhinos or their habitat)
- Touch sign frequency (how many times visitors touched/physically interacted with signage)
Results

With the older graphics, the average stay time in the exhibit was roughly 237 seconds, or just under four minutes, with approximately one minute spent looking at the exhibit. Average time that study subjects spent looking at exhibit signs was just one percent of the total time spent in the designated area (Table 1), and fewer than 14 percent of the study subjects had physical contact with a graphic (i.e. touched).

After the new graphics were installed, average exhibit stay time was 228 seconds, or three and a half minutes, thus slightly lower than the pre-installation figures (Table 2). Visitors’ average sign engagement time increased from 2.40 seconds (1% of their total exhibit stay time) to 10.08 seconds (4.4% of their total exhibit stay time), an increase of more than 400 percent. Time spent looking at the exhibit increased from 53.38 seconds to 74.66 seconds (a 40 percent increase), and the number of visitors who touched our rhino graphics nearly doubled, from 8 with the earlier graphics to 15 after new sign installation.

Breaking the data down into demographic groups reveals some interesting trends beyond the averages. Within gender, males were most affected by the interpretive graphic changes, exhibiting a 600 percent increase in time spent looking at exhibit graphics. Interestingly, females viewed the new graphics for dramatically less time than
males, although visit and exhibit look durations were virtually equal to men. This may be due to social roles women played in these spaces, as they were anecdotally observed interacting with peers or accompanying children more than males did. It may also represent a difference in how men and women prefer to use exhibit spaces and graphics. However, evaluators did not take note of subjects’ activities outside of the scope of this study, so no solid conclusions can be drawn.

Informal Visitor Interviews
In addition to visitor follows, program staff also conducted 25 informal visitor interviews in February 2011. Interviews were short in duration and focused on what motivated guests to stop at the exhibit, as well as engagement levels with the signs. The aim of these interviews was to provide descriptive data regarding the guests’ subjective experience and the efficacy of the new rhino graphics, to complement the data from the visitor follows. Although the interviews took place outdoors in the cold Chicago winter climate, when rhinos are not allowed in the outdoor habitats, numerous members of the public nonetheless stopped to read and interact with the rhino signage, particularly the life-size silhouette. When asked, a majority of those guests who stopped indicated that they did so because of the hands-on elements of the signs. This suggests that signage, specifically interactive signage, might be attractive enough to guests to encourage them to spend time in a zoo exhibit, even when animals are not present. Additional studies are needed to properly assess this hypothesis, but it may be an important area of investigation for zoos that face different levels of animal visibility due to their climate or other factors.

Discussion
The study suggests that, at least at this site, well-designed signs do have the potential to change visitor behavior in an exhibit space, not just in relation to the signs themselves but also in relation to the animals on display. The opportunity for hands-on experiences is attractive to visitors, and, importantly, may cause them to stop at an exhibit even when animals aren’t present. However, dynamic signage may not impact all visitors equally. Multiple types of interpretation, including signs, demonstrations, videos, and chats, should be included to maximize a zoo’s potential impact on its visitors. Lincoln Park Zoo took this multimodal approach in 2016 with the design of its Walter Family Arctic Tundra, an exhibit showcasing polar bears. In that space, personal, digital, and static signage were all deployed, including a life-size interactive polar bear graphic, based on the indicated successes of the rhino signs. The zoo plans to evaluate the interpretation in that space in the near future to examine the interactive graphic relative to other interpretive elements. Follow-up studies examining conversations and interactions between visitors in both rhino and polar bear exhibits would provide further context to what, if any, social learning or emotional provocation is occurring as a result of this kind of signage.

Additionally, this study is an example of how institutions with limited budgets and resources can still make data-informed decisions. Evaluation of programs or interpretive elements need not be complex in order to provide important insights (Foster 2008). Yet practitioners in the informal learning and interpretive profession may often feel they lack the time, resources, or expertise to effectively evaluate their work (Kubarek and Trainer 2015). With even a simple methodology, however, practitioners can glean valuable insights that can help them be sure they are making wise investments in programs and collateral for the visitors that come through their doors.
Acknowledgments
Thank you to the Lester E. Fisher Center for the Study and Conservation of Apes, specifically Dr. Stephen Ross, for the use of data-tracking equipment to assist with data collection; Museum Explorer for help designing the interactive graphic elements; LPZ staff who helped with the project; and The Field Foundation of Illinois for its financial support of the project.

References


Learning in the HJ Andrews Forest: Experiences and Outcomes at a Science Education Event

Lauren Remenick
PhD Student, Higher Education and Policy Studies
College of Education and Human Performance
University of Central Florida
12494 University Boulevard
Orlando, FL 32816
lauren.maroon@ucf.edu
(407) 823-2939

Author Notes
This research was funded by the National Science Foundation, award #DEB-0823380. I gratefully acknowledge Dr. Michael P. Nelson, the PI for the study, Dr. Christine S. Clark, my major professor, Dr. Lissy Goralnik, for survey design support, and the LTER community for HJA background information and feedback on survey implementation.

Abstract
Understanding best practices in various interpretive settings and contexts may help event planners to implement successful educational programs in which participants are satisfied with their experience and learning outcomes. With this in mind, we sought to examine participants’ perceptions and outcomes of a science education event in Oregon’s HJ Andrews Experimental Forest, HJA Day. Data from 76 participants were quantitatively analyzed to understand how participants’ satisfaction with the field trip elements related to their perceived outcomes. Most participants were very satisfied with the field trip elements. Participants perceived overall satisfaction to be their greatest outcome, followed by overall appreciation, knowledge gain, and then change in thinking. All main outcomes positively and significantly correlated except for overall satisfaction and change in thinking. These findings may inform program planners of the experiences and outcomes that result from a field-based learning setting, thus allowing insight and preparation for similar programs in the future.
Keywords
interpretation, adult learning, science education, field-based education, non-formal learning, physical learning environment, HJA Day, HJ Andrews Forest

Introduction
For interpretive programs to meet the educational goals of adult learners, it is helpful for educators and event planners to understand what type of learning environment is conducive to participants’ needs (Storksdieck, Ellenbogen, & Heimlich, 2005) because it affects their learning outcomes (e.g. Chuan & Barnett, 2012; Clarke, 2005; Towler & Dipboye, 2001). To expand our understanding of how adult learner outcomes are shaped by different interpretive settings, we performed an exploratory case study of a field-based science education event, HJA Day.

HJA Day is held at the headquarters of the HJ Andrews (HJA) Experimental Forest in Blue River, Oregon. The HJ Andrews Forest is one of 28 sites that are part of the Long Term Ecological Research (LTER) Network created by the National Science Foundation (LTER Network Office, 2015). The LTER Network performs research and educational programs in the HJ Andrews Forest, which are showcased yearly at HJA Day.

Research Problem and Purpose
HJA Day is “an annual field gathering to share information about research, outreach, education, management, and arts and humanities at the Andrews Forest” (HJ Andrews Experimental Forest, 2015). As interpretation is a field that studies short-term educational interventions in the natural world, the literature offers useful insights into events like HJA Day. Our findings may fill in the gaps of current literature on the practices and outcomes of interpretation at this type of event and may provide relevant information on interpretation best practices for similar events.

HJA Day has no set learning objectives, so the four main research questions were exploratory in nature.

1) Who are the participants at HJA Day?
2) Were participants satisfied with the field trip elements: the structure and presenters?
3) What participant outcomes resulted from HJA Day?
4) How are participants’ satisfaction with the field trip elements and participants’ outcomes related?

Literature Review
In the context of any educational program, it is important to understand at least a little bit about participants in order to meet their needs and educational goals (Collins, Paisley, Sibthorp, & Gookin, 2012). Catering to the needs and goals of learners is important for any educational program, but is especially so for optional programs where participants have no incentive or requirement to return if they are unsatisfied with the experience or learning outcomes (Storksdieck, Ellenbogen, & Heimlich, 2005). Therefore it is important to understand best practices for interpretation in various settings and contexts if event planners want successful educational programs in which participants are satisfied with their experience and learning outcomes (Harris & Bell, 2013).

Before interpreters communicate with the learners, it is important to understand the
learners’ backgrounds (Falk, Storksdieck, & Dierking, 2007). Wang (2003) suggested that educators should be as knowledgeable about adult learners as they are about their teaching material. Knowing a bit about the learner allows educators to communicate more effectively, as most of the learning that takes place in adulthood is because of a need, motivation, or personal interest (Knowles, 1980). To solve a problem or satisfy an interest, many adults turn to non-formal learning settings (Falk, Storksdieck, & Dierking, 2007) such as science centers, nature centers, academic conferences, and other similar educational settings. These sites serve as a way to enhance the public’s understanding of science (Bell, Lewenstein, Shouse, & Fedler, 2009), as many people gather science information from a variety of places and contexts (Falk, Storksdieck, & Dierking, 2007; McClain & Zimmerman, 2014, 2017).

Participants’ perceptions of presenters’ verbal and nonverbal cues can impact multiple outcomes, including positive experience, satisfaction, and appreciation (e.g. Chesebro, 2003; Lin, Atkinson, Christopherson, Joseph, & Harrison, 2013; Madin & Fenton, 2004; Stern & Powell, 2013). A meta-analysis of interpretation research by Skibins, Powell, and Stern (2012) found that the top studied outcome of interpretive programs is knowledge gain. However, it is difficult to assess if the learner’s knowledge gain after a non-formal learning intervention can be directly attributed to that event. Rather, knowledge gain could result from the compilation of multiple learning activities, as the public’s understanding of science comes from a multitude of information sources that overlap and are built upon throughout one’s lifetime (Falk, Storksdieck, & Dierking, 2007). Therefore, in the non-formal setting, it may be more pertinent to examine perceived knowledge gain, or how much participants believe they learned from the event. In this study we examine participants’ goals, experiences, and perceived outcomes at HJA Day to determine how to craft a better learning experience in the future.

**Methods**

**Site Description**
The HJ Andrews Experimental Forest consists of 15,800 acres of old growth and dense forested land in Oregon’s Western Cascades Mountains. The forest serves as a site of major research contributions to the advancement of environmental science, management, policy, and education, and the HJA Program consists of a multifaceted, interdisciplinary group of researchers with more than 85 research projects underway in any given year. Educational programs exist for all ages including K–12, undergraduate, and graduate students, and continuing education for natural resource managers and the public (LTER Network Office, 2015). HJA Day showcased this work.

**Program Description**
HJA Day 2014 was open to anyone interested, up to about 130 participants. Participants departed from Oregon State University to the HJ Andrews Forest, two hours away, via vans provided for the day. Participants were formally welcomed and given refreshments upon arrival. In the morning participants attended four 20-minute sessions that introduced the research and education programs taking place in the forest:

- **Fun with Long-Term Measurements (Seriously!).** Large hanging posters about long-term ecological measurements were displayed in a small clearing in the woods. Two presenters described the long-term research on snowpack. Participants were asked to consider the information and what it might mean for the future; discussion was encouraged among the group.
Pollinators: Using Radio-frequency Identification Devices to Measure Pollinator Movement in the Andrews Forest Meadows. Participants gathered around a table of flowers and instruments in an open field, where two presenters explained their hummingbird research. One presenter held a line of string attached to a hummingbird trap about 15 feet away as a visual explanation of how the hummingbirds were caught and tagged in the study.

Sound, Smoke, and Swishing Rotors: New Ways of Detecting Climate Change in the Andrews Forest. In an open area surrounded by woods, two research presenters explained the use of large technical instruments in climate change research. Participants were given time to examine each instrument and question presenters.

Interdisciplinary Exhibit: Art, History, Writing, Cyberforest. This poster session was located inside forest headquarters. Posters displayed both research and artwork that took place in the forest. Participants were encouraged to walk around and read the posters; some artists and researchers were present to converse with as well.

At the end of the morning sessions, before lunch, participants chose one of four afternoon field trips that provided more in-depth information about the research and programs at the HJ Andrews Forest:

- Discovery Trail: The Forest as a Teacher. Participants took a short, level walk along the Discovery Trail through a patch of old-growth and plantation forest to learn how visitors of all ages engage and learn from the forest. An education coordinator and high school teacher led the group in discovery and experiential learning, and shared examples of how Oregon high school students engage with Andrews Forest research. A veteran Andrews Forest scientist shared how students, creative writers, and other citizens encounter the forest and gather progressively deeper insights. Participants were invited to share their own experiences, insights, and observations.

- Forest Detectives: Forest Scientists’ Tools and Methods to Evaluate Forest History and Productivity. Participants cored trees and examined soil and LIDAR data to characterize the disturbance, succession, and growth history of a forest, as well as its soil characteristics and its relation to productivity, structure, and phenology. New instruments were displayed that could be used to characterize forest structure, productivity, and phenology.

- Live Streaming Ecology (Without the Internet): Exploring Stream Ecology in Headwater Ecosystems at the Andrews Forest. Andrews Forest scientists and graduate students shared some of the methods used to quantify ecological processes in stream ecosystems and asked participants questions about how characteristics of the riparian forest can influence streams. Activities included brief examples of sampling methods to assessing metrics in headwater streams, such as invertebrate communities, stream light, stream nutrient demand, fish and salamander abundance, and primary production.

- Ecological Forestry: A New Paradigm. On this field trip, participants gained firsthand experience with different forest management practices and talked with leading foresters and scientists about the pros and cons of ecological forestry. Participants and presenters discussed their values and ethics about managing Oregon’s important forest resources.
Three of the four field trips used a bus to go deeper into the woods than the morning sessions allowed, but the Discovery Trail: The Forest as a Teacher group remained near the main headquarters. Presenters included researchers, educators, managers, and artists whose work and programs took place in the forest. While their information was geared towards “middle-knowledge” scientists, presenters’ styles varied at each site to include hands-on activities, large group discussion, small group discussion, presentations, and group work. After the field trip, the groups returned to the headquarters for refreshments, snacks, and networking before departing in vans.

Data Collection
For this study, part of a larger research project (Remenick, 2015), we used quantitative analysis of a survey to understand the experiences and outcomes of participants at HJA Day. Pre- and post-HJA Day surveys were used: the pre-HJA Day survey consisted of 13 questions, which informed us about participants; the post-HJA Day survey consisted of 18 questions, which asked participants about their satisfaction with the field trip structure and presenters, and their perceived outcomes.

Outcomes examined in the study were overall satisfaction, overall appreciation, knowledge gain, and change in thinking, while the field trip elements of interest were satisfaction with the field trip structure and satisfaction with the field trip presenter. Questions about satisfaction with the field trip elements came from a combination of five-point Likert-type survey questions from studies by Needham (2010) and Stern and Powell (2013).

All participants were asked to complete the surveys after registering online, reminded via email one week before the event, invited to participate on the drive to and from the HJ Andrews Forest, then emailed again one week after the event. Of the 136 people who attended the event, 76 pre- and 76 post-surveys were gathered for a response rate of 56% for each survey. Not all participants took both surveys.

Data Analysis
Data was analyzed using the Statistical Package for Social Sciences (SPSS) version 20. Face validity and a reliability analysis were used to ensure internal consistency before computing the five variables of interest. The reliability analysis determined the variables were sufficient based on a .65 cut-off (Cronbach’s Alphas=field trip structure 0.86; field trip presenter .93; overall appreciation .88; knowledge gain .66; and change in thinking .87).

We wanted to determine whether we had primed respondents to think differently about the post-survey by giving them a pre-survey before the start of the event (Parkin, 2008). A Mann-Whitney U test showed that no major variables statistically differed between participants who filled out both the pre- and post-survey (n=33) and those who only filled out the post-survey (n=43). A Mann-Whitney U test was also used to check for differences in the pre-survey between those participants who had previously attended HJA Day (n=28) and those who had not (n=46). Only age (U=948.00, p=.001, r=.37, standardized test statistic=3.39) varied between the groups. New participants (M=36, SD=15.30) were statistically younger than returners (M=48, SD=13.95).

The research questions for this study were correlational in nature, so we used a spearman rho correlation analysis to determine the relationships between the field trip elements and outcomes. Because of the small population size and sample number, we used non-probabilistic sampling in this study, and therefore make no attempt to generalize the findings beyond the scope of the participants in this study.
Results

Results from this study are organized into four sections to follow the four research questions.

Who are HJA Day participants?
We found that many of the participants are closely linked to the scientific field. Participants are researchers (34%), Oregon State University faculty or staff (30%), forestry personnel (23%), HJ Andrews field crew (20%), LTER personnel (18%), and students (18% undergraduate; 12% graduate). Participant ages ranged from 19 to 81 years old, with an average age of 41; 57% were female and 43% were male.

Participants attended HJA for a variety of reasons: to learn about or stay up to date on the research and education programs performed at the HJ Andrews Forest (85%); to network with other participants or researchers (70%); to spend time in the forest or to enjoy a day in nature (66%); and to receive free lunch and snacks (27%).

While the majority of participants had never previously attended HJA Day (64%), 26% had been up to 10 times, and 9% of participants had previously participated in 11 or more HJA Day events, constituting a substantial portion of participants who are regular attendees. Of those who were new to HJA Day, 60% indicated that they had previously visited the forest, mostly to perform research in the forest (57%), visit the forest (36%), or participate in another program (34%). This gathering of information about participants’ backgrounds, preferences, and personal choices allowed us to give context to their experiences and outcomes.

Were participants satisfied with the field trip elements: the structure and presenters?
For research question two, we sought to examine how satisfied participants were with the field trip elements, field trip structure and field trip presenter.

Satisfaction with field trip structure
We asked participants about their satisfaction with aspects of the field trip structure. The ability to see was the most highly rated aspect of the field trip structure, with 95% of participants being satisfied or very satisfied. The number of participants in the field trip group was the lowest rated item, with 77% of participants being satisfied or very satisfied.

Satisfaction with field trip presenter
We also asked participants about their satisfaction with specific aspects of the field trip presenter. Participants were most satisfied with the professionalism of the speaker (95% satisfied or very satisfied), and least satisfied with the visuals and graphics that the speaker used (73%) and the speaker’s ability to explain complex issues (73%).

What participant outcomes resulted from HJA Day?
For the third research question, we sought to determine what participant outcomes resulted from HJA Day. Outcomes examined included overall satisfaction, overall appreciation, perceived knowledge gain, and change in thinking.

Overall satisfaction
Overall, participants were very satisfied with their experience at HJA day, with 93% indicating that they were satisfied or very satisfied.
Overall appreciation
Participants answered seven questions about their appreciation of the event, and agreed most with the statement, “As a result of participating in HJA Day, I gained an appreciation of the HJ Andrews Forest” (96% agreed or strongly agreed). They agreed least with the statement, “As a result of participating in HJA Day, I gained an appreciation of nature” (80% agreed or strongly agreed). In general, participants felt that HJA Day increased their overall appreciation ($M=4.27, SD=.63$).

Perceived knowledge gain
Three questions were used to gauge participants’ perceived knowledge gain. Participants most agreed with the statement, “I learned something new at HJA Day,” (95% agreed or strongly agreed) and least with the statement, “HJA Day increased my knowledge of specific scientific topics” (68% indicated a great deal or a moderate amount). Examination of the three variables that compose knowledge gain suggests that participants believe they learned at HJA Day ($M=4.22, SD=.69$).

Change in thinking
Eight questions were used to assess participants’ change in thinking. Participants agreed most with the statement, “HJA Day changed the way I think about my field trip topic,” (61% agreed or strongly agreed) and least with the statement, “HJA Day changed the way I think about my behavior” (15% agreed or strongly agreed). Participants generally agreed that their thinking changed at HJA Day ($M=3.36, SD=.59$).

How are participants’ satisfaction with the field trip elements and participants’ outcomes related?
Once we gained an understanding of the participants, their experiences with the field trip, and their outcomes, we sought to understand how the field trip elements and participant outcomes related to one another. Figure 1 displays a comparison of average responses between the field trip elements and participant outcomes. Most participants were very satisfied with the field trip elements, field trip structure ($M=4.32$) and field trip

![Figure 1: Means of participants’ perceived outcomes and satisfaction with field trip elements](image-url)
presenter \((M=4.23)\). Participants indicated that the outcome they achieved the most was overall satisfaction \((M=4.44)\), followed by overall appreciation \((M=4.27)\), knowledge gain \((M=4.13)\), and then change in thinking \((M=3.36)\).

In addition to comparing means between the field trip elements and participant outcomes, we also examined the relationship using a spearman rho correlation. The two field trip elements positively and significantly correlated with all outcomes. Field trip structure had a large (Cohen, 1998) relationship with field trip presenter \((r=.711, p<.001)\), overall appreciation \((r=.529, p<.001)\) and overall satisfaction \((r=.448, p<.001)\), and a small (Cohen, 1998) relationship with knowledge gain \((r=.275, p<.05)\) and change in thinking \((r=.280, p<.05)\). The field trip presenter had a large relationship with overall appreciation \((r=.507, p<.001)\) and overall satisfaction \((r=.513, p<.01)\), but a medium (Cohen, 1998) relationship with knowledge gain \((r=.400, p<.01)\), and a small relationship with change in thinking \((r=.250, p<.05)\). Other than change in thinking and overall satisfaction \((r=.213, p=.10)\) in which no relationship occurred, all main outcomes positively and significantly correlated with a large relationship.

**Discussion**

From this study we discovered who participants are, what participants experienced, and what resulted from those experiences. HJA Day participants attended primarily to learn about the research and programs going on in the HJ Andrews Forest, to network with other participants and presenters, and to spend a day in nature. Using this information, we might alter the day to help participants meet these goals by presenting topics that are of specific interest; we could use techniques that stimulate discussion and interaction for enhanced networking; and we could craft more alone time in the forest to allow participants to really connect with the forest.

Most participants have a connection to the HJ Andrews, and could relate their work to the information being presented at HJA Day. Some participants are already part of a tight-knit community that attend monthly LTER meetings hosted by Oregon State University, and others have been attending HJA Days for more than 10 years. This follows the literature that says visitors of interpretive sites typically value lifelong learning and consider learning a hobby (Falk & Heimlich, 2009).

Of all our questions about the field trip structure, participants were most satisfied with the ability to see and least satisfied with the number of participants. The number of participants in any one field trip is something that we can, and possibly should adjust. Although field trip size was a drawback, participants were still satisfied with their ability to see the presenter and educational materials, and generally very satisfied with the field trip structure as a whole. Knowing that the physical learning environment can impact adults’ motivation, learning, and cognitive function (e.g. Choi & Van Merriënboer, 2014; Evans & Stecker, 2004; Hiroto, 1974), adjustments to the field trip structure may enhance participants’ learning and enjoyment.

Research tells us that presenters contribute to learner satisfaction by exhibiting organization, connection, consistency, clarity and credibility (Finn et al., 2009; Stern & Powell, 2013). HJA Day participants were most satisfied with their professionalism and enthusiasm, and found the presentations interesting. They were least satisfied with the visuals or graphic used, presenters’ ability to explain complex issues, and the amount of time allocated to discussion and/or questions. Knowing that some participants are attending to inform their work, the information they receive could be very important to
their careers. Since we know that many of our participants return to HJA Day for multiple years, assessing their specific needs (such as clearer explanations and visuals and more time for questions) enables future presenters to address the needed information.

As the outcomes of this study were partially formed from Stern and Powell’s (2013) study, we can easily compare results. This study found that satisfaction was the most cited outcome, followed by appreciation, knowledge gain, and then change in thinking (Figure 1). Stern and Powell (2013) had similar results, with satisfaction being the greatest indicated outcome, followed by appreciation and then a change in behavior (as did Powell & Ham, 2008). One explanation for the similarity in our findings could be that appreciation and satisfaction are the easiest to produce, while knowledge gain builds on prior knowledge, and change in thinking or change in behavior take more energy and effort. Future studies might test this hypothesis to explore the pattern in our findings.

Participants’ appreciation was strongly related to all outcomes and field trip elements. Researchers have found that interpretive practices can influence appreciative attitudes toward nature (e.g. Fishbein & Ajzen, 2010; Petty & Cacioppo, 1986), which we may have seen here. Others have found that while appreciation of nature is related to environmental protection, changing one’s attitude toward nature and environmental protection is difficult to achieve with adults (Kaiser, Brügger, Hartig, Bogner, & Gutscher, 2014). We found similar results, such that appreciation was an often-identified outcome, but a change in thinking was less so. As such, future studies may examine appreciation as a potential contributing factor to meaningful field-based adult learning.

Finally, we found that perceived knowledge gain was minimally related to satisfaction with the field trip structure but moderately related to satisfaction with the field trip presenter, reinforcing the idea that people and relationships impact learning (Lizzio, Wilson, & Simmons, 2002; Pianta, Hamre, & Allen, 2012). Perceived knowledge gain was also strongly related to appreciation, change in thinking, and satisfaction, suggesting that when we meet participants’ goals, in this case, they respond positively.

Conclusion
Organizers and educators will be better able to meet participants’ educational goals if they assess participants’ interests, needs, and goals and then modify programs accordingly (Harris & Bell, 2013). This study is one attempt to assess participants’ learning preferences and outcomes at a field-based science education event in order to enhance and improve interpretive programs.

First we found that HJA Day participants were similar to visitors of non-formal learning centers in that they are lifelong learners, either through their career or personal interest. As such, HJA Day serves as a way to disseminate knowledge to the broader community. We also found that participants were generally satisfied with the field trip elements, and indicated that they achieved multiple outcomes, with overall satisfaction being the greatest and change in thinking being the least. Finally, we found that participants’ satisfaction with the field trip structure and presenter related to their outcomes, with the field trip structure relating most to overall appreciation and the field trip presenter relating most to overall satisfaction. All of these findings can help us adjust future HJA Days to create an interpretive event that meets participants’ needs and goals in order for them to achieve positive outcomes.

This study gives education program developers and interpreters insight into the program elements that contribute to positive learner outcomes. As adult learners
are primarily internally driven to attend educational programs (Falk, Storksdieck, & Dierking, 2007; Knowles, 1980), meeting the needs of attendees is likely to contribute to the success of these events and continued registration of participants each year. Therefore, event planners might find it helpful to consider our findings as they plan and implement adult education programs.

References


APPENDIX
Appendix: Manuscript Submission

Instructions to Authors

Purpose
The purposes of the *Journal of Interpretation Research* are to communicate original empirical research dealing with heritage interpretation and to provide a forum for scholarly discourse about issues facing the profession of interpretation. The *Journal* strives to link research with practice. The *Journal of Interpretation Research* is published by the National Association for Interpretation, the preeminent professional association representing the heritage interpretation profession.

General Information
The primary function of the *Journal* is to disseminate original empirical research regarding interpretation. However, the *Journal of Interpretation Research* takes a broad view of the field of interpretation and publishes manuscripts from a wide-range of academic disciplines. The primary criteria for deeming a manuscript appropriate for the *Journal* are whether it adds to the current state-of-knowledge for practitioners, researchers, academics, or administrators who work in the field of interpretation.

In recognition of how diverse the relevant literature is, the *Journal* will also publish reviews of recent books, government publications, original literature reviews, and bibliographies dealing with interpretation. Abstracts from dissertations, private consultant materials, and reports from public agencies will be published in the *Journal* in a section called “In Short: Reports and Reviews.” This section will also provide an outlet for summaries of research studies with limited scope. Interpretation research often consists of small “in-house” program evaluations and basic visitor studies. The purpose of this section is to communicate current research activities, allow readers to identify colleagues with similar interests, and provide practitioners and administrators with useful information and direction for conducting their own mini-research projects. Submissions for the “In Short: Reports and Reviews” section should be limited to 1,000 to 1,200 words and will be reviewed by the editor and two associate editors.

Additionally, the *Journal* will publish thought pieces that exhibit excellence and offer original or relevant philosophical discourse on the state of heritage interpretation. The “In My Opinion” section of the *Journal* encourages the development of the profession and the practice of interpretation by fostering
discussion and debate. Submissions for the “In My Opinion” section should be limited to 600 to 800 words and will be reviewed by the editor and two associate editors.

Research Manuscript Submission Guidelines
All research manuscripts will be reviewed anonymously by an associate editor and by at least two other reviewers. Based on the nature of the manuscript, special efforts will be made to identify well-qualified associate editors and reviewers to evaluate the manuscripts. From the recommendations of the associate editor, the editor will make the final decision of the manuscript’s disposition and communicate this information to the author.

Manuscripts
Manuscripts will be accepted with the understanding that their content is unpublished and not being submitted elsewhere for publication.

• All parts of the manuscript, including title page, abstract, tables, and legends, should be typed in 12-point font, and double-spaced on one side of 8.5” x 11” or A4 white paper.
• Margins should be 1” on all sides.
• Manuscript pages should be numbered consecutively in the top right corner.
• All papers must be submitted in English. Translations of papers previously published in other languages will be considered for publication, but the author must supply this information when the manuscript is submitted.
• Maximum length of manuscripts shall be 30 double-spaced pages (including all text, figures, tables, and citations). The editor will consider longer manuscripts on an individual basis.

Titles
Must be as brief as possible (six to 12 words). Authors should also supply a shortened version of the title, suitable for the running head, not exceeding 50 character spaces.

Affiliation
On the title page include full names of authors, academic, and/or other professional affiliations, and the complete mailing address of the author to whom proofs and correspondence should be sent. An email address and phone and fax numbers should also be included. As all manuscripts will be reviewed anonymously; the name(s) of the author(s) should only appear on the title page.

Abstract
Each paper should be summarized in an abstract of no more than 150 words. The abstract will preface the paper and should be a comprehensive summary of the paper’s content, including the purpose or problem, methods, findings, and implications or applications. It should enable the reader to determine exactly what the paper is about and make an informed decision about whether to read the entire paper. Abbreviations and references to the text should be avoided. All abstracts shall be listed on the Journal of Interpretation Research Web site (www.interpnet.com/JIR).
Keywords
Authors must supply five to 10 key words or phrases that identify the most important subjects covered by the paper.

References and Citations
Include only references to books, articles, and bulletins actually cited in the text. All references must follow the Publication Manual of the American Psychological Association (APA), version 6.2. References in the text should cite the author’s last name, year of publication, and page (if appropriate). All references used in the text should appear at the end of the typed script in alphabetical order using APA version 6.2 style.

Examples of references:


Figures
All figures must be discussed in the text and numbered in order of mention. Each figure must be submitted as a print-ready digital file. Label each figure with article title, author’s name, and figure number by attaching a separate sheet of white paper to the back of each figure. Each figure should be provided with a brief, descriptive legend. All legends should be typed on a separate page at the end of the manuscript.

Tables
All tables must be discussed in the text and numbered in order of mention. Each table should have a brief descriptive title. Do not include explanatory material in the title: use footnotes keyed to the table with superscript lowercase letters. Place all footnotes to a table at the end of the table. Define all data in the column heads. Every table should be fully understandable without reference to the text. Type all tables on separate sheets; do not include them within the text.

Permissions
If any figure, table, or more than a few lines of text from a previously published work are included in a manuscript, the author must obtain written permission for publication from the copyright holder and forward a copy to the editor with the manuscript.

Copyright
Under U.S. copyright law, the transfer of copyright from the author to the publisher (National Association for Interpretation, DBA Journal of Interpretation Research) must be explicitly stated to enable the publisher to ensure maximum dissemination of the author’s work. A completed copyright form sent to you with the acknowledgment must be returned to the publisher before any manuscript can be assigned an issue for publication.
Proofs
All proofs must be corrected and returned to the publisher within 48 hours of receipt. If the manuscript is not returned within the allotted time, the editor will proofread the article, and it will be printed per his/her instruction. Only correction of typographical errors is permitted. The author will be charged for additional alterations to text at the proof stage.

Submission
Please submit a digital (Microsoft Word) of your manuscript to Carolyn J. Ward at the address below. Authors whose manuscripts are accepted for publication must submit final manuscripts electronically or on computer disk.

Contact
If you have comments or questions regarding the Journal of Interpretation Research, please contact the editor:

Carolyn J. Ward, Ph. D.
CEO, Blue Ridge Parkway Foundation
322 Gashes Creek Road
Asheville NC 28803

cward@brpfoundation.org
828-776-4547

Subscriptions
If you have questions regarding subscription rates or delivery services, please contact the National Association for Interpretation toll-free at 888-900-8283, online at www.interpnet.com, or by mail at P.O. Box 2246, Fort Collins, CO 80522.