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A Note from the Editor

This issue of *JIR* includes three research articles, two “In Short” reviews and reports, and one “In My Opinion” article. Two of the articles review and discuss the impacts of training and certifications, three tackle issues surrounding non-personal interpretation techniques and topics, and one offers an opinion regarding the disconnect between academics, interpreters, and historical interpretation.

As you read through the *Journal*, traveling from immersion exhibits to the halls of academia, remember that our discipline is as varied and diverse as our locations, mediums and messages, but what unites us as a field is our desire to make a measurable difference. The articles in this issue provide information, guidance and insight into how to capture that ‘measurable’ difference and how to begin to communicate that to each other, managers and practitioners of the science of interpretation.

Through research, we can ensure that we are doing the best job we can to serve the mission.

In this divisive climate, bringing people together through interpretation to discover and experience the natural and cultural resources of our parks and public lands can have a tremendous impact for our places, our purposes and our people. Remember to ask tough questions, imagine the impossible, and think beyond that which is now.

I look forward to the future developments of our field through your quality submissions to *JIR*.

—C
RESEARCH
An Investigation into the Impact of Environmental Education Certification on Perceptions of Personal Teaching Efficacy

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Abstract
The purpose of this study is to examine how participation in the North Carolina Environmental Educator (NCEE) program influences the individual’s perceived self-efficacy. Specifically, this study examines the impact of NCEE certification on participants’ perceived personal teaching self-efficacy. This study compared personal teaching efficacy scores of certified environmental educators, non-certified environmental educators, and licensed schoolteachers. The study found significant differences in teaching efficacy between certified and non-certified environmental educators, as well as certified environmental educators and licensed school teachers. In addition, the study found no significant difference in efficacy scores between NCEE certified licensed school teachers and NCEE certified environmental educators.

Results of this study indicate a link between environmental education certification and higher personal teaching efficacy.

Keywords
certification, teaching self-efficacy, formal and non-formal educators
Introduction
For over a century, environmental education (EE) programs have contributed to society’s understanding of the relationship between the environment and human health and welfare. In the past 50 years, the creation of the U.S. Environmental Protection Agency, followed by numerous actions at the federal and state level, has resulted in formal and non-formal programs that promote EE as a means of improving upon current conditions.

In the United States, each state varies in its approach and methods of training for environmental educators; to achieve competency for certification, all programs are rigorous and comprehensive (Glenn, 2004). North Carolina began offering EE certification in 1997, a process that has evolved into a formalized training program facilitated through the Department of Environmental Quality. More recently, the North American Association for Environmental Education (NAAEE) has begun accreditation of state EE certifying programs. Fourteen states currently offer environmental education certification, though only three are NAAEE accredited. While much qualitative feedback and internal program analyses indicate success in achieving the goals of formalized environmental educator preparation (NAAEE, 2016), little research has been conducted on the certification training.

In North Carolina, interested individuals can attend a number of workshops or programs whether seeking certification or not. The North Carolina Environmental Educator (NCEE) certification program requires the fulfillment of particular criteria and includes standards for professional excellence for formal and non-formal educators. The purpose of this study is to examine how participation in the NCEE program influences the individual’s perceived self-efficacy. Specifically, this study examines the impact of NCEE certification on participant’s perceived personal teaching self-efficacy.

Description of NCEE Program
To become a certified NC environmental educator, participants complete 200 hours of training that have been organized across five criteria (Table 1). Seventy of the required hours fall under “Criteria I: Workshops and Seminars.” Within this criterion, two seminars are required for all participants: “Basics of Environmental Education” and “Methods of Teaching Environmental Education.” Both courses total 20 hours and provide the environmental educator with pedagogical approaches and background for teaching environmental education. The remaining 50 hours include workshops selected by the participant that focus on national and/or state curriculum. Project Wild, Project Learning Tree, Flying Wild, CATCH, the Leopold Education Project, and Sea Turtle Exploration are a few examples. These seminars are offered by a variety of state parks, the NC Wildlife Resources Commission, and environmental education centers.

Criteria II require that the participant engage in 50 hours of “Outdoor Instructor-led Experiences.” The State certifying agency recommends university or college courses “such as ecology, forestry, etc., which include an outdoor lab, instructional workshops or field trips held in an outdoor environment, or organized nature hikes led by environmental education professionals at parks, forests, zoos, aquariums and other Environmental Education Centers” (North Carolina Office of Environmental Education and Public Affairs, 2016).

Criteria III, IV, and V total 80 hours, 30 of which include visits to state EE resources and facilities (with a minimum of 10 different sites); 30 dedicated to environmental education teaching (with a minimum of 10 hours conducted outdoors) and the remaining 20 hours centered on a “Community Partnership Project”. To meet this final
criterion, participants must “lead a partnership that will have a positive and lasting effect on the community and that will increase environmental awareness and understanding” (http://www.eenorthcarolina.org/certification--about-the-program.html).

### Literature Review

**Self-efficacy**

Self-efficacy stems from social cognitive theory, a theory that describes human behavior in terms of the aptitude to interpret one’s environment and reflect upon, evaluate, and influence one’s self. In this manner, humans are in fact agents of the path one’s life takes. While talent, skill, and physical and psychological environment influence direction, achievement, and health, it is the individual’s belief regarding his or her effectiveness that mediates the influence of the aforementioned factors (Bandura, 1977). This belief is referred to as perceived self-efficacy. Using self-efficacy as a general outcome measure of the effectiveness of a program or intervention (such as the concept of self-esteem has been used) is not appropriate. However, self-efficacy measures can be predictive of behavior when targeted and specific, such as personal teaching efficacy in regard to teaching environmental education content.

### Table 1. NCEE Requirements

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Examples of Experiences</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Workshops and Seminars</td>
<td>Basics of EE; Methods of Teaching Workshop</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>Various Workshops Selected By the Participant</td>
<td>50</td>
</tr>
<tr>
<td>II: Outdoor Instructor-led Experiences</td>
<td></td>
<td>50</td>
</tr>
<tr>
<td>III: Visits</td>
<td>Visits to state EE resources and facilities (min of 10 sites)</td>
<td>30</td>
</tr>
<tr>
<td>IV: Teaching</td>
<td>EE Teaching (10 hours must be outdoors)</td>
<td>30</td>
</tr>
<tr>
<td>V: Community Partnership Project</td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>

Criteria 1 = 70 hours, Criteria 2 = 50 hours, Criteria 3 = 30 hours, Criteria 4 = 30 hours, Criteria 5 = 20 hours
Perceptions of self-efficacy originate from the interaction of four sources of information (Bandura, 1997):

1. Mastery experiences (performance accomplishments) that indicate to an individual how capable he or she is;
2. Vicarious experiences (observing others) through which an individual can learn, or through social comparison, draw conclusions regarding his or her capability;
3. Verbal persuasion that serves to influence an individual regarding his or her capabilities, and
4. Physiological and affective states (such as physical manifestations of nervousness) that individuals regard as indications of capability.

By addressing and assessing such sources of efficacy information, one can provide experiences that are more likely to change an individual’s efficacy perceptions.

Self-efficacy is not to be confused with “overall” sense of self. Self-efficacy is the perception of one’s ability to perform a specific behavior (Bandura, 1997). Research conducted on individuals who participate in a wide variety of activities shows that, controlling for ability, self-efficacy regarding a specific task remains a significant contributor to performance (Cervone, 1989; Bandura, Reese, & Adams, 1982; Bandura, 1997; Finney & Schraw, 2003; Oliver & Cronan, 2002; Wise, 2002). While there is some evidence of the causal nature of perceived efficacy, it does not necessarily cause success, but rather mediates willingness to learn, enact, and maintain a behavior (Bandura, 1997).

Teacher self-efficacy
As non-formal educators, participants in environmental education programs develop self-efficacy over time and through ongoing interactions with their participants. Teacher self-efficacy has been defined many ways in the literature. Berman et al. (1977) define teaching efficacy as “the extent to which the teacher believes he or she has the capacity to affect student performance” (p. 137). Woolfolk and Hoy (1990) describe it as the teacher’s belief that he or she can influence student learning. Guskey and Passaro (1994) explain how teaching efficacy includes the “teachers’ belief or conviction that they can influence how well students learn, even those who may be difficult or unmotivated” (p. 4). The slight variation in these definitions often contradict each other and can ultimately lead to confusion within the field about how to accurately measure the construct (Pajares, 1997; Tschanzen-Moran & Woolfolk Hoy, 2001). Regardless, one’s sense of efficacy regarding his or her ability to teach has been related to student outcomes (Ross, 1992; Midgley, Feldlaufer, & Eccles, 1989; Goddard, Hoy, & Hoy, 2000; Tschanzen-Moran & Hoy, 2001; Leithwood & Jantzi, 2008). Therefore, the individual with a higher perceived self-efficacy regarding his teaching ability is more likely to have higher achieving and more motivated students (Bandura, 1997).

Teacher self-efficacy measures. Bandura’s Social Cognitive Theory (1977) consists of two main constructs: efficacy expectations and outcome expectations. Efficacy expectations are an individual’s convictions for orchestrating the necessary actions to complete a task. Outcome expectations are defined as an individual’s expectations for performing a task that will lead to a certain outcome. Gibson and Dembo (1984) elaborated upon Bandura’s idea of outcome expectations and efficacy expectations and attempted to measure the two
constructs using general teaching efficacy (GTE) (representing outcome expectations) and personal teaching efficacy (PTE) (representing efficacy expectations) (Tschannen-Moran & Woolfolk Hoy, 2001; Woolfolk & Hoy, 1990). GTE and PTE are the two constructs measured in the Teacher Efficacy Scale (TES) (Gibson & Dembo, 1984). Other researchers used the Gibson and Dembo’s TES as a springboard to measure self-efficacy within specific contexts by rewording the TES items to be content-specific.

The Science Teaching Efficacy Belief Instrument (STEBI) constructed by Riggs and Enochs (1990) is one such measure. For the STEBI, PTE was left as is while GTE became Science Teaching Outcome Expectancy (STOE). Enochs and Riggs (1990) published two versions of the STEBI, version A (Riggs & Enochs, 1990) and version B (Enochs & Riggs, 1990). Version A was written for in-service elementary teachers while version B was written for pre-service elementary teachers. In this study, we use the STEBI-B for two reasons: like pre-service teaching candidates, the majority of individuals participating in the EE certification program have limited to no formal teaching training. Second, the comparative group includes elementary pre-service teachers who have participated in at least one EE workshop. Both groups are engaged in a component of the EE certification process, but have limited formal teaching experiences.

**Efficacy and Environmental Educators**
The majority of participants enrolling in the NCEE certification program are either formal or non-formal educators. To distinguish between the two, formal educators are typically K–12 classroom teachers, including both pre-service and in-service practitioners. Non-formal educators include but are not limited to rangers, environmental educators, docents, and park volunteers. In North Carolina, there are cases in which EE certification must be obtained for a state position (e.g., park ranger) and there are cases in which EE certification is not recognized as a licensure area (e.g., school teacher). Therefore, if not mandated, the majority of participants who seek certification do so out of interest or for professional development purposes.

A number of efficacy studies have been conducted on formal educators’ science teaching and learning as situated within or through an environmental education program. Carrier (2009) examined a group of pre-service candidates (PCs) teaching elementary-age children environmental science lessons (in the outdoors) as part of her science methods course. EE lessons were taught at a forest ecology preserve with school groups using Project WILD lessons. The researcher noted an increased comfort in PCs’ teaching, suggesting the field experience as important to efficacy development. Mosely, Reinke, and Bookout (2002) evaluated how PCs participation in a three-day outdoor environmental education program influenced attitudes toward self-efficacy. Unlike Carrier’s outcomes, Mosely et al. reported little change from the experience, indicating a significant drop in efficacy over time. There was no significant change in outcome expectancy as a result of participation in the program. In another study, researchers measured the efficacy beliefs of biology teachers in environmental education using Sia’s (1992) “Environmental Education Self-Efficacy Belief Scale” (Cimen, Gökmen, Altunsoy, Ekici, & Yilmaz, 2011). They investigated differences in gender, years of training, and professional membership related to efficacy beliefs. While no significant difference between gender, teachers who were involved in professional organizations had significantly higher efficacy than those who were not involved. Additionally, years of training were correlated with higher efficacy scores.
There are few studies related to EE efficacy beliefs of non-formal educators. However, in a 2008 study investigating the effects of EE training with non-formal educators, researchers found significant differences after an EE training between pre- and post-test specific EE content efficacy, motivation efficacy, and a combination of the two, termed total teaching efficacy, of whitewater raft guides. All three comparisons were found to be significant (p < .005), indicating an increase in self-efficacy as a result of the seminar training. The researchers found that age, gender, position, or length of time in the field were not significant predictors of total teaching efficacy or motivation efficacy (Harrison & Banks, 2008). In a follow-up study, the experiences of raft clients who were in the boat of a guide who had participated in the previously mentioned EE training was compared to those whose guide had not participated in the EE training. The study found that overall scores were statistically significantly higher (p < .005) for both interest and knowledge regarding the river environment for all clients following their river rafting experience. Post scores for clients whose guide attended the EE training were statistically significantly higher (p < .005) for both interest and knowledge over the clients whose guide did not attend (Author, 2010).

The NCEE certification is structured in many ways to address the sources of information from which an individual draws to make efficacy judgments. For example, the certification requirements for practice teaching and community partnership (mastery experience), observing peers and professionals teaching (vicarious experience), and in many cases, receiving verbal feedback from facilitators as well as peers (verbal persuasion) contribute to a process which is gradual and builds on successes, creating opportunity for the mastery experience. In order to better understand the influence of certification on perceived self-efficacy with regard to EE facilitation, the following research questions were investigated:

1. Is there a difference in self-efficacy perceptions between those who had completed certification and those who were earning certification at the time of the survey?
2. Is there a difference in PTE between EEs and licensed classroom teachers?
3. Does certification along with career predict PTE?

Methods
This study utilized survey research methodology. The survey had 48 items and was organized into four sections. Respondents completed the survey online using Survey Monkey™. The survey was available for 30 days. Two validated instruments were included in the survey along with a section concerning demographics and a section concerning challenges and beliefs regarding EE. The two validated instruments were the STEBI-B (Science Teaching Efficacy Belief Instrument version B) and the New Ecological Paradigm (NEP). Both are detailed below, although only the STEBI-B was used for this study.

Participants
The participants in this study were drawn from two sources. The first source was the NC-EE listserv. This listserv was accessed with the cooperation of the N.C. Office of Environmental Education and Public Affairs.

The second source, the comparison group, was an alumni database of elementary education graduates from a college of education at a midsize public university in North Carolina. This comparison group was chosen as a convenience sample, and
additionally because these teaching candidates had been required to attend at least one EE workshop as a part of a science teaching methods course during their tenure in the elementary education program. Their familiarity with and participation in a workshop as well as their potential to continue in the EE certification program provide us with an opportunity to examine self-efficacy in terms of those with formal pedagogical training and those without. Using the college database, elementary education majors (n=973) who graduated between spring 2010 and spring 2015 were invited to participate. All individuals were sent an email describing the study, with a link to an online survey. While participants from both sources were personally invited to participate in the study, responses to the survey were anonymous and data self-reported. Therefore survey responses could not be connected to the original database information. The survey was sent to approximately 800 individuals. Two hundred twenty-seven participants completed the survey (28% response rate). Some of the participants who responded to the online survey did not complete all items, thus incomplete surveys were not included in analysis. The final number of complete surveys was 176. These participants were grouped into four categories based on identified role/position: 38 (18.63%) identified as NC State Park Rangers, 66 (32.35%) as environmental educators, and 44 (21.57%) as licensed public school teachers (elementary, middle, and high school). (For further breakdown of each category see Table 2.) Of the participants, 77 (47.5%) were currently seeking NCEE certification. Ninety-seven (47.5%) of the respondents were already certified. Within the certified group, 21 percent were male and 79 percent female.

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<th>% of Total</th>
<th>n</th>
<th>Relative %</th>
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<tr>
<td>Environmental Educator</td>
<td>56</td>
<td>31.8%</td>
<td>30</td>
<td>53.6%</td>
</tr>
<tr>
<td>Other</td>
<td>41</td>
<td>23.3%</td>
<td>24</td>
<td>58.5%</td>
</tr>
<tr>
<td>Park Ranger</td>
<td>34</td>
<td>19.3%</td>
<td>24</td>
<td>70.6%</td>
</tr>
<tr>
<td>Retired</td>
<td>4</td>
<td>2.3%</td>
<td>4</td>
<td>100.0%</td>
</tr>
<tr>
<td>Student: Graduate</td>
<td>4</td>
<td>2.3%</td>
<td>2</td>
<td>50.0%</td>
</tr>
<tr>
<td>Student: Undergraduate</td>
<td>3</td>
<td>1.7%</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Teacher: Elementary</td>
<td>18</td>
<td>10.2%</td>
<td>6</td>
<td>33.3%</td>
</tr>
<tr>
<td>Teacher: Middle Grades</td>
<td>8</td>
<td>4.5%</td>
<td>2</td>
<td>25.0%</td>
</tr>
<tr>
<td>Teacher: High School</td>
<td>8</td>
<td>4.5%</td>
<td>4</td>
<td>50.0%</td>
</tr>
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<table>
<thead>
<tr>
<th>Group</th>
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<th>%</th>
<th>n</th>
<th>Relative %</th>
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<tr>
<td>Certified Public School Teacher</td>
<td>34</td>
<td>19.3%</td>
<td>12</td>
<td>35.3%</td>
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<tr>
<td>Environmental Educator</td>
<td>56</td>
<td>31.8%</td>
<td>30</td>
<td>53.6%</td>
</tr>
<tr>
<td>Other (Includes Student and Retired)</td>
<td>52</td>
<td>29.5%</td>
<td>30</td>
<td>57.7%</td>
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<tr>
<td>Park Ranger</td>
<td>34</td>
<td>19.3%</td>
<td>24</td>
<td>70.6%</td>
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Table 2. Respondent Current Employment and Certification Status (n = 176)
**Survey Instrument**

The online survey contained four sections. Section I included general and demographic items, as well as questions pertaining to challenges and perspectives regarding environmental education. Only the demographic questions in this section were utilized in this study. Section II of the survey included a modified STEBI Version B (Enochs & Riggs, 1990). The STEBI-B was created for use with preservice teachers. As an attitudinal measure, the limited pedagogical experiences of the two participant groups were better measured with this instrument than STEBI-A, which was created for in-service teachers. A sample item from the STEBI-B that measures the construct of PTE reads, “When a student does better than usual in science, it is often because the teacher exerted a little extra effort.” The respondent answers this item on a Likert-type scale ranging from “Strongly Agree” to “Strongly Disagree.” For the purpose of this study, items were reworded to include environmental education and the EE role. For example, the item above was reworded to read, “When a student does better than usual in science or environmental education, it is often because the teacher/facilitator exerted a little extra effort.” Both constructs on the STEBI-B (Science Teaching Efficacy Belief Instrument) were included on the survey but for the purpose of this study we only analyzed PTE. Section III included items specific to NCEE certification. Participants were asked to state their certification status as well as the number of seminars they had completed. Participants were also asked to detail the number of hours they had completed towards the five different NCEE criteria. Participants usually completed this section only if they had not completed the certification.

**Data Analysis**

The data were cleaned and recoded in order to investigate the research questions. After deleting cases with an extreme amount of missing data, removing duplicate responses, and removing participants who did not complete the STEBI-B (Science Teaching Efficacy Belief Instrument), 176 participants remained in the dataset (see Table 1). Some of the items (3, 6, 8, 17, 19, 20, and 22) were reverse coded (Enochs & Riggs, 1990) and those items were treated as such in the dataset.

Next, the two constructs measured on the STEBI-B were analyzed. Those two constructs are PTE (Personal Teaching Efficacy) and STOE (Science Teaching Outcome Expectancy). Means for both PTE and STOE were computed for each participant. If the participant skipped an item, imputation of the mean for that construct was conducted using the mean for that construct. As PTE is the focus of this study, reliability of the PTE construct was examined using Cronbach’s alpha coefficient ($\alpha = .62$). The Cronbach’s alpha is a bit lower than is ideal but the researchers hypothesize that is due to the difference in time after certification, meaning that some participants had likely completed the certification process recently while others had completed it years prior. Unfortunately years of experience were not included in the survey data. For all tests of significance the alpha was set at $\alpha = .05$, a priori.

**Results**

A t-test was used to investigate the first research question: is there a difference in self-efficacy perceptions between those who had completed certification and those who were earning certification at the time of the survey.

Having examined the surveys from the 176 participants, 96 (54.5%) of the
participants were NCEE certified and 80 were completing certification at the time of the
survey. Six participants did not answer the question about certification. Those who had
earned certification had a mean score of 3.88 (SD = .36, n = 96) for PTE and those in the
process of earning certification had a mean score of 3.74 (SD = .36, n = 80). The t-test
revealed a statistically significant difference between groups with regard to PTE (p = .01).
The effect size between groups was medium (d = .39).

An ANOVA was used to investigate the second research question: Is there a
difference in PTE between EEs and licensed classroom teachers?

Traditional EEs for this analysis included both participants who identified as
“environmental educators” and “park rangers” who were either NCEE certified or were
in the process of obtaining NCEE certification. The ANOVA indicated a statistically
significant difference between these two groups with regard to PTE. The EE group had
a higher mean PTE score (n = 90; M = 3.82, SD = .32) than the licensed public school
teachers (n = 34; M = 3.69, SD = .42). This result was statistically significant (p = .04). The
effect size for this analysis was medium (d = .37).

To further test this hypothesis, we examined only certified EEs and the small
number of teachers in the comparison group that were EE certified. This greatly reduced
the sample size for the analysis (EE, n = 54; teachers, n = 12). The difference in PTE was
not statistically significant although sample size likely played a role.

In order to further investigate PTE, the PTE of certified EEs and (non–EE certified)
licensed teachers was then examined. The certified EEs (n = 54, M = 3.80, SD = .37) had
a statistically significantly higher PTE than the non-certified licensed teachers (n = 22,
M = 3.60, SD = .44) (p = .005). This validated our hypothesis that certified EEs had a
higher PTE than the comparison group (non-certified licensed teachers).

As certification does seem to have an impact on PTE, the focus of research question
3 was to examine whether NCEE certification coupled with the respondent’s occupation
could predict PTE. In order to conduct this analysis, participants were first grouped into
larger job categories based on their responses to the survey. These groupings can be seen
in Table 2. Although the group sizes were not entirely equal, an examination of the data
showed normality that allowed us to proceed with the analysis.

A hierarchical multiple regression was conducted to determine whether NCEE
certification and career (licensed public school teacher, environmental educator, park
ranger, and other) could predict on PTE. The results of step one indicated that the
variance accounted for (R²) with the first predictor (NCEE certification) equaled .035
(adjusted R² = .029), which was significantly different from zero (F(1, 174) = 6.24, p < .01).
Next, career was entered into the regression equation. The change in variance accounted
for (DR²) was equal to .01, which was not a statistically significant increase in variance
accounted for over the step one model.

Discussion
Overall, our findings indicate that NCEE certification may indeed be linked to higher
personal teaching efficacy (PTE). Participants in this study who were EE certified had
a higher mean PTE score than those who were in the process of certification, and that
difference was statistically significant. Additionally, the environmental educators—
whether EE certified or in the process of certification—and the comparison group
(licensed public school teachers) were examined with regard to PTE. Environmental
educators had a higher PTE than the comparison group and that difference was
statistically significant. Then, the PTE of only the certified environmental educators was compared to that of non-EE certified licensed public school teachers and the difference was statistically significant. Certified environmental educators had a higher mean PTE. Additionally, further examination of certified environmental educators and EE certified teachers did not yield statistically significant differences with regard to PTE score.

Another research question for this study concerned the ability of the certification process, coupled with the participants’ career, to predict PTE. After dividing the participants into four very different career groupings (environmental educators, licensed public school teachers, park rangers, and other), we examined the predictive ability of the PTE. Our hypothesis was that certification would play a role in self-efficacy but that this might be mediated or enhanced by the participant’s career. For example, we hypothesized that the public school teacher group might have a higher PTE than the “other” group, simply based on occupational trajectory. Our hypothesis was partially proven to be true as certification predicted a very small percentage (3.5%) of variance in PTE, although it was statistically significant (p < .01). Occupation however, did not account for any variance in PTE. This finding in particular provides evidence that completing the NCEE certification process does enhance PTE.

The evidence provided here shows that the overall certification process has positive benefits for participants, which previous literature (Ross, 1992; Midgley, Feldlaufer, & Eccles, 1989; Goddard, Hoy, & Hoy, 2000; Tschanen-Moran & Woolfolk Hoy, 2001; Leithwood & Jantzi, 2008) indicates creates, in turn, positive benefits for the NCEE certified educators’ students and participants.

However, there are several limitations of this study, which should be noted. One such limitation of this study is the design itself. As this was survey research and not a controlled pre and post evaluation of the training programs, we can only make educated assumptions about how the training program impacted PTE. Obtaining certification, however, does maintain its importance with level of PTE through our analysis of the data. Additionally, having participants from so many different occupations gave us heterogeneous groups of participants. Even through our best efforts to maintain consistency, it was difficult to treat all environmental educators and all teachers the same, for example. Some of the teachers (comparison group) did actually obtain certification, making it hard to use them as a consistent comparison to certified environmental educators. Also, some environmental educators had not completed their certification at the time of this study, therefore our results might look more substantial had the survey been given to all EEs at the end of their certification and within the same time period.

The major limitation of this study is temporality. These results do not take into account time between starting the certification and completing the certification, or similarly, pre- and post-certification efficacy measures. The results do not take into account the amount of time an individual spends facilitating EE, or how long he or she has been an environmental educator. Acknowledging this, we cannot suggest a causal relationship between certification and PTE. However, given the multiple results of this study that point to a link between NCEE certification and higher PTE, we feel confident in suggesting that environmental education training is worthwhile for those who are or would be environmental educators, and likely for those in more traditional, formal education settings as well. One reason for this may be because the certification process is structured to provide participants with opportunities to observe peers, receive feedback from professionals, and to have mastery experiences, all sources of information.
that can affect efficacy perceptions (Bandura, 1997). Essentially, the EE certification process includes essential experiences that increase knowledge as well as efficacy, thus increasing the likelihood of successful teaching and facilitation experiences. These successful “mastery” experiences in turn bolster a facilitator’s efficacy, which again can affect performance in positive ways. The results of this study indicate the possibility that certified environmental educators might be more effective in increasing society’s understanding of the relationship between the environment and human health and welfare—confirming this is an appropriate focus for future research. Finally, the results of this study indicate that, as EE certifications become more common, EE organizations might consider requiring or preferring EE-certified job candidates and employees.

References


Interpretation Training Needs in the 21st Century

A Needs Assessment of Interpreters in the National Park Service

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Abstract
To identify critical training needs in the Interpretation and Education (I&E) Division within the National Park Service (NPS), a team of experts and practitioners, including six academic institutions, the National Association for Interpretation, and the NPS, developed a comprehensive list of knowledge, skills, and abilities thought to be relevant for providing and managing interpretation in the 21st century. Using this list of 80 competencies, we received over 1,000 NPS I&E employees’ responses regarding their beliefs about the importance and their level of preparation performing these tasks. The results identified not only the most important competencies, but also three broad training needs: skills related to research-evaluation literacy, engaging new and diverse audiences, and using emerging and existing social media technologies. Preparing interpreters to perform these skills at the highest level appears imperative if the NPS is to maintain relevance and continue to meet the demands of 21st-century audiences.

Keywords
interpretation, competencies, and evaluation

Introduction
As the largest provider of interpretation in the U.S., the National Park Service (NPS) has contributed significantly to the profession for over a century by sponsoring research, in-service training, and developing certification standards. Entering its second century, the NPS seeks to continue to provide enjoyable, relevant, and educational experiences for the changing U.S. population (NPS, 2014). However, advances in technology, changes in culture, and other economic and social forces are changing visitors’ expectations, desires, and preferences (Council on Environmental Quality, 2011; McCown, Laven, Manning, & Mitchell, 2012; National Parks Second Century Commission, 2009). In light of these social changes, the NPS Interpretation and Education (I&E) made a commitment to review interpretive approaches and techniques to align with the needs of contemporary visitors.

This is the second “needs assessment” focused on I&E undertaken by the NPS, the first of which occurred in 1995 (Wright & Makay, 1995). Because much has changed since 1995, subject matter experts (SMEs) reviewed and updated the competencies needed to perform at the highest level. From these competencies, we developed an online survey that asked NPS employees who have responsibilities in I&E to evaluate the importance of and their level of preparation to perform tasks and responsibilities essential to providing and managing interpretation services in the 21st century. This process allowed us to identify gaps in preparation for performing important I&E tasks that ultimately informed future training efforts.

Study Purpose
The overarching purpose of this research was to identify the training needs of NPS personnel that have I&E responsibilities. To accomplish this purpose, we took the following steps: a) reviewed and revised the I&E competencies performed within the NPS; b) assessed the importance of these competencies to job performance; c) assessed the level of preparedness of employees to perform these competencies; d) determined the gaps existing between the importance assigned to, and perceived preparation to perform, each competency which identified the training needs of the NPS I&E workforce; and e) examined if there are different training needs depending upon the age of individuals.
Methods
Following the procedures outlined by Hammitt, Machnik, Rodgers, and Wright (2007),
Machnik, Hammitt, Rodgers, and Wright (2007), Weddell, Fedorchak, and Wright (2009,
2013), and Depper, Vigil, Powell, and Wright (2016), we undertook a multi-stage process
that included a series of participatory workshops with SMEs to develop and refine a list
of competencies. We then developed a survey with these items and surveyed all NPS
employees with I&E responsibilities.

Competency Development
To begin the process of developing competencies, also known as knowledge, skills, and
abilities (KSAs), we reviewed the current and emerging goals pertaining to the NPS
I&E program. We also reviewed the goals of organizations that shared similar missions.
Using this comprehensive review we developed a draft list of potential outcomes for I&E
for the 21st century. This process coincided with a parallel effort that generated the NPS
Service-wide Interdisciplinary Strategic Plan for Interpretation, Education, and Volunteers
(National Park Service, 2014) and the vision paper, Interpretive Skills: 21st Century
National Park Service (National Park System Advisory Board Education Committee,
2014), which further defined the outcomes for I&E in the 21st century. Next, we began
a systematic process of identifying in the peer reviewed literature, “best practices” that
were thought to achieve and enhance these desired visitor outcomes. This literature
review included over 70 articles pertaining to interpretation (Skibins, Powell, & Stern,
2012), approximately 66 articles pertaining to environmental education (Stern, Powell, &
Hill, 2014), and over 119 articles on interpreting climate change and other controversial
and complex issues (Brownlee, Powell, & Hallo, 2012).

In addition, we utilized the findings from a large NPS service-wide research project
that identified which programmatic elements and practices lead to better outcomes in
live interpretation. This study investigated 376 live interpretive programs and monitored
over 56 programmatic characteristics to establish their link with desired visitor
outcomes (Powell & Stern, 2013a, 2013b; Stern & Powell, 2013; Stern et al., 2013). These
efforts informed the preliminary development of skills and competencies needed to
effectively provide interpretation and education services.

In September 2013, I&E subject matter experts, the Interpretation and Education
Learning and Development Advisory Committee (which includes academics
and members from professional interpretive organizations, along with NPS field
practitioners, peer review certifiers, and the regional lead coaching team), and training
specialists from Stephen T. Mather Training Center met to examine the list of outcomes
and “best practices” produced from this review. The goal of the process was to revise
and update the list of competencies that would be relevant in the 21st century and were
deemed necessary to perform at high levels within NPS I&E. This group of professional
experts ultimately identified six major categories of competencies and developed their
operational definitions.

Instrument Development
Using the list of competencies, the authors, in collaboration with the I&E training
team, developed a draft online survey. We then pilot tested the survey using NPS I&E
professionals. We adjusted the wording of the competencies and made other minor
modifications to the survey based on an iterative process of pilot testing, feedback, and
peer review with the I&E training team and SMEs. The final instrument included 80 items (specific competencies) nested under six broad categories: Audience Experience (16 items), Finding and Assessing Knowledge (12 items), Appropriate Techniques (19 items), Partnering, Collaboration, and Community Outreach (8 items, 4 of which were asked only of supervisors), Planning and Evaluation (11 items, 4 of which were asked only of supervisors), and Professional Development of Self and Others (15 items, 3 of which were asked only of supervisors). Respondents were asked to rate each of the items twice using a 7-point Likert scale; first for importance (1=unimportant to 7=extremely important) and next for their level of preparedness (1=unprepared to 7=extremely well prepared).

Sample and Data Collection
The Associate Director for Interpretation, Education, and Volunteers sent an email invitation to all 3,469 NPS employees designated as having I&E responsibilities on March 19, 2014. These I&E employees were asked to complete the online survey as part of their normal duty. Three follow-up e-mail reminders were sent to all I&E employees on March 31, 2014, April 14, 2014, and April 21, 2014, following recommendations by Dillman, Smyth, and Christian (2009). Data collection ceased on April 28, 2014. By design, most seasonal employees were excluded due to the timing of the study, which is a limitation of the study. Seasonal employees and volunteers provide the majority of live interpretation for the NPS.

Data Analyses
The mean importance assigned to each competency, the mean preparation to perform each competency, and the mean weighted discrepancy score (MWDS) for each item were calculated and reported. The mean weighted discrepancy score is used to identify the largest training needs and measures the “gap” between importance and preparedness while also taking into account the overall (average) importance of a competency as reported by the total number of respondents. Mean weighted discrepancy scores were calculated for each individual using the formula, ((Preparedness – Importance) multiplied by the (Importance Grand Mean)) (Bullard et al., 2013; Edwards & Briers, 1999; Robinson & Garton, 2008). When interpreting the results, a larger negative MWDS indicates a higher training priority. We report the mean score of importance, preparation, and MWDS for each individual competency because it represents a particular skill or action that is relevant to job performance. We also report an aggregate composite score for each “category” of competencies, which is the mean of all items within that category.

We used one-way analysis of variance (ANOVA) with Bonferroni post hoc mean comparison to explore if training needs differ depending upon the age of individuals. To facilitate interpretation of the post hoc mean comparisons, we calculated Cohen’s d for each statistically significant result. Cohen’s d is an effect size measure that provides an assessment of the meaningfulness of the difference between groups (Tabachnick & Fidell, 2007). Meaningful differences begin near 0.2, which may be considered small, while those approaching 0.5 are considered medium, and 0.8 large (Cohen, 1992).
Results

Description of Study Participants

At the conclusion of data collection, 1,032 respondents returned surveys with usable data, resulting in an effective response rate of 29.7%. Put simply, approximately one-third of all personnel identified by the Washington Support Office as having interpretation and education responsibilities in the NPS responded.

A large majority (89%) of respondents spend more than 20% of their time on interpretation and education responsibilities. The majority of respondents identified themselves as non-supervisors (62%). Study participants were well educated; 94% of respondents had a college degree. Close to half (42.3%) had an advanced degree. The respondents’ ages ranged from 22 to 78 years of age and almost half of participants (46.5%) were 50 years of age or older. This indicates that a large portion of the interpretation and education workforce is nearing retirement.

Importance Assigned to Interpretation and Education Competencies

The results (Tables 2–7) suggest that all competencies were relatively important with all ranked above the midpoint of the 7-point scale (4) with mean scores ranging from a high of 6.61 to a low of 5.31.

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Frequencies</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (by generation)</td>
<td>Millenials (18-34)</td>
<td>19.8%</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Generation X (35-49)</td>
<td>33.7%</td>
<td>11.85</td>
</tr>
<tr>
<td></td>
<td>Baby Boomers (50+)</td>
<td>46.5%</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>AA/AS or Less</td>
<td>6%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>MA/MS</td>
<td>39.2%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PhD</td>
<td>3.1%</td>
<td></td>
</tr>
<tr>
<td>Grade (GS) Level</td>
<td>GS 3-7</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GS 9+</td>
<td>70%</td>
<td></td>
</tr>
<tr>
<td>Supervisory vs. Non-Supervisory</td>
<td>Supervisory</td>
<td>38%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Non-Supervisory</td>
<td>62%</td>
<td></td>
</tr>
<tr>
<td>Time Spent on I&amp;E</td>
<td>Less than 20%</td>
<td>11%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>More than 20%</td>
<td>89%</td>
<td></td>
</tr>
<tr>
<td># of Years in Position</td>
<td></td>
<td>7.48</td>
<td>7.28</td>
</tr>
<tr>
<td># of Years in I&amp;E</td>
<td></td>
<td>15.56</td>
<td>10.34</td>
</tr>
<tr>
<td># of Years in NPS</td>
<td></td>
<td>15.0</td>
<td>10.21</td>
</tr>
</tbody>
</table>

Table 1. Summary of the Demographics (N=1,032)
Definition: Knowing and understanding audiences and reaching out to both visiting and non-visiting publics to create a welcoming, relevant, collaborative experience for all.

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Mean Importance</th>
<th>Mean Preparation</th>
<th>Mean Weighted Discrepancy Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Audience Experience</strong></td>
<td>5.92</td>
<td>4.78</td>
<td>-7.08</td>
</tr>
<tr>
<td>Assess the needs of audiences from diverse backgrounds, age groups, nationalities, abilities and cultures.</td>
<td>6.06</td>
<td>4.35</td>
<td>-10.60</td>
</tr>
<tr>
<td>Identify and engage non-visiting audiences through using existing and emerging media technologies.</td>
<td>5.64</td>
<td>3.99</td>
<td>-9.89</td>
</tr>
<tr>
<td>Update interpretive programming based on changing societal trends.</td>
<td>5.89</td>
<td>4.29</td>
<td>-9.89</td>
</tr>
<tr>
<td>Explore the relevance that park resources have for different audiences.</td>
<td>6.12</td>
<td>4.72</td>
<td>-8.76</td>
</tr>
<tr>
<td>Apply principles of current learning theory to engage audience members of different developmental stages.</td>
<td>5.65</td>
<td>4.27</td>
<td>-8.23</td>
</tr>
<tr>
<td>Adapt interpretation as needed to meet the physical, emotional, cultural and cognitive needs of audience members.</td>
<td>6.05</td>
<td>4.78</td>
<td>-8.04</td>
</tr>
<tr>
<td>Identify and engage non-visiting audiences through community outreach efforts.</td>
<td>5.59</td>
<td>4.27</td>
<td>-7.91</td>
</tr>
<tr>
<td>Gather and synthesize formal and informal research on audience motivations, needs and barriers to participation.</td>
<td>5.63</td>
<td>4.30</td>
<td>-7.89</td>
</tr>
<tr>
<td>Plan interpretation based on knowledge of specific audiences.</td>
<td>5.98</td>
<td>4.85</td>
<td>-7.01</td>
</tr>
<tr>
<td>Identify and integrate the educational objectives and/or curriculum standards of groups.</td>
<td>5.66</td>
<td>4.59</td>
<td>-6.74</td>
</tr>
<tr>
<td>Facilitate collaborative learning by encouraging audiences to participate and contribute to their interpretive experiences.</td>
<td>5.97</td>
<td>5.07</td>
<td>-5.83</td>
</tr>
<tr>
<td>Resolve conflicts through empathy and diplomacy.</td>
<td>6.10</td>
<td>5.21</td>
<td>-5.79</td>
</tr>
<tr>
<td>Encourage visitors to safely express personal viewpoints and hear the perspectives of others.</td>
<td>5.86</td>
<td>5.04</td>
<td>-5.13</td>
</tr>
<tr>
<td>Display a genuine interest in and respect for the diversity of audience experiences and input.</td>
<td>6.37</td>
<td>5.61</td>
<td>-5.12</td>
</tr>
<tr>
<td>Connect visitors with related resources and experiences outside of the park.</td>
<td>5.58</td>
<td>4.98</td>
<td>-3.53</td>
</tr>
<tr>
<td>Display professional, open and patient demeanor in all audience interactions in order to provide excellent customer service.</td>
<td>6.61</td>
<td>6.22</td>
<td>-2.88</td>
</tr>
</tbody>
</table>

Table 2. Audience Experience: Mean Importance, Preparation, and MWDS Scores
Definition: Gathering, synthesizing, and assessing resource and subject matter knowledge in order to develop accurate, relevant interpretive content.

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Mean Importance</th>
<th>Mean Preparation</th>
<th>Mean Weighted Discrepancy Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Finding and Assessing Knowledge</strong></td>
<td>5.92</td>
<td>4.94</td>
<td>-6.30</td>
</tr>
<tr>
<td>Acknowledge history and science as processes of continual revision by updating a site's stories and relevance through research.</td>
<td>6.11</td>
<td>4.93</td>
<td>-7.68</td>
</tr>
<tr>
<td>Identify and illuminate embedded biases in historical and scientific data and documents.</td>
<td>5.81</td>
<td>4.60</td>
<td>-7.53</td>
</tr>
<tr>
<td>Develop ongoing collaborative relationships with subject matter experts to remain current with issues and research.</td>
<td>6.05</td>
<td>4.87</td>
<td>-7.49</td>
</tr>
<tr>
<td>Facilitate experiences where visitors can investigate ways to create a healthier natural and cultural environment.</td>
<td>5.54</td>
<td>4.38</td>
<td>-7.23</td>
</tr>
<tr>
<td>Involve visitors in active investigations, to discover both evidence-based and personal truths related to the resource.</td>
<td>5.45</td>
<td>4.31</td>
<td>-7.00</td>
</tr>
<tr>
<td>Explore controversial issues with visitors to pursue an understanding of the diverse perspectives on a topic.</td>
<td>5.86</td>
<td>4.82</td>
<td>-6.66</td>
</tr>
<tr>
<td>Investigate and incorporate contemporary cultural and natural resource issues into discussions with visitors to help them find personal relevance.</td>
<td>6.05</td>
<td>5.02</td>
<td>-6.62</td>
</tr>
<tr>
<td>Seek out and incorporate diverse and newly discovered primary and secondary source materials.</td>
<td>5.98</td>
<td>5.06</td>
<td>-5.73</td>
</tr>
<tr>
<td>Connect historical events with broader cultural and historical trends.</td>
<td>6.08</td>
<td>5.19</td>
<td>-5.68</td>
</tr>
<tr>
<td>Articulate complex concepts in layman's terms without using jargon or losing accuracy.</td>
<td>6.40</td>
<td>5.71</td>
<td>-4.70</td>
</tr>
<tr>
<td>Connect historical and natural resources to one another.</td>
<td>5.92</td>
<td>5.22</td>
<td>-4.67</td>
</tr>
<tr>
<td>Articulate how humans impact natural systems and how natural systems impact humans.</td>
<td>5.81</td>
<td>5.17</td>
<td>-4.63</td>
</tr>
</tbody>
</table>

Table 3. Finding and Assessing Knowledge: Mean Importance, Preparation, and MWDS Scores
Definition: Use of appropriate interpretive strategies and techniques to explore the significance and relevance of park resources with diverse audiences.

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Mean Importance</th>
<th>Mean Preparation</th>
<th>Mean Weighted Discrepancy Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appropriate Techniques</td>
<td>5.90</td>
<td>5.04</td>
<td>-5.87</td>
</tr>
<tr>
<td>Apply best practices and protocols in developing informational and interpretive content for park websites.</td>
<td>5.60</td>
<td>4.22</td>
<td>-9.09</td>
</tr>
<tr>
<td>Comply with technical and legal standards in developing programs and media (NPS editorial guidelines, accessibility mandates, copyright, intellectual property, etc.).</td>
<td>5.96</td>
<td>4.60</td>
<td>-8.76</td>
</tr>
<tr>
<td>Develop and curate content for social media using protocols, conventions and interpretive strategies appropriate to the medium.</td>
<td>5.45</td>
<td>4.12</td>
<td>-8.50</td>
</tr>
<tr>
<td>Address different learning styles and apply multiple intelligence theory in curriculum-based education programs.</td>
<td>5.51</td>
<td>4.48</td>
<td>-7.17</td>
</tr>
<tr>
<td>Design traditional and digital media to use interpretive principles.</td>
<td>5.75</td>
<td>4.68</td>
<td>-7.02</td>
</tr>
<tr>
<td>Use techniques that foster citizenship skills (such as critical thinking, problem-solving, informed decision making, collaboration and respectful dialogue).</td>
<td>5.78</td>
<td>4.69</td>
<td>-6.79</td>
</tr>
<tr>
<td>Select interpretive techniques and content to address diverse audience needs and interests.</td>
<td>6.20</td>
<td>5.20</td>
<td>-6.63</td>
</tr>
<tr>
<td>Use facilitation and dialogue skills to foster a respectful and proactive exchange of thoughts and ideas.</td>
<td>5.91</td>
<td>4.91</td>
<td>-6.56</td>
</tr>
<tr>
<td>Develop place-based experiential education programs that incorporate state and national curriculum standards.</td>
<td>5.45</td>
<td>4.62</td>
<td>-6.41</td>
</tr>
<tr>
<td>Emphasize discovery techniques and the Socratic method in education and interpretive programs.</td>
<td>5.31</td>
<td>4.38</td>
<td>-6.33</td>
</tr>
<tr>
<td>Write and integrate interpretive text for traditional and digital media.</td>
<td>5.93</td>
<td>5.10</td>
<td>-5.41</td>
</tr>
<tr>
<td>Integrate experiential techniques that focus audience attention on the tangible park resources rather than on the interpreter.</td>
<td>6.01</td>
<td>5.28</td>
<td>-5.22</td>
</tr>
<tr>
<td>Use interpretive techniques to intentionally craft opportunities for both intellectual and emotional connections to resource meanings.</td>
<td>6.27</td>
<td>5.56</td>
<td>-5.01</td>
</tr>
<tr>
<td>Select interpretive techniques and content to meet the goals and desired outcomes of the park/site.</td>
<td>6.25</td>
<td>5.55</td>
<td>-4.99</td>
</tr>
<tr>
<td>Develop and present all interpretive products using a cohesive organizational strategy, audience-relevant theme and well-crafted introduction, conclusion and transitions.</td>
<td>6.13</td>
<td>5.53</td>
<td>-4.22</td>
</tr>
<tr>
<td>Plan for logistical issues and skillfully manage groups to enhance audience experience and protect resources and visitors.</td>
<td>6.15</td>
<td>5.62</td>
<td>-4.05</td>
</tr>
<tr>
<td>Adjust programs to meet audience needs based on audience questions and cues.</td>
<td>6.19</td>
<td>5.73</td>
<td>-3.65</td>
</tr>
<tr>
<td>Select and integrate props, demonstrations and illustrative media into programs to reveal meanings and relevance.</td>
<td>5.96</td>
<td>5.59</td>
<td>-2.90</td>
</tr>
<tr>
<td>Provide appropriate types of orientation, information and audience-centered interpretation in informal visitor contacts.</td>
<td>6.26</td>
<td>5.89</td>
<td>-2.83</td>
</tr>
</tbody>
</table>

Table 4. Appropriate Techniques: Mean Importance, Preparation, and MWDS Scores
Definition: Ability to partner and collaborate on a daily basis working cooperatively, developing networks, and building alliances.

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Mean Importance</th>
<th>Mean Preparation</th>
<th>Mean Weighted Discrepancy Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partnering, Collaboration, and Community Outreach</td>
<td>5.94</td>
<td>4.72</td>
<td>-6.05</td>
</tr>
<tr>
<td>Build a trusting relationship with partners by facilitating open dialogue.</td>
<td>6.07</td>
<td>5.07</td>
<td>-6.57</td>
</tr>
<tr>
<td>Collaborate with local formal and informal education institutions to share resources and expand learning opportunities.</td>
<td>5.72</td>
<td>4.74</td>
<td>-6.45</td>
</tr>
<tr>
<td>Demonstrate continued involvement with the surrounding community by engaging on a personal level with local groups and organizations.</td>
<td>5.71</td>
<td>4.86</td>
<td>-5.93</td>
</tr>
<tr>
<td>Seek opportunities to partner and collaborate when undertaking any interpretive or educational project or plan.</td>
<td>5.69</td>
<td>4.86</td>
<td>-5.23</td>
</tr>
</tbody>
</table>

Table 5. Partnering, Collaboration, and Community Outreach: Mean Importance, Preparation and MWDS Scores

Definition: Ability to plan and evaluate products and services for multiple outcomes to maximize the desired outcomes for park programming, to meet park and agency missions to identify professional development needs, to achieve visitor satisfaction, and to address societal interests.

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Mean Importance</th>
<th>Mean Preparation</th>
<th>Mean Weighted Discrepancy Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning and Evaluation</td>
<td>5.83</td>
<td>4.55</td>
<td>-7.02</td>
</tr>
<tr>
<td>Evaluate effectiveness of interpretive products or services at all stages of development.</td>
<td>5.83</td>
<td>4.41</td>
<td>-9.06</td>
</tr>
<tr>
<td>Identify training needs of staff, volunteers and partners based on results of evaluation.</td>
<td>5.73</td>
<td>4.41</td>
<td>-8.89</td>
</tr>
<tr>
<td>Analyze costs and benefits as part of prioritizing programming and allocating resources.</td>
<td>5.45</td>
<td>4.12</td>
<td>-8.57</td>
</tr>
<tr>
<td>Apply results of formal and informal evaluation to ensure programming meets desired outcomes.</td>
<td>5.87</td>
<td>4.58</td>
<td>-8.12</td>
</tr>
<tr>
<td>Foster an environment conducive for routine, informal, peer-driven evaluation.</td>
<td>5.74</td>
<td>4.61</td>
<td>-7.13</td>
</tr>
<tr>
<td>Collaborate with colleagues, subject matter experts, partners, potential audience members and other stakeholders during planning and development of all interpretive and educational products and services.</td>
<td>5.93</td>
<td>4.96</td>
<td>-6.07</td>
</tr>
<tr>
<td>Prioritize and align interpretive and educational products and services with division, park and agency goals and objectives.</td>
<td>5.98</td>
<td>5.73</td>
<td>-1.30</td>
</tr>
</tbody>
</table>

Table 6. Planning and Evaluation: Mean Importance, Preparation, and MWDS Scores
Level of Preparedness Assigned to Interpretation and Education Competencies
Results regarding preparedness suggest that respondents felt somewhat prepared for all of the competencies (Tables 2–7). The lowest mean for an individual item was 3.99, which is approximately the midpoint on the 7-point Likert scale. The Planning and Evaluation category had the lowest preparedness mean (4.69).

Mean Weighted Discrepancy Scores for each Interpretation and Education Competency Category
The MWDS measures the “gap” between importance and preparedness while taking into account the overall importance of a competency as reported by the total number of respondents (Tables 2–7). The Appropriate Techniques category exhibited the smallest mean weighted discrepancy score (-5.87) whereas Professional Development of Self and Others had the largest (-7.13).

Within Audience Experience, the three competencies with the largest MWDS

Table 7. Professional Development of Self and Others: Mean Importance, Preparation, and MWDS Scores

<table>
<thead>
<tr>
<th>Competencies</th>
<th>Mean Importance</th>
<th>Mean Preparation</th>
<th>Mean Weighted Discrepancy Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional Development of Self and Others</td>
<td>6.07</td>
<td>4.87</td>
<td>-7.13</td>
</tr>
<tr>
<td>professional growth opportunities.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Keep current on interpretive best practices, theories</td>
<td>6.09</td>
<td>4.67</td>
<td>-9.02</td>
</tr>
<tr>
<td>and changes in the field of interpretation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop and experiment with new interpretive techniques.</td>
<td>5.86</td>
<td>4.64</td>
<td>-7.71</td>
</tr>
<tr>
<td>Foster an environment of interpersonal trust, and open</td>
<td>6.23</td>
<td>5.03</td>
<td>-7.58</td>
</tr>
<tr>
<td>conversations where peers share insights and feedback.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use self-assessment and evaluative feedback from others</td>
<td>5.97</td>
<td>4.80</td>
<td>-7.25</td>
</tr>
<tr>
<td>to gauge effectiveness of communication methods.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Share interpretive success with peers within workgroup</td>
<td>5.80</td>
<td>4.69</td>
<td>-6.87</td>
</tr>
<tr>
<td>and broader communities of practice.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seek out and participate in peer collaboration and</td>
<td>5.82</td>
<td>4.67</td>
<td>-6.84</td>
</tr>
<tr>
<td>mentoring relationships.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use feedback to improve personal performance.</td>
<td>6.28</td>
<td>5.27</td>
<td>-6.49</td>
</tr>
<tr>
<td>Practice effective listening and communication skills</td>
<td>6.29</td>
<td>5.32</td>
<td>-6.42</td>
</tr>
<tr>
<td>to provide constructive feedback.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify and minimize the impact of own personal</td>
<td>6.16</td>
<td>5.20</td>
<td>-6.02</td>
</tr>
<tr>
<td>biases.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Identify and articulate elements of success when</td>
<td>6.07</td>
<td>5.16</td>
<td>-6.01</td>
</tr>
<tr>
<td>critiquing the work of peers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicate positive, provisional and specific verbal</td>
<td>6.04</td>
<td>5.21</td>
<td>-5.71</td>
</tr>
<tr>
<td>and written feedback in peer mentoring and coaching</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>relationships.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
pertained to assessing the needs of diverse audiences, the use of media technologies for reaching non-visiting audiences, and updating programming to coincide with changes in society. In Finding and Assessing Knowledge, the three competencies with the largest MWDS pertained to acknowledging history and science as processes of continual revision by updating a site’s stories and relevance through research; identifying and illuminating embedded biases in historical and scientific data and documents; and developing relationships with experts to remain current with issues and research.

In Appropriate Techniques, the three largest MWDS all related to managing, developing, and maintaining social media, websites, and other electronic media. In Partnering, Collaboration, and Community Outreach, the three items with the largest MWDS pertained to building trusting relationships with partners, collaborating with educational institutions to share resources and expand educational opportunities, and engaging on a personal level with local groups and organizations. In Planning and Evaluation, the three items reflecting the largest training needs included the ability to
evaluate interpretive products and services, identifying training needs of staff, volunteers, and partners based on evaluation results, and analyzing costs and benefits as part of prioritizing and allocating resources. Finally, in Professional Development of Self and Others, the three items with the largest MWDS pertained to planning and pursuing professional development, keeping current on interpretive best practices, theories, and changes in the field, and developing and experimenting with new interpretive techniques.

Mean Weighted Discrepancy Scores: Supervisors’ Interpretation and Education Competencies
In this study, we also measured 11 competencies in three categories that applied to supervisors exclusively: 1) Partnering, Collaboration, and Community Outreach, 2) Planning and Evaluation, and 3) Professional Development of Self and Others (Table 8). The largest MWDS pertained to the ability to find and use alternative funding to offset costs. The next largest MWDS pertained to developing, implementing, and evaluating marketing of interpretation programs.

Are there different training needs depending upon the age of individuals?
We divided respondents into three generational groups based on reported ages. Group 1 represented the “millennial” generation with an age range of 18–34 (n=162; 20%). Group 2 represented “generation X” with an age range of 35–49 (n=276; 34%), and Group 3 represented the “baby boomer” generation (n=381; 46%). We then compared the mean weighted discrepancy scores of the three groups using an ANOVA with post hoc comparisons. Significant results are reported in Table 9. For the competency category Partnering, Collaboration, and Community Outreach, the “millennial” generation and “gen X” had significantly larger MWDS on the composite, indicating greater training needs, than “boomers.”

Table 9. ANOVA Comparison of Mean MWDS by Generations

<table>
<thead>
<tr>
<th>Competencies</th>
<th>18-34 (1) M (SD)</th>
<th>35-49 (2) M (SD)</th>
<th>50+ (3) M (SD)</th>
<th>F (df)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audience Experience</td>
<td>-7.29 (6.35)</td>
<td>-7.58 (7.07)</td>
<td>-6.50 (7.19)</td>
<td>2.05</td>
<td>(2,800)</td>
</tr>
<tr>
<td>Finding and Assessing Knowledge</td>
<td>-6.59 (6.92)</td>
<td>-6.59 (7.63)</td>
<td>-5.83 (7.54)</td>
<td>1.01</td>
<td>(2,799)</td>
</tr>
<tr>
<td>Appropriate Techniques</td>
<td>-5.99 (6.43)</td>
<td>-5.76 (7.07)</td>
<td>-5.65 (7.29)</td>
<td>.122</td>
<td>(2,804)</td>
</tr>
<tr>
<td>Partnering, Collaboration, and Community Outreach MWDS Composite</td>
<td>-7.69 (9.50)</td>
<td>-6.73 (9.46)</td>
<td>-4.76 (8.36)</td>
<td>7.04</td>
<td>(2,771)</td>
</tr>
<tr>
<td>Planning and Evaluation</td>
<td>-7.80 (9.06)</td>
<td>-7.32 (8.72)</td>
<td>-6.35 (9.56)</td>
<td>1.716</td>
<td>(2,800)</td>
</tr>
<tr>
<td>Professional Development of Self and Others</td>
<td>-7.89 (8.04)</td>
<td>-7.57 (8.27)</td>
<td>-6.40 (8.09)</td>
<td>2.599</td>
<td>(2,807)</td>
</tr>
</tbody>
</table>

*p<.05 **p<.01 ***p<.001
Discussion

This study identified a range of competencies that were thought to be necessary for the provision of NPS interpretive services in the 21st century. Results also identified a number of strategic training needs. The largest mean weighted discrepancy scores indicate that training is needed to develop skills related to research literacy, engaging changing and new audiences, and effective use of available and emerging technologies.

The need for training focused on research literacy (ability to interpret and apply results to improve programs and inform decision-making) within the NPS appears to be paramount. Another recent needs assessment study on Visitor and Resource Protection in the National Park Service also found that skills related to understanding and using research to improve job performance were a training priority (Depper et al., 2016). In this study, evaluating the effectiveness of interpretation and keeping current on research appeared to be particularly important. Without the ability to utilize research and evaluate programs, either informally or formally, how will the practice of interpretation evolve and improve in the 21st century?

Developing skills related to engaging new audiences is also vitally important for the NPS if they wish to maintain relevance with the public (NPS, 2014). Specific competencies with larger training needs pertained to assessing the needs of diverse audiences, developing outreach for new and diverse audiences, identifying and engaging non-visiting audiences using current and emerging media, and updating programming based on shifting societal trends. Additional training regarding the development and use of research to identify audiences and non-visitors; their values, attitudes, and preferences; and the best ways to engage these different groups also appear necessary. These results suggest that staff need not only improved research literacy skills, but the ability to apply research findings to inform outreach and programming. For example, research suggests that women are concerned about safety, the lack of facilities, costs, and potential pests when considering participation in outdoor recreation (Johnson, Bowker, & Cordell, 2001). This information could aid program planning for women such as addressing safety concerns prior to interpretive hikes.

Moreover, a recent study of non-visitors to national parks revealed two major impediments, being too busy and travel time (Solop, Hagen, & Ostergren, 2003). African Americans and Hispanic Americans in particular did not visit because of too little information about the parks (Solop et al., 2003). Potential visitors need information regarding opportunities, ways to overcome potential barriers, and social norms regarding appropriate behaviors in park settings. Information is also needed for non-visitors who perceive that parks are in remote and distant locations and may be unaware of sites that are more accessible and urban proximate. This research suggests that engaging new audiences may require providing outreach efforts where these audiences live since they feel too busy to travel to parks. In addition, engaging new audiences in their own language may be required (Rodrigues, Clarke, & Alamillo, 2012). Training I&E employees to access, interpret, and apply relevant studies such as these should help build confidence and improve performance engaging new audiences.

Another overarching training need that arose from the study focused on using existing as well as emerging technology. Two competencies reflecting this gap were engaging non-visitors through media technology and applying interpretive best practices to content development on websites. These two items highlight that current NPS interpreters feel unsure of how to complete these job duties. This result may be
influenced by the average age of I&E staff. Given that approximately half of respondents are 50 or older, their training may not have included effective use of current as well as emerging digital technology. This being said, if it is a goal to reach younger generations, dubbed by Russell (2014) “digital natives,” then online communications are essential. When looking to engage non-visitors Russell (2014) suggests conducting focus groups or other pre-targeting techniques to learn where these potential audiences are spending their time online and what types of material and content appeal to them. Training in the use of emerging digital technology could be invaluable for developing a 21st-century I&E workforce. The NPS is currently undergoing the process of developing digital communications competencies for the entire agency. These competencies could help guide I&E training in the future.

For supervisors, a few training needs were critical. These included providing advanced training in skills necessary for leadership and management such as identifying and securing alternative funding through grants, partnerships, and other “non-traditional” revenue sources as well as the ability to evaluate not only educational and interpretive products and programs but also to evaluate the marketing of these services.

Conclusion

In an effort to identify critical training needs in Interpretation and Education within the NPS, a team of subject matter experts from across the profession, including six academic institutions, the National Association for Interpretation, and the National Park Service, developed a comprehensive list of KSAs relevant to providing and managing interpretation in the 21st century. Using this list of competencies, we then implemented a study that investigated NPS I&E employees’ beliefs regarding how important and how well prepared they are in fulfilling these specific competencies that are necessary to perform at the highest levels.

The National Park Service has a long history of advancing the profession of interpretation. This effort is useful for organizations such as the National Association for Interpretation (NAI) as well as others that provide interpretation and educational programming by identifying a comprehensive list of competencies related to providing and managing interpretation services. The process of reviewing and updating the competencies associated with I&E also reiterated the need for the field to continually test the “best practices” in interpretation and education that are assumed to facilitate the co-creation of meaningful experiences and thereby meet the needs of the 21st-century public. Few studies to date have explicitly tested the efficacy of many of the best practices employed today (e.g., Stern & Powell, 2013; Powell & Stern, 2013a,b). Through experimentation, refinement, and periodic evaluation/validation of these practices, not only will the NPS I&E program excel, but also the broader field will continue to ensure that techniques and approaches promoted in training and certification efforts are supported by the “best available science” to enhance visitor outcomes.

References

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Can an Immersion Exhibit Inspire Connection to Nature and Environmentally Responsible Behavior?

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Abstract
Nature centers, museums, zoos, and other exhibit-based institutions need to sustain or increase visitation for economic viability. To generate visitor interest, exhibits have become more interactive, with immersion exhibits becoming increasingly popular. Visitor research has traditionally focused on learning or social aspects of the visitor experience rather than psychological dimensions related to attitudes, values, and behaviors. Yet nature-focused institutions increasingly support broad-based issues, such as encouraging connection to nature and environmentally responsible behavior. This paper explores how an immersion exhibit without personal interpretation, impacts connectedness to nature, intentions for environmentally responsible behaviors, and other aspects of visitor experiences. Short
visits to a free-flying butterfly exhibit were found to augment visitors’ connectedness to nature and environmentally responsible behavioral intentions. Visitors also described how they appreciated the intensely beautiful surroundings, were awe-struck, felt a great deal of peace and relaxation, and felt oneness with nature.

**Keywords**
immersion exhibits, connection to nature, environmentally responsible behaviors, direct experience, non-personal interpretation

**Literature Review**
Interpretive centers are traditionally interested in learning outcomes. Visitor centers such as museums, botanical gardens, zoos, aquariums and nature centers are prime examples of such interpretive centers (Berry & Jönsson, 2015; Bitgood, 2002). In the last decade, it is increasingly recognized that visitor centers need to concentrate on visitor experiences by incorporating interpretive elements; focusing attention on “how are [the visitors] inspired to change, think and act differently as a result of their visit?” (Kelly, 2004, p. 48). Inspiring visitors to seek out experiences in nature and carry out more environmentally responsible behaviors is an outcome of particular importance to zoos, natural history museums and nature centers (AZA, 2004; Berry & Jönsson, 2015; Stoinski, Allen, Bloomsmit, Forthman, & Maple, 2002). However, the effectiveness of these institutions in encouraging conservation behavior is not well documented (Dierking, Burtnyk, Buchner, & Falk, 2002; Stoinski et al., 2002). Although there is abundant research on attention and learning outcomes, there are few studies looking at encouraging environmentally responsible behavior in interpretive centers, museums, and zoos (Dierking et al., 2002; Stoinski et al., 2002), although there are related studies using outdoor wildlife tours (Ballantyne, Packer, Hughes, & Dierking, 2007; Ballantyne, Packer, & Sutherland, 2011; Chiu, Lee, & Chen, 2014; Christensen, Needham, & Rowe, 2008; Lee, 2011; Lee, Jan, & Huang, 2015).

Immersion exhibits, a relatively recent type of exhibit, often rely on the experience itself rather than an interpreter to interact with visitors. Gilbert (2002) defines immersion exhibits as:

> a multisensory experience that allows visitors to walk into the “scene” (unlike a glass-fronted diorama). Such exhibits pull visitors out of the passive, one-dimensional museum viewing ritual and transport them to a different time, place or situation where they become active participants in what they encounter. (Gilbert, 2002, p. 10).

Examples of immersion exhibits include simulated rainforests, swamps, savannahs, and caves as well as simulations of the past with living history and simulations of experiences such as traveling through space or the human body (Bitgood, Ellingsen, & Patterson, 1990). These exhibits may have personal interpretation by a guide; non-personal interpretation through signage, exhibits, or brochures; or a combination of these methods, and some exhibits may not have any interpretation at all.

Even without personal interpretation, immersion exhibits may be ideal interpretive venues for promoting connectedness to nature. Connectedness to nature is defined as the degree to which a person considers themselves a part of nature and includes nature in their self-concept (Schultz, 2000, 2002). Connectedness to nature has a positive relationship with environmental concern (Perkins, 2010; Schultz, Shriver, Tabanico,
environmentally responsible behavior (Capaldi, Dopko, & Zelenski, 2014; Dutcher, Finley, Luloff, & Johnson, 2007; Gosling & Williams, 2010; Heintzman, 2010; Mayer & Frantz, 2004; Nisbet, Zelenski, & Murphy, 2009), as well as positive emotions and mindfulness (Heintzman, 2002, 2009; Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009; Nisbet, Zelenski, & Murphy, 2011; Zhang, Howell, & Iyer, 2014).

For instance, in a study of visitors’ emotional responses to zoo animals, Myers, Saunders, and Birjulin (2004) found four patterns of emotions expressed toward three focus animal species: gorillas, snakes, and okapis. Feelings of love and a sense of connection were significantly different across all three species and were felt the most for the gorillas and least for the snakes. The emotions of love and connection related powerfully to concern and a desire to help that species. The emotions of love and connection could be, as Myers and colleagues concluded, highly selective and related to the species with the most charisma or similarity to humans (i.e., gorillas) or they could be related to exhibit type and experience provided. The gorilla exhibit was the most naturalistic, while the snake exhibits consisted of glass enclosures in the reptile house and was therefore the least like an immersion experience. This begs the question: Is it the immersion characteristic of the exhibits that increases emotional responses, including connection to nature, rather than the type of animal?

In other research experiments, simulated sights and sounds of nature using videos or potted plants were shown to increase connectedness with nature and positive emotions (Mayer et al., 2009; Weinstein, Przybylski, & Ryan, 2009). Mayer and colleagues (2009) documented that exposure to real or simulated nature (watching nature videos) increases attention, positive emotions, reflection, and connectedness to nature. Exposure to real nature (15 minutes in the natural area depicted in the simulated nature video) had greater psychological benefits than virtual nature. Similarly, Weinstein, and colleagues (2009) found that immersion in simulated environments increased connectedness to nature, intrinsic aspirations, and generosity. They, as well as Capaldi and colleagues (2014), speculate that these effects are correlated with pro-environmental behaviors.

In addition, interpretation research suggests that providing enjoyable, satisfying, and engaging experiences lays a firm foundation for promoting environmental attitudes and improving the likelihood that visitors will adopt pro-environmental behaviors (Farmer, Knapp, & Benton, 2007; Powell & Ham, 2008). If interpretation has these characteristics, visitors will be less likely to tune out (Ham, 1992; Powell & Ham, 2008), enhancing the probability that visitors will embrace conservation messages and values (Farmer et al., 2007; Powell & Ham, 2008). Farmer and colleagues (2007) suggest that interpretation venues that succeed in promoting pro-environmental attitudes and behaviors typically provide, among other things, direct aesthetic experiences with nature, sensitive and emotional content, and a multisensory environment—all characteristics of immersion exhibits.

Research supports the idea that attention and satisfaction are positively related to immersion design features in exhibits. Both visitor stay-time and enjoyment were increased through immersion exhibits (Shettel-Neuber, 1988; Wineman, Piper, & Maple, 1996). Immersion exhibits seem to enhance learning and pleasure (Bitgood et al., 1990; Harvey, Loomis, Bell, & Marino, 1998; Ogden, Linburg, & Maple, 1993). Flow—a sense of being completely absorbed and losing a sense of time and self (Csikszentmihalyi,
— is thought to be promoted by immersion exhibits. In fact, Harvey and colleagues (1998) did find a positive relationship between a sense of immersion and flow. Furthermore, immersion exhibits that simulate nature can provide much-needed nature opportunities for those, especially in urban environments, experiencing a nature deficit (Arnold, 2011; Kahn & Kellert, 2002; Louv, 2005, 2011). Studies show that exposure to nature is correlated to an individual’s psychological and physical well-being (Capaldi, Dopko, & Zelenski, 2014; Kamitis & Francis, 2013; Pedretti & Soren, 2006; Weinstein et al., 2009; Zhang et al., 2014). Kamitis & Francis (2013) found that experiences with nature that were not part of an individual’s everyday experiences were most strongly correlated with such benefits. A visit to a nature-based immersion exhibit would typically constitute a non-ordinary experience with nature. In addition, Weinstein et al. (2009) found that the degree to which individuals experience such benefits may hinge upon the degree of immersion, suggesting that experiences where visitors become fully immersed in the natural environment were the most beneficial.

The potential benefits of immersion exhibits have been tested during a qualitative study, based on observations, interviews, and exit surveys by Pedretti & Soren (2006) at the Niagara Parks Butterfly Conservatory. Their results showed that conservatory visitors highly valued feelings of nature connectedness with many visitors stating that visits to the conservatory rekindled this connection. These findings suggest that nature-based immersion exhibits can increase connectedness to nature. However, this study did not definitively show that visits to the conservatory increased connectedness to nature; it is possible that these visitors already had a high connection to nature prior to their visit. Likewise, this study did not provide firm conclusions on whether visitors experienced an increase in intentions to participate in environmentally responsible behaviors. Therefore, the current study was conducted in a natural history museum with free flying butterflies in an enclosed natural habitat with the purpose of qualitatively and quantitatively testing whether or not such immersion exhibits can increase connectedness to nature and intentions for pro-environmental behavior, as well as explore other aspects of the experience visitors find noteworthy.

**Methods**

**Site Description**
The Butterfly Rainforest is an immersion exhibit adjacent to the Florida Museum of Natural History in Gainesville, Florida. Admission to the museum is free, however, there is a charge to enter the Butterfly Rainforest. Similar to immersion exhibits located in zoos, the exhibit contains a created, self-contained habitat with live plants and roaming animals. Visitors enter the exhibit from the inside of the museum but the exhibit itself is outdoors, encased by screens and glass. Visitors walk a meandering path through the exhibit while butterflies fly around them and various plants surround them. The butterflies are so numerous that they seem to surround visitors, and many people have butterflies land on them. Lush landscaping includes a variety of flowers and trees, a pond, stream, and several waterfalls. Other species present include finches, lizards, turtles, and moths. Benches are located throughout the exhibit so visitors can relax and enjoy the surroundings.
Study Design
A post-test-only experimental design was used. In this design, a pre-test is not utilized since the treatment group and comparison group are randomly assigned (by systematic sampling in this case) and thus are considered equivalent groups (Trochim, 2006). This design, while simple, is considered a strong design. This design is particularly good when threats to internal validity exist (Gribbons & Herman, 1997). Visitors to the butterfly rainforest exhibit typically stay in the exhibit roughly 30 minutes, with stay times ranging from 15 minutes to over an hour. Using the same survey instrument as both the pre-test and post-test within such a short duration would likely impact responses, artificially increasing scores on the post-test and threatening internal validity with a testing effect (Campbell & Stanley, 1963). When given a pre-test, participants can be sensitized to specific measured variables impacting their responses on the post-test. This means post-test results can be due to pre-test sensitization rather than the treatment. Using two equivalent groups helps control this threat to internal validity by ensuring that the difference in results is not due to testing (Cook & Campbell, 1979; Christensen, Johnson, & Turner, 2011). Additionally, since the exhibit requires a fee, sampling visitors who do not pay to see the immersion exhibit but see a static museum butterfly exhibit as a comparison group would result in nonequivalent groups and a selection threat to internal validity, thereby also creating a threat to external validity due to a potential interaction of selection and treatment (Cook & Campbell, 1979). Since both sampling days and visitors were randomly selected, there is no reason to believe these groups are not probabilistic equivalents, and therefore any difference in post-tests is due to the treatment (Trochim, 2006). This design has also been called a “simulated pre–post-test design” (Lukas & Ross, 2005). A similar quasi experimental design (without random assignment or selection) is labeled a static group comparison design (Morgan, 2009, Campbell & Stanley, 1963).

The Sample
A purposive sample targeting visitors who paid to walk through the exhibit was used (Babbie, 2001). Sampling consisted of randomly choosing three weekdays and one weekend day for each group (pre-visit comparison group and post-visit treatment group) and then randomly choosing two-hour blocks to sample visitors on those days. All visitors were systematically sampled by asking every fourth adult in the entrance or exit area (no one was selected to do both) to participate during the data collection period. Surveys were printed on paper and color coded to distinguish between treatment and comparison groups. Multiple trained data collectors surveyed visitors.

Since the two samples were systematically selected from the same target population, with no apparent distinctive differences, they are considered comparable or equivalent (Cook & Campbell, 1979). As an added measure of insurance, a two-sample Kolmogorov-Smirnov Test was used to detect possible differences among the two groups in terms of the distributions’ shapes and locations. This test of group differences did not reveal any significant differences for the two samples on gender, education, ethnicity, income, age, and group make-up. Therefore, the two samples were deemed equivalent.

However, since there is an additional fee to see the exhibit and a purposive sample targeting those who paid was conducted, we cannot generalize the results to the general population, but only to those who choose to pay to see the immersion exhibit.
Table 1: Independent samples t-test for differences in connectedness to nature between the control and treatment groups.

<table>
<thead>
<tr>
<th>Index</th>
<th>Treatment/Control</th>
<th>n</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>t</th>
<th>df</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CNS</td>
<td>Control</td>
<td>168</td>
<td>3.64</td>
<td>0.629</td>
<td>-2.121</td>
<td>416</td>
<td>0.035</td>
</tr>
<tr>
<td></td>
<td>Treatment</td>
<td>250</td>
<td>3.78</td>
<td>0.659</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wildlife</td>
<td>Control</td>
<td>163</td>
<td>3.40</td>
<td>1.696</td>
<td>-2.883</td>
<td>406</td>
<td>0.004</td>
</tr>
<tr>
<td></td>
<td>Treatment</td>
<td>249</td>
<td>3.72</td>
<td>1.055</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ERB</td>
<td>Control</td>
<td>159</td>
<td>3.74</td>
<td>0.779</td>
<td>-2.771</td>
<td>390</td>
<td>0.006</td>
</tr>
<tr>
<td></td>
<td>Treatment</td>
<td>233</td>
<td>3.95</td>
<td>0.742</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Questionnaire
Respondents were given a self-administered questionnaire with scales measuring connectedness to nature and environmentally responsible behaviors. Connectedness to nature was measured using the 14-item Connectedness to Nature Scale (CNS) (Mayer & Frantz, 2004). This scale was reported to have strong reliability (Cronbach’s alpha = .84, .84, .82, .79 and .79, Mayer & Frantz, 2004). Environmentally responsible behavioral intentions were measured with 11 items that were divided into two behavior indices. Four items measured behaviors related to attracting backyard wildlife such as butterflies and birds and seven items asked about general environmental actions. Behaviors related to backyard wildlife included “feed birds at my home,” “grow nectar plants for butterflies,” and “provide water or shelter for wildlife at home.” General items included “stay informed about environmental issues,” “discuss environmental issues with others,” and “properly dispose of toxins like oil, paint & chemicals.” In addition, the survey had one open-ended question that asked, “Is there anything else you would like to tell us about your experience at the Butterfly Rainforest?”

Results
The total sample size was 426; 257 visitors were surveyed after exiting the exhibit and served as the treatment group, and 169 visitors who qualified as not having previously toured the Butterfly Rainforest were surveyed before entering the exhibit thereby serving as the comparison group. The sample consisted of 157 males (37%) and 269 (63%) females. Visitors surveyed were 18 to 84 years old, with 18- to 30-year-olds making up 25% of the sample; 12% were in their thirties, 17% in their forties, 23% in their fifties, 16% in their sixties, and 7% were aged 70 years or older. Respondents were highly educated with 55% of the visitors having at least a college degree and 23% having a graduate or professional degree. The sample was not very diverse in terms of ethnicity, as 86% of those sampled were Caucasian with Latino/Hispanic visitors comprising about 5% of the sample.

Almost all of the respondents (97%) came to the exhibit with someone else. Half of these visitors (50%) reported attending with a spouse or companion, about 28% with...
children and/or other family members, 14% with friends, and 7% with a school, church, or other organized group. Most were first time visitors (90%) and came specifically just to visit the Butterfly Rainforest (71%) as opposed to also visiting the museum. Very few were museum members (3%). Reliability for the 14 item Connectedness to Nature (CNS) scale in this study was high (Cronbach’s alpha = .854). The behavioral items were divided into two indices: four items for backyard wildlife related behavior including two related to butterflies and two related to birds; and seven items measuring general environmental behaviors including donating used items, staying informed about issues, discussing issues, and disposing toxins properly. Cronbach’s alpha for testing reliability of the measures was .842 for the backyard wildlife items and .833 for the seven general items.

Did the Butterfly Rainforest immersion exhibit experience affect connection to nature and behavioral intentions?

Only first-time visitors to the exhibit were surveyed. This qualifying question was asked during the consent phase. Those surveyed before entering the exhibit served as a comparison group. A separate sample of visitors who had just exited the rainforest served as the treatment group. Independent samples t-tests were computed on the two behavioral intention indices and the 14-item CNS scale index for differences between control and post scores. Significant differences (p < 0.05) were found for all three indices indicating that the experience provided by the butterfly immersion exhibit positively impacted CNS and behavioral intentions for responsible wildlife related behavior and general environmentally responsible behavior (ERB) (see Table 1).

Is there a relationship between connection to nature and responsible environmental behavioral intentions?

A regression analysis was performed on both behavioral intention indices and the connectedness to nature scale (CNS). A check for outliers, multicollinearity, normality, homoscedasticity, and independence of residuals was done and no issues were found. For the backyard wildlife-related behavioral intentions β = .387, t(240) = 3.76, p < .001. Connection to nature (CTN) explained a significant proportion of variance in depression scores, R² = .15, F(1, 240) = 42.19, p < .001. For general environmental behaviors β = .549, t(230) = 9.95, p < .001. CTN explained a significant proportion of variance in general environmentally responsible behavioral intentions, R² = .302, F(1, 230) = 99.03, p < .001.

What impact did the experience have on visitors?

The survey for the treatment group had an open-ended question, “Is there anything else you would like to tell us about your experience at the Butterfly Rainforest?” resulted in a surprising number of written responses (n = 118, 46% from the 257 in the treatment group responses). The responses were tabulated and coded into themes using qualitative thematic analysis (Aronson, 1994; Attride-Stirling, 2001; Braun & Clarke, 2006).

Four themes were revealed including appreciation for the beauty of nature, feelings of awe, restorative feelings, and feelings of oneness. Many participants wrote that the experience was awe inspiring and amazing. It was also described as wondrous, thrilling, magical, and fascinating. For example, one participant wrote, “I got tears in my eyes & a lump in my throat. It’s an overwhelming experience to see & have so much delicate beauty swarming around you!” Another said, “Nature is awesome. I take it when I can. I love to get lost in nature—it is much bigger than me.”
Another common theme was how restorative, peaceful relaxing and soothing visitors found the exhibit. For example, one visitor wrote, “I absolutely loved it! Very peaceful and refreshing—will definitely come again!” Another visitor commented, “I can’t imagine coming here and leaving unhappy. I couldn’t stop smiling.” Commenting on how beautiful visitors found it to be was also very common as noted here, “Great, species are varied and brilliant, plants are incredible.” And “I have never seen such a fine example of living art in my life!” A much less common theme was profound experiences of oneness that was expressed by a few visitors. For example, responses included, “Words really can’t express the experience, just the being in the natural and understanding the oneness is the best to experience.” And, “The experience cannot be put into words. What has been provided is akin to being invited into another world and being treated like a long-lost relative.”

Discussion
People who visited the butterfly rainforest exhibit had a significantly higher connectedness to nature than those who had not visited. Visitors to the butterfly rainforest also reported more intentions to engage in environmentally responsible behaviors. Some of these behaviors were related to the immersion exhibit that people had just experienced, including butterfly gardening and bird feeding. The more general intentions for environmentally responsible behaviors showed a greater association with connection to nature, explaining more of the variance ($R^2 = .302$) than the backyard wildlife related behavioral intentions ($R^2 = .15$). This finding was not expected, as an evaluation of a swamp exhibit found visits led to an increase in behaviors related to visiting wetlands in the future (Saunders & Stuart-Perry, 1997). It was thought that the experience of the free-flying butterflies would make respondents more likely to want butterflies in their backyards. Although planting and landscaping is much more involved and time-consuming behavior than visiting a similar habit. Also, we did not ask about homeownership. This sample may have consisted of a number of people who did not own homes. Indeed, 25% of this sample was fairly young, between the ages of 18 to 30, with many of those being college students.

These results also show that CTN is malleable (Schultz, 2002; Schultz et al., 2004). Connectedness to nature has previously been shown to increase by virtual and direct experience in nature before, including simulated immersion (Mayer et al., 2009; Schultz & Tabanico, 2007; Weinstein et al., 2009). In fact, Schultz and Tabanico (2007) found that visitors exiting the San Diego Wild Animal Park, had higher implicit nature connectedness and a corresponding increase in environmental concern than did guests entering the park (Schultz & Tabanico, 2007). Schultz and Tabanico (2007) hypothesized that the change occurred because participants spent several hours in the park. However, in this study, most visitors did not spend an extended period of time in the butterfly exhibit, yet results showed that connectedness to nature and nature protective behavioral intentions were higher for those who had experienced the exhibit than those who had not. The qualitative responses and visitor comments upon exit show a positive impact on attitudes and emotions as expressed with themes of awe, oneness, restoration, and appreciation for nature’s beauty. These responses also reveal that for many visitors it was a brief yet personally intense, extraordinary experience. Maslow (1971) described “high plateaus” that were similar to peak experiences, although not as intense. Peak experiences in nature and with animals are described as eliciting a sense of wonder, awe, timelessness, union, absorption, excitement, fascination, and mysticism (Csikszentmihalyi, 1990;
Dowdall, 1998; Maslow, 1970; Vining, 2003; Williams & Harvey, 2001). Visits to popular interpretation venues, such as zoos and wildlife tourism operations, have been shown to elicit strong emotional reactions, especially via close-encounters, with charismatic megafauna such as whales, penguins, gorillas, okapis, and big-horned sheep (Muloin, 1998; Schanzel & McIntosh, 2000; Vining, 2003). This study is unique in that connectedness and other positive emotions were elicited by close contact with insects.

It may well be that as people increase their positive feelings toward nature, their connectedness to nature increases. Connectedness seems to be increased by experiential learning where a person is in direct contact with nature. Therefore, immersion exhibits, animal programs, and positive real-world experiences such as walks and hikes, could all foster connectedness to nature. According to the biophilia hypothesis (Kellert & Wilson, 1993; Wilson, 1984), people have a predisposition to affiliate with life and perhaps this translates to connectedness to nature. Positive emotions such as mindfulness, social, psychological, and emotional well-being (Howell, Dopko, Passmore, & Buro, 2011), vitality (Ryan, Weinstein, Bernstein, Brown, Misretta, & Gagne, 2010), life satisfaction (Mayer & Frantz, 2004), positive affect (Mayer et al., 2009; Perkins, 2010), and autonomy, personal growth, and purpose in life (Nisbett et al., 2011) were all shown to correspond with connectedness to nature.

Intentions to perform environmentally responsible behaviors were previously associated with connectedness to nature. The results reported here associated with an immersion experience among Lepidoptera and lush plantings suggests that stimulating connectedness to nature as a means of increasing environmentally responsible behavior could be promising. In addition, this was done without an educator or interpreter. Therefore, connectedness to nature appears to provide an intrinsic source of motivation for helping the environment. Increasing one’s intrinsic desire to help the environment would be a much better motivator of environmentally responsible behaviors (ERB’s) than incentives, fear, or guilt—all tactics commonly used (De Young, 2000; McKenzie-Mohr, 2000; McKenzie-Mohr & Smith, 1999; Ryan & Deci, 2000).

Conclusion
Interpretation venues, including zoos, environmental education, nature centers, and nature-based tourism operations, can use immersion exhibits and other direct, positive experiences to foster connectedness to nature, psychological well-being, and intentions for environmentally responsible behavioral change. This manner of encouraging behavioral change would fit well into settings where people are often not motivated to read educational signs or listen to an interpreter but prefer experiential learning (Bashaw & Maple, 2001; Bitgood, Patterson, & Benefield, 1988). Furthermore, since encouraging conservation behavior is the mission of environmental education centers, zoological parks, and aquariums, then encouraging connection to nature seems to provide a way to meet these goals.

The results of this study are limited. The researchers only examined one setting and other possible outcomes—such as learning, attitudes, and emotions—were not systematically measured. However, if the direct experience offered by this immersion exhibit led to an increase in connectedness to nature, it follows that immersion exhibits and experiences may also lead to an increase in positive attitudes and positive emotions. Lukas and Ross (2014) did find that naturalistic zoo exhibits were more likely to lead to attitude change than traditional zoo exhibits. Likewise, the study also used a
purposive sample of visitors that self-selected to see the exhibit. To some extent, these individuals are likely a nature interested population to begin with; thus, we do not know if they were primed to have the observed impacts or if this impact would be the same in a random sample of the general population. Additionally, the study did not measure exhibit exposure duration and its impact on connectedness to nature. Future studies should strive to compare their treatment findings to a sample from the general public. Randomly assigning visitors to exhibit type such as immersion, naturalistic, traditional, and static would also differentiate impacts due to exhibit type. Finally, although intentions for environmentally responsible behavior increased, actual behavior changes were not measured. All treatment measures were taken immediately after exiting the exhibit, resulting only in short term measures of behavioral intentions and connectedness to nature. Therefore, enduring impact of these exhibits is not clear.

Implications for future research
The results of this study show that connectedness to nature and environmentally responsible behavioral intentions can be stimulated in the absence of specific messages or efforts to increase knowledge such as educational signs and programs. Further research is needed on the effects of such experiences on connectedness, attitudes, and behaviors. For example, do only certain types of experiences increase connectedness? What exhibit types and duration of contact is needed to increase connectedness? Would personal interpretation detract or enhance this effect? Finally, since direct experiences are more predictive of learning than indirect experiences (Fazio & Zanna, 1978; Ford, 1992; Millar & Millar, 1996), further research should be conducted to determine the effect of immersion exhibits on learning. How does learning from immersion exhibits compare to learning from exhibits with signs, videos, or interpreters? It is possible that the more positive visitor experiences created by such exhibits stimulate more interest and positive feelings, both found conducive to learning (Iozzi, 1989a, 1989b; Pooley & O’Connor, 2000).

References


IN SHORT
Digital Heritage Interpretation: Learning from the Realm of Real-World

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Abstract
Heritage interpretation is often used to indicate the storylines adapted to help visitors to engage with and understand historical sites or artefacts. However, until now we hardly find any noteworthy scholarly works, charter, and critical discourse on the theory and methodology of interpretation in the field of Digital Heritage. Praxis limited by such theoretical underpinning, and at the same time the unwitting obsession with technology as a way out for better interpretation is leading most of the digital heritage projects to become descriptive and ocular-centric. Although technologies and tools like game-engines, multi-player virtual environments, haptic devices, augmented visualizations and immersive displays are being used to accentuate experience and visual fidelity, nevertheless, many scholars argue that technology alone can only provide partial interpretation. This paper raises the demands for an interpretive method for digital heritage and proposes some guidelines based on interpretation theories and scholarly materials from the real-world heritage domain.

Keywords
digital heritage, interpretation, real-world, interpretive principles, Tilden, end-user
Background

UNESCO’s Charter for “Preservation of Digital Heritage (2003a, p. 1)” defines digital heritage as “unique resources of human knowledge and expression. It embraces cultural, educational, scientific and administrative resources as well as technical, legal, medical and other kinds of information created digitally or converted into digital form from existing analogue resources.” In this way, the field of digital heritage appears broad while digital contents in both 2D (e.g., text, image, motion pictures) and 3D (e.g., VRML models, virtual environment, navigational 3D models, and environments), can be categorized under the rubric of digital heritage. Digital heritage objects can also be viewed regarding the point of creation and classified accordingly into two types i.e. digitally born and digital surrogate. Digitally born or “born digital” are those which only exist in digital format, i.e. electronic journals, Web pages, and on-line databases. Digital surrogate on the other hand, is only a digital replica captured from an original “real-world” object for preservation, representation, or research. Captured images, 3D scanned objects, and digital video of a ritual are examples of digital surrogate objects. According to Addison (2000), the development process of digital heritage owns three major steps: (i) Documentation: everything from site survey to epigraphy, (ii) Representation: from historical reconstruction to visualization, and (iii) Dissemination: from immersive networked worlds to “in-situ” augmented reality.

Disciplines such as archaeology, history, and heritage management have set the role and objectives of interpretation with long practice and research. “Interpretation” has always been considered in these disciplines as an effective learning, communicating, and management tool that increases visitors’ awareness and empathy to the heritage site and artifacts. On the contrary, the definition of interpretation in digital heritage theory and discourse is still wide, and often suffers due to lack of adequate scholarly material, principles, and methods of interpretation (Affleck & Kvan, 2008; Tan & Rahaman, 2009) and critical discourse (Cameron, 2008; López-Menchero Bendicho, Flores Gutiérrez, Vincent, & Grande León, 2017). While there are charters available for “Interpretation and presentation of cultural heritage sites,” nothing similar exists for digital heritage. Motivated by widespread popularity and driven by the risk of losing intricate data, UNESCO (2003b) had earlier adopted the Charter for “Preservation of the Digital Heritage.” However, this only expresses its concerns for the protection of digital
resources without making any indication to its presentation or interpretation. There is also The London Charter (Beacham, Niccolucci, & Denard, 2009) and the Principles of Seville (Lopez-Menchero & Grande, 2011). Whereas the former focuses primarily on computer-based virtualization methods and their implication only, the latter is intended to improve the conditions of applicability of the London Charter.

Due to the lack of scholarly support, in most cases, digital heritage projects become obsessed with technology as a deliverer for greater interpretation and turn into descriptive while being disoriented with diverse objectives (Rahaman, Das, & Zahir, 2012). The usage of a game engine to achieve the hermeneutic environment (Champion, 2003), the usage of somatic impulse (Flynn, 2008) or haptic devices (Roussou, 2008) to achieve an embodied interaction, the application of an artificial agent and dynamic contents to get a realistic environment and the usage of augmented stereographic panoramas (Kenderdine, Shaw, Favero, & Brown, 2008), immersive displays (Tan, 2007) and holographic displays with augmented reality application (Pedersen, Gale, Mirza-Babaei, & Reid, 2017) to get more immersion are some examples. Although these efforts may accentuate experience and visual fidelity, they can only provide partial interpretation (Rahaman & Tan, 2010, 2011; Tan & Rahaman, 2009) of heritage unless it is planned under a comprehensive interpretive framework integrated with well-articulated objectives that offer an in-depth understanding of the past.

The primary objective of this paper is to suggest some guidelines for digital heritage interpretation based on learning from real-world heritage interpretation principles and methods. The paper expects these suggested guidelines would benefit further development of charters and interpretive digital content. In terms of methodology, several interpretive principles for real-world heritage interpretation by various heritage scholars are reviewed, and two matrixes are developed to correlate the ambivalence between them. Although these principles are developed solely for the physical realm, some of these are found applicable to the digital heritage and are presented as the outcome of this study.

(Real-World) Heritage Interpretation: A Review
“The chief aim of interpretation is not instruction but provocation”

—Freeman Tilden (1977, p. 18).

The term interpretation is often used to indicate the storylines adapted to help visitors to engage with and make an understanding of the place or objects in a real-world heritage site or museum. Oxford Advanced Learner’s Dictionary (2009) defines interpretation as “the particular way in which it is understood or explained.” This definition points to an inherent duality. Understood indicates to self-interpretation or self-learning, or rather to reflexiveness, explained, on the other hand indicates to presentation (or communication factor; similar concept mentioned by Moscardo, 1996, 1999) which is mostly “the act” of the interpreter (or the interactive device). A compilation of heritage interpretation definitions from diverse scholarly sources and heritage institutes by Rahaman and Tan (Rahaman & Tan, 2011) presents that interpretation has traditionally been considered as a method or tool for the presentation of or communication with visitors, aiming to facilitate, (i) Learning (conveying symbolic meaning) (ii) Provocation (promoting attitudinal or behavioral change), and (iii) Satisfaction (enhancing enjoyment of place and visit).
Figure 02: Tilden's principles elaborated by other heritage scholars
Figure 03: New principles added by other heritage scholars
Tilden (1977, p. 9) suggested a set of six principles for an “effective or correctly directed” interpretation practice for real-world heritage sites. Followed by Tilden’s other heritage scholars proposed their own set of principles while questioning the ambivalence pertaining to achieve a more effective interpretation. The first matrix (figure 2) attempts to correlate Tilden’s six principles with other scholars, and the second one (figure 3) accumulates the new additions and relates their inherent commonalities. The first matrix however reveals that many of these suggested principles are actually an elaboration and clarification of Tilden’s original principles. For example, Uzzell (1994) devised a set of fifteen principles for “good interpretive practice,” where ten of these proposed principles actually elaborate or clarify Tilden’s six principles. Uzzel’s principles no. 5 and 8 reflect Tilden’s no. 1, 1 and 13 with no. 2, 14 with no. 3, 3 with no. 4, 11 and 12 with no. 5, and 2 and 6 with no.6 (figure 2). Additionally, Uzzell has encouraged visitor participation, highlighted the importance to serve their needs, and asked to be sympathetic to locals, which are illustrated in the second matrix (figure 3) as new principles, and have been being correlated with other scholars.

From these matrixes, it has become evident that, in general, there exists eleven principles and nevertheless these principles are aimed to accentuate interpretation of real-world heritage sites, and therefore may not be directly applicable to “digital heritage” realm. However, this review sets forth some objectives for designing and planning an interpretive process for digital heritage, and helps to formulate few propositions for better presentation and interpretation as well.

Digital Heritage Interpretation
Setting the Objectives
The definition of interpretation in digital heritage theory and discourse is still in infancy, and so far, no explicit method and objective are apparently present. It is also evident that, in most cases, digital heritage projects are oriented by diverse objectives and descriptive in nature developed through a top-down approach. Therefore, an immaculate need of a comprehensive interpretive framework integrated with well-articulated objectives is evident for experiencing an in-depth understanding of the past from digital heritage project.

The current trends of interpreting digital heritage are mostly linear and authoritative and rarely offer any possibility for the emergence of multiple meaning at the narrative level (Affleck & Kvan, 2008; Rahaman & Tan, 2011). As such, it limits the possibility of interpreting the inherent significance or intrinsic values of cultural heritage from multiple perspectives. Bearing in mind that “past” is a cultural construction, this paper, therefore, suggests that the past in the digital media should also be reconstructed in a pluralistic manner. As virtual reconstruction models are mostly partial (Dave, 2008, p. 49); allowing users with diverse backgrounds with social and ethnic identity to contribute to the narrative level, a simultaneously pluralistic and multiple perspectives of history can be achieved. Thus, a more comprehensive and inclusive scenario, akin to the concept of re-construction by Uzzell (1989) seems achievable. Moreover, accepting these multiple voices and juxtaposing them at the narrative level, it can also be possible to overcome any “linear interpretation” and present shortcomings of “image of practice” (the term coined by Kalay, 2008).

Referring to the matrix (figure 2 and 3), it has become apparent that most scholars emphasized on three primary objectives. First, any interpretation should aim to satisfy
the visitors (no. 1, 6, 8, 10). Second, most of the scholars suggested some learning activities for conveying the inherent significance of the site or artefact to the visitors (no. 1, 2, 3, 5, 11). Third, a successful interpretation should also enable the visitors to make their own constructions of the past. That is why the interpretive program should aim to provoke visitors (no. 4, 7, 9) to attain some empathy about the heritage site as well as local people for future preservation, conservation, and restoration. Finally, engaging visitors through dialogue and discussion, various task-based activities, including role-play, are suggested by different scholars.

Concerning the previous review and having the possibility of an enhanced dialogue and interaction in delivering multiplicity in content creation (Witcomb, 2008), this paper presents the following four objectives to be consider for an effective and engaging “digital heritage interpretation”:

1. Satisfaction: Users need to be made satisfied. The interpretive process should aim to enhance their enjoyment of the place and visit.

2. Provocation/Empathy: The process should increase the awareness of heritage protection, preservation, or conservation. It should facilitate attitudinal and behavioral change among the end-users about the heritage site, people and culture throughout the process.

3. Learning: The process should aim to convey the symbolic and cultural meaning to the end-users through some learning activities.

4. Multiple perspectives of the past: The interpretive process should present the history from possible multiple perspectives; thus, it would provide the opportunity to have a broader and alternative understanding of the past.

Some suggestions:

It is evident that the principles, which are presented in figures 2 & 3, are primarily developed for interpreting real-world history and archaeological remains, and unfortunately, most of them are not directly applicable to digital heritage realm. For example, principles related to physical experiences (touching or orienting) are still incomprehensible in the digital realm. Again, implementation of some principles such as variety in experience or stimulation to know more requires a deeper understanding of interaction design theory and practices. Nevertheless, some principles are still proving to be useful as a source for development of guidelines for digital heritage interpretation. For example:

- Variety in content with the consumer-led approach: End-users are people with varied interests, modes, and expectations. Therefore, content delivery and design must appreciate their needs and interests. Thus, it needs to follow a consumer-led approach with variety in content and presentation. Information can be sorted and delivered at different levels such as beginner, intermediate and expert. 360-degree panorama, interactive maps, VRML models, images, videos, animations etc. can support a 2D platform to achieve variety in content (such as the project bdheritage, www.old.bdheritage.info, dated April 29, 2015, developed on web 2.0 platform). For 3D environments, the range may differ according to the means offered by the media/tool to present information (such as 3D stereoscopic projection of the project Place Hampi, http://www.place-hampi.museum, dated April 29, 2015). Moreover,
the exploration routes and challenges arising from having different complexities or options to select will satisfy end-users’ preference and can further strengthen the consumer-led approach. Manipulative and interactive contents, therefore, may act as a catalyst here. This way, the end-users will be able to explore the variety in terms of levels or contents and according to their preferred time and needs.

- Novelty, conflict, and surprise in content presentation: Studies show that for exhibits in a museum that are different from traditional static objects have more “attracting power” and “holding time” on visitors (Moscardo, 1996, 1999). Considering this, presentations, which are novel and inherit the potential to surprise end-users, are likely to induce mindfulness and enhance users’ level of understanding and promote learning. The introduction of new digital media/tool, such as haptic devices for simulating the sense of touch (such as CREATE project) or re-use of old media for creating a new experience (such as “Hole in the Earth” in Bullivant, 2007), are examples of such attempts.

- Setting cognitive dissonance by challenges to explore: Repetitive or conventional presentation or environment leads the end-users to a situation of mindlessness. On the other hand, mindfulness occurs in a novel and unfamiliar situation where individuals require considerable effort or cost to take control of the activity (Langer, 1989). In a situation where a breakdown occurs, the users have to shift their attention consciously to handle the situation, thus correcting or improving the involvement (Riva, 2004). This helps visitors to learn more and to be empathetic about the heritage site. An effective interpretation process can help mediate the present experience of the end-users with a new complex historic environment, such as The Palenque project (Champion, Bishop, & Dave, 2011). This can be done by involving them in cognitive conflicts and challenging them to explore this environment while allowing them to be in a collaborative discourse and knowledge sharing. Online competition, challenges, points and awards for successful task completion can help enhance exploration and participation. Featured members can be highlighted to stimulate others to engage more (e.g. http://museum3.net, dated April 29, 2015).

- Easy orientation and navigation: Visitors’ own choice of exploration is highly recommended for physical heritage interpretation practice to enhance the satisfaction of the visit. 3D maps, guide maps and signs for directions are often used to support visitors’ own choice of exploration at a heritage site. Studies from Orion and Hofstein (1994) and Falk (1991) revealed that people in a new and unfamiliar setting spend a significant portion of their energy in getting oriented, and consequently learn less from the site. Similarly, for digital heritage, the end-user needs easy orientation in the new virtual environment or interface. Long data loading time, complex navigation system and heavily loaded graphical details may hinder their expedition. Some end-users may not even have enough time and interest to visit the whole project. Moreover, it is necessary to help them develop a mental model of the entire site so that they can map their way of exploration. Interactive maps, navigational maps, virtual agents and visual guides can be strategically used considering the media or platform. Additionally, the end-users should be allowed to save the experience, quit any time from the tour or re-start their journey to ensure full freedom of the visit (such options are available in 3D games like Tomb Raider, Crysis, and Call of Duty).
Openness to new information: Our knowledge of the past is limited, and end-users are varied people with different expectations. To have an enhanced understanding, the past needs to be presented from multiple perspectives. Moreover, to make every visit unique, new and updated information is to be frequently added (as in Facebook). Instead of considering “interpretation” as a tool, it can be conceived as a “process” that allows the narrative to evolve over time through collective participation. Allowing end-users to contribute at the narrative level will therefore not only allow accommodating multiple perspectives of the past, but also help those individuals to get familiarize with the context and to have a sense of ownership. This will also enrich the collective content as well as inter-subjective understanding (i.e. learning).

Affordances and connection to the visitors’ experience: Interpretation as a process should relate the presented information with the personality or experience of the visitor; otherwise, the experience would be sterile. Tilden (1977, p. 13) suggested a personal connection with the visitors with examples of presenting information. McManus (1989) Rand, Design, Parks, & Aquariums (1990) and Volkert (1991) also suggested simple conversational style approach for making a connection with the visitors. Analogies and metaphors that link the interpretive content to the everyday experience of the end-users may be used. For example, perceiving the size of a soccer field is easier than a size of an area of 42,599 square feet. For digital heritage, some pre-visit information may be asked and the system may then provide the sorted or filtered information according to the preference or last visit of the end-users, similar to the way that Google presents its search results to users.

Conclusion
UNESCO (2003a) refers to digital heritage as any “born digital” or “digital surrogate” objects that contain unique resources of human knowledge and expression. Heritage interpretation, on the other hand, is considered as an effective learning, communicating, and managing tool that increases visitors’ awareness of, and empathy to, the heritage site or artefacts. In contrast, the definition of digital heritage interpretation is still broad; so far, neither any method nor any objective is evident within the domain of “digital heritage” theory and discourse. This gap has led many digital heritage projects to be motivated towards on demonstrating the technical artistry and power of new technology in representation rather on the methodology on how to interpret the digital content to the end-users. Developed through a top-down approach with linear narratives, such projects assume end-users as a unique entity and limit heritage to the level of a mere consumable product. Although the use of new technologies may sometimes accentuate experience and visual fidelity, however, they only provide partial interpretation, as technology alone cannot comprehensively represent the past from multiple perspectives.

Considering the limitations of assuming a straightforward definition of digital heritage, and highlighting the limited role of cultural institutions in developing guidelines or charter on digital heritage interpretation, this paper first conceptualized the definition of digital heritage. Some traditional interpretation theories and methods from the real-world heritage are reviewed, and subsequently, two matrixes have been developed to compile notable interpretive principles discussed by various heritage scholars, and to correlate them with Tilden’s. This study has revealed the inherent ambivalence between these principles and led us to define four key objectives, such
as satisfaction, provocation, learning, and multiple perspectives of the past for digital heritage. Learning form this matrix, this paper eventually proposes a set of suggestions for further development of a comprehensive interpretive method for digital heritage.

Overall, this paper raises a critical query of a much larger issue, instead of providing a comprehensive solution. As such, these recommendations are based only on real-world heritage realms; development of a comprehensive interpretive method for digital heritage would indeed require an in-depth study of allied disciplines such as Human Computer Interaction (HCI), Learning and Cognition.

References


A Brief Evaluation of an Interpretive, Self-Guided Mobile Tour

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Abstract
In this brief report, an evaluation of a self-guided mobile tour was conducted at a new set of research facilities located at a university designed to attract two audiences: researchers and public visitors. A qualitative analysis using the think-aloud method was completed using the three types of devices through which visitors can complete the tour: a paper booklet, smartphone, or tablet. Findings from a college student sample demonstrated that the paper booklet was easier to use as opposed to the use of a tablet or smartphone. Participants discussed that paper booklets in guided tours offered the ability to take time to explore the landmarks and interpret the underlying meaning behind them. Suggestions are offered for future research on self-guided mobile tours based on research facilities.

Keywords
Self-guided mobile tours, think-aloud method, research tours, qualitative evaluation

Background
The Discovery Park Tour is a new, self-guided tour that allows users to explore a set of research facilities guided by their choice of a booklet, smartphone, or tablet. As part of a university setting, Discovery Park is tailored towards researchers in healthcare delivery and biosciences. The site is publicly accessible through exhibits throughout its six buildings, including sculptures, videos, static graphics, glass barriers where visitors can observe lab experiments, and a café.

Through the Discovery Park Tour, visitors can walk through its research facilities guided by one of the aforementioned mobile devices. There are 11 “stops” in total throughout the six buildings. The tour is designed to attract the two main audiences...
at Discovery Park: 1) scientific researchers at the university and 2) the general public. Visitors can take the tour of Discovery Park by following printed signs posted throughout each building, numbered and marked with QR codes. Physical booklets provide additional information about the tour. By scanning a tablet or phone via the QR code, visitors can listen to a pre-recorded narrator provide audio/video as a guide as they visit each building through a website optimized for each device.

In this report, a study for Discovery Park was conducted to assess a user evaluation of the tour to help inform future iterations of the tour.

Methods
Upon Institutional Board Review approval, data collection included 30 students at the university (54% female; 46% male). Participants ranged from 19 to 25 years old (M=22). Participants elected to take the study through a university-wide research recruitment system as part of fulfilling a requirement to complete a research study. Participants were either given the booklet (n=10), tablet (n=10), or smartphone (n=10). In recent studies of interpretive-oriented guided tours, participants could opt to use their own phone (Van Winkle, 2012), a common practice in tours (e.g., museum and historic sites). As such, participants assigned to use a tablet or smartphone were given the option to use their own mobile device. Of these, three participants opted to use their own phone, and one opted to use their own tablet.

To briefly assess the evaluation of the tour via its materials, the think-aloud method was used (Lewis & Rieman, 1993). Using this method, participants talked aloud as they took the tour, and were encouraged to say what was on their mind. Think-aloud methods typically include participants saying what comes to mind as they complete a task, which has been useful in previous evaluation (Marley, Bekker, & Bewick, 2016). The method allowed the researcher to better understand the thought process and evaluation of the tour materials as participants used them to navigate the tour (e.g., Marcus, Cooper, & Sweller, 1996).

The role of the researcher was to use a pre-task session (Gibson, 1997) to explain to the participant how the think-aloud process works. The researcher asked brief, probing questions during each session only on minor occasions as it could otherwise distort the thought process. In each think-aloud session, the researcher accompanied the participant as they took the tour. Each session lasted approximately an hour, and an audio recording was taken with participants’ permission prior to the session.

Audio from each think-aloud session was transcribed by hand. Two graduate students assisted with transcribing a portion of the audio files to compare them for accuracy. To analyze the data, a thematic analysis was conducted to identify, analyze, and organize themes in the data (Boyatzis, 1998). Themes in the data helped to categorize similar meanings from the data (Braun & Clarke, 2006).

Findings
Most participants (n=24) agreed that regardless of the mobile device provided, the tour was easy to take. Participants reported that having materials to supplement the tour experience was helpful.
Participants who were given the booklet tended to say that it was useful during the tour (n=6). Those who were given the booklet tended to report a favorable experience, often reporting that it helped with interpreting their surroundings. One participant noted that they were “able to make a connection between places.” Another participant said that the booklet was tailored to the site, and, “It seems like it was made for this place. I like flipping through the pages and visiting here.” No participants who used the brochure reported difficulty using the materials.

Participants who used tablets or smartphones occasionally said that the devices were hindrances (smartphone, n=5, tablet, n=6) to the tour experience. The devices detracted from their interpretation of the landmarks surrounding the tour itself. One participant said, “There’s so much you can uncover. The lab and the lego statue is my favorite…. I think the phone should just be quick, no audio or video, just a story.” Some participants reported that they spent more time looking at their device (smartphone, n=5, tablet= n=4) as opposed to viewing the exhibits. One participant noted, “The videos on the phone are good—like, I liked the first one, but then I felt like I was missing the rest of the things, like the first sculpture, I wanted to see what it was about, but, I tried to keep up with the next stop along the way instead.” A participant who was given a tablet noted, “For a place like this, you just need one device—I saw the booklets and would have liked that. I like the video, but I’m not watching around me as much, even though I can click, can stop [video].”

The research facilities that were the setting for this case study contained exhibits for public visitors, though several participants felt overwhelmed by audio/video materials.

<table>
<thead>
<tr>
<th>Device-specific themes</th>
<th>Tour itself</th>
<th>Brochure</th>
<th>Smartphone</th>
<th>Tablet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Device was examined more than the tour itself</td>
<td>-</td>
<td>1*</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Device provided helpful video</td>
<td>-</td>
<td>-</td>
<td>6*</td>
<td>5*</td>
</tr>
<tr>
<td>Device was appropriately tailored</td>
<td>-</td>
<td>7</td>
<td>7*</td>
<td>6*</td>
</tr>
<tr>
<td>Device hindered interpretation of the tour</td>
<td>-</td>
<td>0</td>
<td>5</td>
<td>6</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Tour-specific themes</th>
<th>24</th>
<th>21</th>
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| Note. N=10 in each category with the exception of tour itself, which encompasses N=30. *Denotes results not discussed in the manuscript.  |

Table 1. Emergence of major themes among participants during the Discovery Park Tour

**Booklet**

**Smartphone and Tablet**

**Discussion**

The research facilities that were the setting for this case study contained exhibits for public visitors, though several participants felt overwhelmed by audio/video materials.
that were given in the materials to assist them. As noted in the findings, participants reported spending more time listening and watching to those contents—thus, missing out on the tour itself. Participants who used a brochure did not have to interact with audio/video, so this was not a concern. The design of materials themselves may need to be analogous across devices. Future research may examine the differences in materials presented across multiple devices.

Participants in the current study who received the booklet reported that they could easily navigate the tour and had no difficulties with the materials, as opposed to those who had a tablet or smartphone. By making associations between printed materials and the purpose of the site itself, visitors might make clearer connections with the tour, thereby building a more meaningful experience (e.g., Hunter, 2016). For example, visitors might be more likely to return to the site in the future.

Several limitations of the current study exist. The next steps in examining tours of research sites that are open to the public are to examine a broad demographic, as opposed to a college student sample. It is necessary to recruit researchers to take the tour to continue to evaluate the tour and identify their reactions. Next, tours like these can vary from large, public institutions to smaller institutions that are beginning to develop tours to assist, educate, and welcome visitors, so these results are not necessarily generalizable. Additional research sites should evaluate tours based on the type of institution in which they are housed.

This study served as an initial evaluation of the self-guided mobile tour of Discovery Park. Future research should expand on this work by employing mixed methods approaches to optimizing self-guided tours. Understanding how to improve the tour can help develop best practices to creating tours of research sites that are useful for scientific researchers and the general public.

References


IN MY OPINION
Mind the Gap: Academics, Interpreters, and Historical Interpretation

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Abstract
This call to arms reminds interpreters and academics to cooperate and collaborate. Historic interpreters and historians often misunderstand and resent each other. Tesdahl suggests that each group aims to inform and inspire the public and misses out if they do not work together to accomplish this. The author harkens back to an earlier definition of the term amateur suggesting that professional interpreters and historians should meet their standards but should do history passionately because they love it. If they do, a more informative, engaging, and collaborative history that includes all audiences will emerge.

Keywords
historic interpretation, historian, amateur, professionalism

Mind the Gap
The thing that I love most about history is that it’s full of amateurs! Before you take this as insulting, consider this. Like a growing number of public history professionals I tread a difficult path. I have participated in living history events of the Seven Years’ War Era for over twenty years. I have worked in public history for over a decade at archives, museums, historic sites, and national parks. I am also an academic historian. I teach and study indigenous histories, American women’s history, and early America. There is a gap between these communities. Each community feels it has the best grip on the past and these communities are all too often unwilling to work together. The gap between us is as noticeable as it is avoidable. Historical interpreters, historians, and museum professionals
each seek to provide the public with the most accurate image of the past. History becomes relevant to students of all ages when historical interpreters, historians, and museum professionals collaborate and use their strengths to inform and inspire.

Many historical interpreters, practitioners of living history, history workers, or re-enactors feel that academics are snooty snobs living in ivory towers. Most academics feel that re-enactors are self-made historians who often dispense an ill-informed brand of history with little effort or filter. Sadly, both sides of this argument are a little bit right. Ironically, both groups are also wrong. At times the public disregards both groups as standoffish know-it-alls. The confusion must stop. Historians and re-enactors are on the same side. Each aims to give the public, the most accurate, interesting, and hopefully entertaining glimpse at the past that they possibly can. Each can spark debate, inspire research, and further historical awareness (Cronon, 2012; Pace, 2004). Whether or not you present interpretation in period attire your offering must be carefully researched and engaging for all (Magelssen and Justice-Malloy, 2011).

First we must dismantle this incendiary word: \textit{amateur}. The \textit{Oxford English Dictionary} offers two definitions for \textit{amateur}. The first is “One who loves or is fond of; one who has a taste for anything (Amateur, 1 (n.d.), \textit{The Oxford English Dictionary}).” The second states, “One who cultivates anything as a pastime, as distinguished from one who prosecutes it professionally; hence, sometimes used disparagingly, as = dabbler, or superficial student or worker (Amateur, 2 (n.d.), \textit{The Oxford English Dictionary}).” The second definition evokes bristling images of ill-informed performances and is too often used as a disparaging epithet for someone who does not know their history. This is akin to the insult, “farb” (Horwitz, 1998, p. 10–11).” This derogatory term for someone who does not do an accurate portrayal within historical interpretation has cross-pollinated many circles from Civil War re-enacting from whence it began. Tony Horwitz explains, “The word’s etymology was obscure; Young guessed that ‘farb’ was short for ‘far-be-it-from-authentic,’ or possibly a respelling of ‘barf’ (Horwitz, 1998, p.10-11).”” Such name calling develops between historical interpreters, museum professionals, and scholars, but they are unhelpful as they are avoidable.

The more meaningful definition and the one with the original intent is the first, someone who does something out of sheer love of it, from the French root \textit{amour}. \textit{Amateur} then can be a very helpful term, even a badge of honor. There is no need for a professional interpreter or historian to apologize for still being in love with the discipline that brought her into the field in the first place. In fact the craft of history needs more people like this.

Inspiring generations of interpreters, Freeman Tilden even mused over the significance of the term amateur in his \textit{Interpreting Our Heritage}. In his fourteenth chapter, titled “The Happy Amateur (Tilden, 1957, 138–147),” he suggested interpreters could transform visitors into amateurs. “It seems to me that in this circumstance the great hope for aiding people in the direction of a happy and fruitful use of leisure is to be found in the national parks, the state and local parks, the museums and other cultural preserves.” Adding to this timeless suggestion, professional interpreters, academics, museum professionals, and public historians must not forget the passion of amateurs themselves.

Formal organizations often laud the professional standards their entity helped create. Part of this is helpful. The American Historical Association has offered training and rigorous standards for its members since 1884. The National Association for Interpretation has done the same since 1988 when it grew from the Association of Interpretive Naturalists (1954) and the Western Interpreters Association (1965). Among other things
this professionalization fought the previous elitism and welcomed more voices into each field (Novick, 1988, p. 182–183). The routines of professional membership can also rob historians and interpreters of something each still sorely needs: passion.

Sites, parks, and museums already collaborate with universities (Krugler, 2013, 200–203). Visitors, researchers, and interpreters benefit from this exchange. Historic sites, museums, universities, state historical societies, blogs, and others are already working together more than ever before to interpret, even the disquieting lessons, of the past with urgency today (Rose, 2016, 126–131; Mast, Vogel, and Lopez, 2014, 44–45). When they do they are reminded what history and culture are, why we should love them, and why we must welcome others to embrace them.

Reclaim the “amateur” label. Restore its passion. This may seem like a Herculean task. It need not be. Together interpreters, teachers, museum professionals, and historians have talent and can close the gap between them. Combining forces will burnish understanding of the American past and enhance how the public engages it. Historians can improve their presentation skills. Interpreters can strengthen their research skills. Most significantly this cooperation will remind all that being an amateur, a passionate professional, wields the power to welcome all into the conversation about history.

References


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 800 to 1,000 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 1,000 to 1,200 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.

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Submission
Please submit a either a digital file (PDF or Microsoft Word) or an original hard copy and three copies 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:

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