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Out with the Old, In with the New?

Comparing the effectiveness and visitor attitudes between a digital trail guide and a traditional paper booklet for self-guided interpretive walks at the Adirondack Interpretive Center

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Abstract

While the impact and use of technology in our everyday lives are significantly increasing, the impact of nature is in great decline. Society has become more interested in staying connected via smartphones and computers and less comfortable with or fascinated by the outdoors. This declining attention to the outdoors has led to a large disconnect between society nature and numerous human actions that threaten the wellbeing of our environment. These trends suggest a potential role technology can play in interpretive efforts to reestablish society's connection with nature. To assess this possibility, a digital trail guide was constructed using a preexisting paper booklet created for self-guided interpretive walks along the Sucker Brook Trail at the Adirondack Interpretive Center (AIC) in Newcomb, NY. The goal of developing this digital guide was to compare its effectiveness and reception by visitors with that of the traditional paper booklet. Assessment of visitor experiences and attitudes were to be measured using post-experiences surveys of either form of the walk. The lack of wireless internet and cell phone service along AIC's trails presented initial challenges in the development of the digital guide. The unforeseen challenge of inconsistent compatibilities of PDF Portfolios on computers and handheld devices delayed implementation of the digital trial booklet and the associated data collection. Despite this, this research project has important implications in interpretive product design and raises an interesting aspect in the debate among interpreters regarding the role technology should play in these fields. Further research and development of the digital trail guide will be essential in completion of this research project.

Table of Contents

List of Figures

List of Tables

Advice to Future Honors Students

This research project is a perfect example that not everything works out the way it is expected to. While moving through our academic careers, unforeseen challenges will present themselves and can ultimately prolong or prevent the completion of our goals and expectations. But with enough drive, research and creativity, solutions can be discovered and used to overcome these challenges.

While designing, implementing, analyzing and presenting their work, I urge future honors students to preserve through the various hardships they will face. Some of these difficulties may prevent the ultimate completion of their research. But this does not mean their work is useless. These hardships and obstacles may be just as important to report as more traditional results.

Introduction

The basis of environmental interpretation can be summarized in a quote from the Senegalese poet and naturalist Baba Dioum in his 1968 speech to the general assembly of the International Union for Conservation of Nature (Baba n.d.):

"In the end, we will protect only what we love. We will love only what we understand. We will understand only what we are taught."

This concept recognizes it is improbable people will conserve and protect nature if they have little understanding or experience with it. The goal of environmental interpretation is to help initiate healthy relationships between humans and the environment by supplying the necessary tools and experiences. By establishing this connection, it is believed participants will develop a sense of environmental stewardship.

Large-scale conservation is often dependent on the participation of society as a whole. Modifications in the behaviors of many people are often required to effectively conserve and protect natural resources and landscapes. Convincing people to implement these behavioral changes in their own lives is a main challenge for these management plans. Interpretation can play an imperative role in mitigating this challenge. As outlined by Ernst and Theimer (2011), once individuals establish a connectedness to nature facilitated by interpretation, they develop environmental sensitivity and eventually exhibit environmental behavior improving the conservation of various species and ecosystems. The importance of environmental interpretation for younger audiences is highlighted by the fact that an individual's environmental sensitivity and therefore

1

behavior is greatly dependent on interactions with nature during childhood (Chawla & Cushing 2007). The importance of this connection to nature builds on Aldo Leopold's beliefs that to feel responsible for the conservation of nature, individuals must view themselves as a part of nature instead of a separate entity (Mayer & Frantz 2004).

Numerous studies have found interpretation is an important and effective component of conservation strategies of various ecosystems. Generally, interpretation can improve conservation of natural resources by reducing human impact within a park and local communities, and providing financial aid to conservation strategies through donations, volunteering, and admission or program fees (Kohl 2005). A study at the Galapagos National Park reported several benefits of interpretation for conservation efforts (Powell & Ham 2008). It was found well-planned and implemented interpretive programs resulted in increased visitor knowledge of the island environments and support of conservation and resource management in the park (Powell & Ham 2008). Following exposure to interpretative programming, visitors also reported intending to participate in more general actions beneficial to conservation and environmental health including monetary donations, writing to political officials and reducing use of harmful products (Powell & Ham 2008).

Research has validated the conventional wisdom that higher quality interpretive media and programming is more effective. A study by Ernst & Theimer 2011 found that only two of environmental educational programs studied actually improved participants' connectedness to nature (Ernst & Theimer 2011). This shows not all interpretative content is created equally, with some being more effective than others based on their

design and implementation. This is an important consideration when designing and reviewing interpretive research studies.

The importance of the interpretive field is magnified by the growing disconnect between people and nature. People are spending more time indoors and away from nature more than they ever have before. While the impacts of this trend are not well understood (Katcher & Beck 1987), recent research has begun to identify and quantify the positive impacts nature has on the health and well-being of society. These benefits include increased vitality, life satisfaction and an improved emotional state (Ryan et al. 2010); increased physical activity and recreation, solitude and relaxation, and improved personal relationships (Maller, Townsend, Brown & Leger 2002). Many of these benefits relate to E.O. Wilson's biophilia hypothesis which states humans have a natural inclination and desire to interact with nature and other forms of life (Wilson 1984). Many people demonstrate unmistakable preference and awe for various ecosystems and natural phenomena. Therefore, it can be expected that spending more unstructured time outdoors can lead to better physical and mental health.

While time spent with nature is declining, the time people spend captivated by technology is on the rise. In 2011, people age 15 and over dedicated an average of 2.8 hours per day watching television, constituting about half of their leisure time (American Time 2012). Spending time on computers and the internet has also become a major component of the everyday lives of many people. A preliminary study of college students found the average participant spent 100 minutes per day on the internet (Anderson, 2001). Through the advancements in cell phones and tablets, users are able to bring technology with them throughout the day and are constantly "plugged in."

This rise in technology use presents interesting problems and opportunities for environmental interpretation. Because people spend so much time indoors captivated by technology, there is less time spent outdoors, particularly at sites where interpretive services are offered. While this is certainly a potential problem, technology may be a tool interpreters can use to better achieve their ultimate goal of facilitating the development of relationships between people and nature. Incorporating technology into interpretive techniques may increase interest, participation and knowledge retention from these provided services. Recent research investigates the many ways technology can be incorporated into environmental interpretation and informal science education. Lai, Yang, Chen, Ho and Chan (2007) investigated the role technology can play in offsetting the general weakness of experiential learning – the lack of a mechanism to encourage learners to focus their attention on the information being provided as well as spending sufficient time reflecting on the information presented. Technologies such as handheld devices help construct a learning flow guiding users along a logical and effective progression and preventing them from losing interest or getting lost in their natural surroundings (Lai et al. 2007). . Using a "Mobile Plant Learning System" on personal digital assistants (PDAs), students in a Taiwanese class scored higher on a botany identification and ecology test following their use of the software in comparison to students who used a traditional guidebook (Huang, Lin & Cheng 2010). Students who used the PDAs also reported they better enjoyed outdoor plant learning activities and valued the educational opportunities the PDA provided them (Huang, Lin & Cheng 2010). Another study found PDA users received higher scores on post-tests and made more reflective observations than students who did not use PDAs (Lai et al. 2007). Use of

technology in education in the field has also been found to improve student motivation (Crom & Jager 2005). In a study very similar to this one, families using an electronic Mobile Nature Guide read more content than those using a paper-based guide (Ruchter, Real & Dupmeier 2005). Also, families and students using this Mobile Nature Guide spent slightly more time at stops along the self-guided walk and were more frequently motivated and inspired while using the guide (Ruchter et al. 2005). Rogers et al. (2004) reported students used information they were learning from various electronic devices and media to make connections with their natural surroundings (Rogers et al. 2004). This same study concluded that digital media has great potential for "stretching children's minds" (Rogers et al. 2004).

Although several studies have identified the educational benefits of using electronic devices in an outdoor setting, these results are not unanimous. In a previously mentioned study, users of a paper-based guide more frequently reported the media was helpful and they were content and relaxed while using traditional media than users of a Mobile Nature Guide (Ruchter et. al 2005). Also, one research study reported no significant differences in knowledge retention, attitude or motivation toward the environment between participants of a PDA-based tour and paper guidebook-based tour (Ruchter, Klar & Geiger 2010). In this particular study, it can be concluded that the technology-based tour is as successful as the traditional paper booklet-based tour. This new research utilizing a digital trail guide presented by this paper will help add to the information available for interpreters and educators regarding the usefulness and success of incorporating mobile devices into interpretive programming and informal science education. This is especially important when considering the need for concrete evidence

that this technological approach is effective before nature centers invest their limited time, energy and resources into the required materials (Ruchter et al. 2005).

The goal of this research project is to further investigate use of technology in the interpretive field by directly comparing effectiveness and visitor acceptance of a technology-based and traditional trail booklet for a self-guided interpretive hike. At the Adirondack Interpretive Center in Newcomb, NY, paper trail booklets are available to visitors to use while hiking along the Sucker Brook Trail. Numbered entries in the booklet correspond to numbered posts found along the one mile trail. Each entry contains interpretive material regarding natural phenomena that has been shaped by water and is located in the vicinity of the matching post. Along with short paragraphs containing information describing the phenomena and introducing associated wildlife species, the entries also include relevant hand drawings depicting the presented concepts. This self-guided interpretive hike allows users to individually explore and discover different aspects of the ecosystems typical of the Adirondacks.

Traditionally, these trail booklets paper-based and are made available to the visitor when they arrive at the center. In contrast to this traditional version, an electronic version of the trail booklet was created to incorporate technology into nature-based education and interpretation. The research questions of this project are:

1. Does a digital trail guide facilitate more effective visitor experiences than a traditional paper booklet?

2. Do visitors approve of this use of technology in nature-based interpretation and education?

The related hypotheses for these research questions are as follows:

1. Users of the digital trail guide will have higher information retention, more enjoyable experiences and be more engaged with the interpretive product than users of the traditional paper booklet.

2. Visitors will approve of and prefer this integration of technology into their experiences along the Sucker Brook Trail.

These hypotheses are based on the overall trends in use of technology and results of similar research projects as discussed above.

Methods

Digital Trail Guide

The new digital Sucker Brook trail guide was created using Microsoft Office 2010 Publisher. During this initial stage, the electronic guide's creative design was developed. Main pages retained the same interpretive text from the paper trail booklet, but did not include the original hand drawings. The program was also used to create new and original "Species Sheets." These documents provide identification, ecology and habitat information regarding species mentioned in the original paragraphs for each stop. Photographs and audio clips were also incorporated into these documents. Once the main pages and species sheets were saved as a portable document format (PDF) files, they were imported into a PDF Portfolio. This program, available through Adobe Reader X, allows navigation through multiple PDFs in an easy-to-use and attractive format. The PDF Portfolio includes a home page that provides access to the main pages for all sixteen stops along the Sucker Brook Trail. Another valuable feature of this program is the ability to create links between different PDFs. Through this function, links were created

between main pages and species sheets associated with wildlife mentioned in the interpretive text at each stop. This allows users to easily investigate the natural history of these species by tapping on the name of species on the main page. Incorporating text and an associated link on species sheets to direct the user back to the main page provides a straightforward opportunity to navigate the numerous documents. It is through this application that audio files are able to be included in these species sheets as well. A visual comparison of interpretive media provided by both forms of the trail booklet is shown in Figure 1.

The digital trail guide in the PDF Portfolio format will be made available on the AIC's website. Using either internet access at home prior to arriving at the center or the wireless access provided in the center's lobby, users can download the guide onto their own mobile device before heading out onto the trail. It was not initially planned for the center to lend out handheld devices to participants.

Surveys

To evaluate the effectiveness and acceptance of the digital trail guide, surveys were created to record responses from users of both the digital and traditional versions of the trail booklet following their completion of the self-guided interpretive hike (Appendix 2). The purposes of each Item can be found in Table 1.

Analysis of Results

Items 4-15 on the digital trail guide survey and Items 4-14 on the paper trail booklet survey are close-ended questions and therefore can be analyzed quantitatively, primarily by taking the mean response. Items 4-13 utilize the Likert scale and will allow for easy

analysis because of inherent numerical values placed on visitor responses. The mean

difference between Items 9 and 10 will provide a better understanding of the change in

knowledge of the information regarding the theme. Item 14 for the paper booklet survey

and items 14 and 15 for the digital trail guide are multiple choice and therefore the

distribution of answers will be used to analyze these responses. Items 6 and 12 will

indicate if visitors are thoroughly reading and answering the questions since they are

negatively connoted or reverse scored. Because the Items of both surveys are so similar,

direct comparison of mean responses of both user types will be reasonable and

meaningful. T-tests will be used to determine if differences are statistically significant.

The last two items of both surveys are open-ended questions and therefore will need

to be analyzed qualitatively. The first open-ended question begins with a yes-or-no

question and therefore this aspect will be able to be analyzed quantitatively, but the

explanation of this answer as well as the second question will need a different approach.

Responses will be organized into different categories and then further analyzed.

Results

Throughout the planning and designing of the digital trail guide and its

implementation, two main complications were revealed and therefore prevented the

collection of any traditional results. One prevented an easier and initially planned format

of the digital trail guide, while the other has delayed the execution and use of the PDF

Portfolio format of the guide.

The initial intent of this research was to utilize quick response (QR) codes. These

small black and white grids can be scanned using any mobile device equipped with a

camera and will subsequently direct the user to information on an assigned website.

Many interpretive sites and educators are beginning to utilize QR codes to better provide information and material to visitors and students (Lee, Lee & Kwon 2011). Unfortunately, the lack of either wireless internet or cell phone service along the trails at the Adirondack Interpretive Center impeded any use of QR codes in this research. It was speculated that QR codes could be used to direct users to documents already downloaded onto the device, but after considerable research, it became clear this was infeasible. Because of this, alternative approaches were researched and the PDF Portfolio format was chosen. This challenge ultimately delayed data collection in the summer of 2011.

Based on preliminary research, it was believed the capabilities of PDF Portfolio on a computer would be the same when transferred to mobile devices. Unfortunately, after a considerable amount of work on the PDF Portfolio, it became clear the format of the PDF Portfolio once transferred to mobile devices became very distorted (Figure 2). The home page and links between the Main Pages and Species Sheets are nonexistent in the reformatted version on handheld devices. Therefore, the original aesthetic and educational benefits of the digital version of the trail booklet are lost. Because of this, it is unlikely this version of the digital trail guide will have any positive effect on visitor preference or experience. Unfortunately this issue was not realized until late summer of 2011 and therefore there left little time to research solutions before the beginning of the fall semester.

Discussion

Benefits of This Format

As stated above, it is believed the digital trail guide will be more appealing to people who are unfamiliar with the outdoor setting, and are comfortable and enjoy using mobile

devices. Alongside this concept, there are many other potential benefits of this new trail booklet format. By including photographs and audio clips, the interpretive hike can accommodate for a wider variety of learning styles and increase accessibility for users with disabilities. This will therefore accommodate for a wider audience (Knudson, Cable & Beck 1995). It also conveniently provides the user with much more information than the original paper booklet. This can reduce the confusion or discouragement of users who are unfamiliar with the many species mentioned in the original trail booklet. It may be difficult for visitors to connect with concepts introduced in the text if the user cannot identify or imagine the referenced species. Providing this additional information also allows the visitors to personally explore information that interests them. Therefore, the digital trail guide can organically cater to a variety of audiences. For example, an avid birder can thoroughly explore the species sheets for various birds and glance over or skip those they are less interested in, such as those dedicated to mammalian species. This additional information could be included in the paper booklet, but it would result in a much thicker and heavier guide that would likely be difficult to carry and navigate. Because the digital trail guide is electronically-based, it will also be much easier to modify the guide to incorporate changing seasons, different age groups, etc. As stated in Huang et al. (2010), this combination of technological devices and environmental interpretation allows education to be more flexible, socially engaging and interactive. Importantly, technology such as the digital trail guide should not be distracting, but instead provokes and encourages users to explore their environment (Rogers et al. 2004).

<u>Implications of Research</u>

Once properly implemented, it is anticipated the results of this research will have great implications in environmental interpretation and informal science education. Once data is collected and analyzed, quantifiable information will be available to better understand and discuss the often theoretical debate surrounding the use of technology in these fields. This study's conclusions will also be helpful in determining where efforts should be placed in these fields to better reach a wider range of audiences and achieve the ultimate goal of environmental interpretation.

There is much debate regarding the role technology should play in interpretation and outdoor recreation. It is evident there needs to be some concern and care when incorporating technology into nature-based education. There is an intangible flawlessness in solitary and tranquil experiences in nature. The use of technology has the possibility of disrupting these moments and many people disapprove of it for these reasons. Similar issues, including "a dependency on technology, a defective handling of nature and a partial loss of holistic experiences," were identified in a study that surveyed experts from numerous related fields in technology and interpretation (Bleck, Bullinger, Lude & Schaal, 2012). Shultis (2001) points out the worrisome trend that some visitors are simply going outside to use their technology, instead of using their technology to better interact with nature. Others realize that many people are unlikely to personally seek out these experiences and instead, the use of technology may help entice them to seek outdoor recreation and education. This is an ongoing debate that concerns not only interpretation and education, but outdoor recreation as well (Shultis 2001). Some park and outdoor recreation managers have strong viewpoints on this subject. For example, the

management at Baxter State Park bans the use of cell phones, radios and televisions within the park (Shultis 2001). The results of this research may help contribute to academic communities understanding of the use of technology in environmental interpretation, education and recreation and contribute to the development of pedagogy and effective strategies.

A major obstacle to the main goal of environmental interpretation is the common difficulty of inspiring people to interact with nature in the first place. The high interest in technology found in today's society can be utilized by interpreters to draw people into their facilities and programs. It can be very intimidating and challenging for people who are constantly "plugged in" to leave their technology behind when entering a natural landscape. This digital trail guide is a perfect intermediate step that helps to encourage these people to explore nature while not feeling too vulnerable or uncomfortable from being in an unfamiliar setting. Hopefully as they begin to build a relationship and appreciation for nature, they will feel comfortable leaving their smartphones and tablets at home and simply explore nature for the purpose of furthering that relationship organically. The progression of this relationship using technology-based interpretation can be simplified into four general stages (Figure 3). Stage 1 occurs before the use of the digital trail guide in nature. This stage is represented by a low interest in and contact with nature. The initial contact with nature using technology-based interpretive media happens at Stage 2. The progression eventually evolves into Stage 3, where the individual is still using the technology-based interpretive media, but is beginning to develop a better understanding and connection with nature. At the last stage, the individual has a strong connection with nature and feels completely comfortable in the natural environment

without the use of technology-based media. This progression is very similar to the theoretical development of an individual's relationship with nature that is facilitated by environmental interpretative media and is the basis for the interpretive approach. The only main difference is the contact with nature is facilitated by interpretive media that is technologically-based.

Whether the future results of this study reveal this modified interpretive approach is beneficial or not, they will be important in improving the effectiveness of environmental interpretation and informal science education. They will help interpreters and educators make mindful and informed decisions regarding the use of technology in their educational instruction. If it is found the digital trail guide facilitates more effective visitor experiences, it could be suggested that other facilities begin to incorporate technology-based media into their interpretation efforts. The opposite can be suggested if users of the paper trail booklet have more effective interpretive experiences.

One of the most important implications of this research is providing better insight in the visitor acceptance and preference of this approach in interpretive media, something few other studies have researched. It may in fact be found that visitors dislike this use of technology in the outdoors and do not intent on using it. If this is the case, it may be unwise and pointless to further pursue the possibility of using such technology in outdoor interpretation and education. Therefore it is not because the use of technology is less effective, but simply because the public does not approve or prefer this approach.

The results of this research will also be relevant to interpreters creating media and programs specifically created for school groups, as well as allowing school teachers to expand learning from the classroom to the outdoors. This type of education is defined as

ubiquitous learning where students can learn the information taught in traditional classrooms and resources "on-demand" in a variety of locations and situations (Huang et al. 2010). The ability to use these technological approaches to help students explore and learn about the natural environment has been studied in several different settings (Huang et al. 2010; Lai et al. 2007; Ruchter et al. 2010; Rogers et al. 2004; Lee et al. 2011). This study's results may be applied to the already available information regarding using technology in school education in an outdoor setting.

Future Research

There are two main components of future research, investigating potential solutions to allow data collection to begin and new projects that will further explore this use of technology in different interpretive and educational settings.

Further investigation in the operating systems of smartphones and tablets may reveal a new approach enabling the digital trail guide to be hosted on these handheld platforms. Also, a simple upgrade in the Adobe Reader app for smartphones and tablets has the potential to overcome the hosting challenge. Either solution will allow data collection to begin. Research and investment in portable micro computers that will host the trail guide in its current form is another potential approach allowing this research project to advance. As opposed to having to reformat the digital trail guide, using compatible computers will allow full utilization of the guide as designed along the trail.

Many other research projects can be implemented to better understand this use of technology in outdoor interpretation and education. Web-based trail guides similar to the one created for this project can be used in conjunction with QR codes at sites where this approach can be supported. This research can study the effectiveness of a different format

of digital trail guides that is easier to create and implement at most sites. Comparing the effectiveness of the digital trail guide and nature walks led by naturalists and interpreters will have interesting implications on where future effort should be placed in the often underfunded and understaffed nature centers around the world. This will be especially true if it is found that one form of interpretation is more effective than the other in connecting visitors with nature. The results of such research can be added to the information obtained in previous studies that incorporated human guided nature tours into the comparison of different interpretive approaches (Ruchter et al. 2010).

Limitations of Data and Potential Sources of Error

Because of the study design of this research project, there are several potential data limitations and sources of error. Because the research is dependent on volunteers from the general public, it is virtually impossible to control for demographics such as age, gender, degree of environmental education, familiarity with the Adirondack ecosystem and familiarity with handheld devices. Inconsistencies in any of these demographics have the potential to skew the results. This stresses the importance of obtaining sufficient demographic information from the visitors using items in the survey that can be included in the analysis of the results.

Due to budget constraints, it is not intended at this time to supply visitors with handheld devices to use along the trail in conjunction with the digital trail guide. Therefore, the users of the digital trail guide will be limited to participants who already own a personal smartphone or tablet. This can affect the results since the opinions of users of the electronic version will mostly include those who are familiar and comfortable with using these devices while excluding many participants who do not own a handheld

device and therefore are unfamiliar with them. It is probable that these different user groups would have different experiences using the digital trail guide and this variation in experience may be misrepresented in the results.

Also, the results stemming from visitor responses to the survey may be misrepresentative of the visitors' actual experiences in some cases due to a variety of reasons. For example, there may be differing interpretations of the numerical values of the Likert scale for the close-ended questions in the survey. There is also a possibility participants are not entirely truthful in their answers or may misunderstand items in the survey.

Conclusion

The strong increase in the use of technology by the general public can be utilized by environmental interpreters and educators to improve their effectiveness in assisting the development and improvement of relationships between people and the natural environment. This research intends to further examine this possibility by comparing a technology-based and paper-based guide for a self-guided interpretive walk. The results of this research will have great implications in the fields of environmental interpretation and informal science education, by helping to inform the ongoing debate regarding the use of technology in interpretation and education and determining the interpretive value of a digital trail guide. For several reasons, implementation of the digital trail guide and data collection has been prevented and delayed. Further research into alternatives will help to alleviate these challenges. There is great potential in incorporating the concepts used in this study into future research projects. Acknowledging an understanding various

limitations and sources of error will be important when analyzing and considering the

results of this study.

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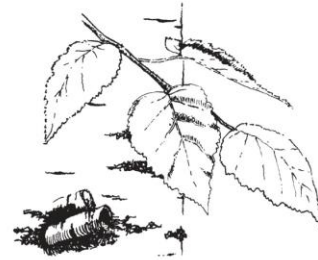Wilson, E. O. (1984). *Biophilia*. Cambridge, Mass.: Harvard University Press.

Appendix A: Figures and Tables

a.

b.

Of Birch Beginnings

Gently touch the bark of this large white birch to your right. Water may play subtle roles in shaping a forest. Crystals of ice fracture stone, initiating soil formation. This tree thrives in mineralized soil where few plants flourish. When water is scarce and fire consumes the organic layer of forest soils, white birch may seed over large areas of the remaining mineral soil, forming nearly pure stands. As the stand ages, only a few hardy survivors such as this giant remain. In summer listen carefully. You may hear the songs of red-eyed vireos and hermit thrushes which nest in this patch of forest!

b.

2

Of Birch Beginnings

Gently **touch** the bark of this large **white birch** to the left of the numbered post. **Water** may play subtle roles in shaping a forest. Crystals of **ice** fracture stone, initiating soil formation. This tree thrives in mineralized soil where few plants flourish. When **water** is scarce and fire consumes the organic layer of forest soils, white birch may seed over large areas of the remaining mineral soil, forming nearly pure stands. As the stand ages, only a few hardy survivors such as this giant remain. In summer, listen carefully. You may hear the songs of **red-eyed vireos** and **hermit thrushes** which nest in this patch of forest!

d.

Hermit Thrush

Back to Stop 2: Of Birch Beginnings

Identification
- Reddish tail
- Spotted white chest and belly
- Cocks its tail and then drops slowly while perching

Call Click here to hear this bird's call!
- Flutelike
- Long first note alternates pitch between phrases

Lifestyle and Ecology
- Diet consists of insects - beetles, caterpillars, ants, and wasps in the spring, and will even occasionally include small amphibians and reptiles! In winter, they switch towards more fruit, including wild berries.
- You don't need to look high for their nests. They typically build them on the ground or in low vegetation.

Figure 1. Landscape at Stop 2 of the Sucker Brook self-guided interpretive walk (a); interpretive material for stop 2 in paper booklet (b); Main Page (c); and sample Species Sheet for stop 2 from digital trail guide (d).
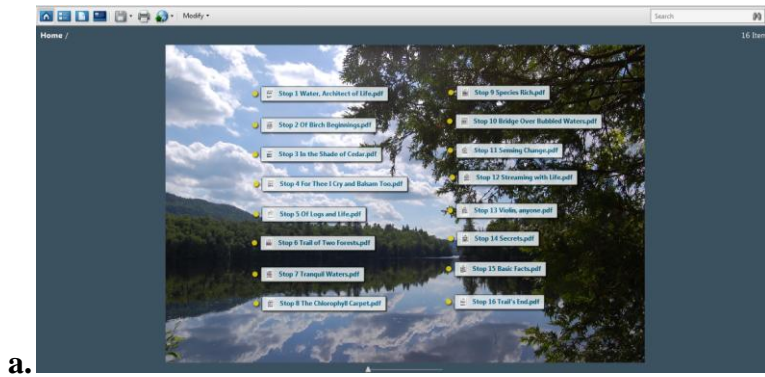
Figure 2. Comparison of homepage of digital trail guide displayed on laptop (a) and tablet (b)

Stage 1:
Pre-initial contact with nature
- No substantial interest or activity in nature
- High interest in technology

Technology Use in Nature: N/A
Connection with Nature: Low

Stage 2:
Initial contact with nature using technology
- Begin to show interest in nature
- Dependent on use of technology while outdoors

Technology Use in Nature: High
Connection with Nature: Low - medium

Stage 4:
Fully developed relationship with environment
- Frequently spend time outdoors
- Fully enjoy outdoors without feeling any need to use technology

Technology Use in Nature: Low
Connection with Nature: High

Stage 3:
Developing relationship with environment
- Occasionally seek outdoor recreation and education
- May still feel more comfortable using technology in nature

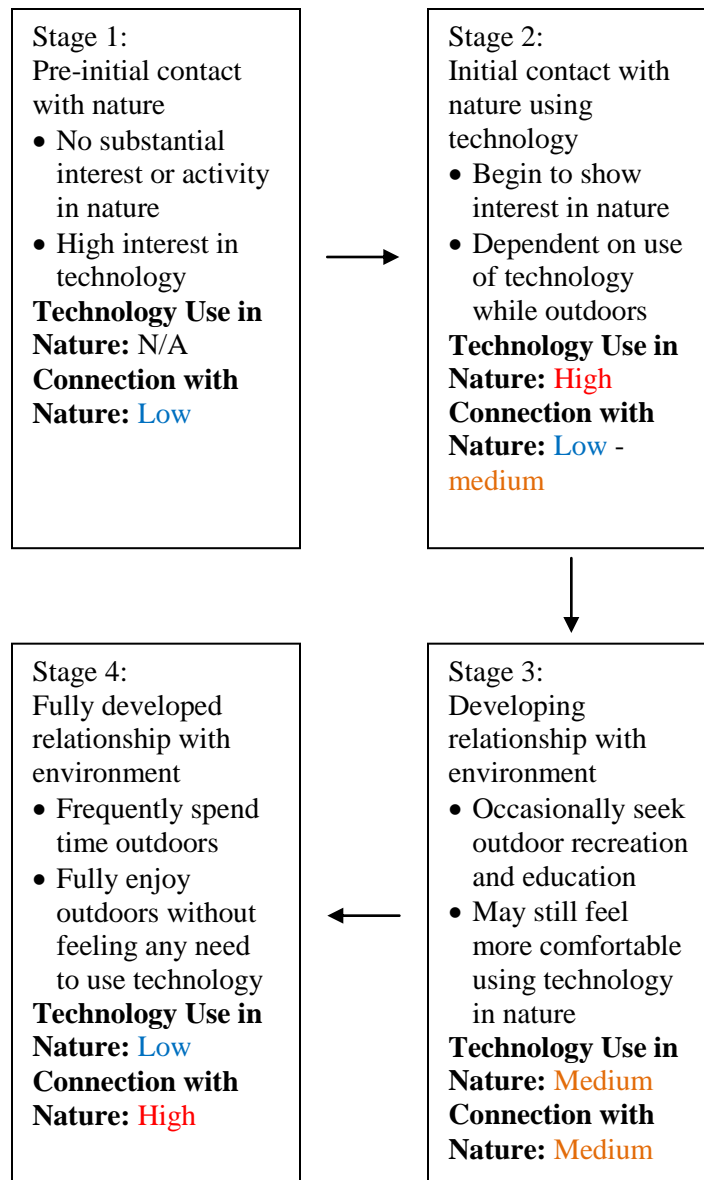**Technology Use in Nature:** Medium
Connection with Nature: Medium

Figure 3. Theoretical progression in the development of visitor's relationship with nature using technology-based interpretation

Table 1. Purpose and Intentions of the Items on visitor surveys

Item Number	Purpose/Intention
1, 2, 3	Gather demographic information of the users to further analyze the data based on age, gender and group size of the users
4, 5, 6, 7	Measure how either form of the interpretive media affected the visitor experience, including the magnitude to which it affected their experience and enjoyment level
8, 9, 10	Quantify the educational value of both versions of the booklet and allow users to reflect on how much information they learned regarding the theme of the walk
11	Indicate users' environmental sensitivity
12, 13	Measure the usability of the different versions of the guide
14, 15	Reveal the extent to which users were engaged with the material
16, 17	Provide the users with an opportunity to expand on their opinions of this use of technology in environmental interpretation and outdoor recreation and the impact of their experience using the booklet or trail guide had on their opinion

Appendix B: Visitor surveys

ESF

State University of New York
College of Environmental Science and Forestry

Sucker Brook Self-Guided Nature Walk and Digital Trail Survey

We appreciate you filling out this survey. Your input helps us build better programs.
Thank you!

1. Age (please circle one)

<15   16-20   21-25   26-30   31-35   36-40   41-45   46-50

   51-55   56-60   61-65   66-70   71-75   76-80   80+

2. Gender (please circle one)

        Male   Female

3. How many people were in your party (including yourself)? _____

For questions 4 through 13 please choose the number that best represents your opinion on each
statement.

Question	1 Completely disagree	2 Somewhat disagree	3 Neutral	4 Somewhat agree	5 Completely agree
4. The self-guided nature walk added to my experience at the Adirondack Interpretive Center.					
5. The self-guided nature walk was enjoyable.					
6. After my experience on the nature walk, I would not recommend it to others.					
7. If self-guided nature walks utilizing handheld devices and PDF Portfolios were available on the other trails at the center, I would use them.					
8. The self-guided nature walk improved my knowledge and understanding of the role water plays in the Adirondack ecosystem.					
9. I was aware and knowledgeable about the role of water in Adirondack ecosystems before the self-guided nature walk.					
10. I am now aware and knowledgeable about the role of water in Adirondack ecosystems after the self-guided nature walk.					

Question	1 Completely disagree	2 Somewhat disagree	3 Neutral	4 Somewhat agree	5 Completely agree
11. I believe the information provided in the self-guided nature walk is important.					
12. It was difficult to use and understand the PDF Portfolio and associated materials.					
13. I was able to use the PDF Portfolio and associated materials to answer any questions I had.					

14. How many of the links and additional materials did you use? (Please circle one)

None   Some   Most   All

15. At how many of the stops that you visited did you use the PDF Portfolio and the associated materials?

None   Some   Most   All

16. How do you feel about incorporating technology such as handheld devices into recreational and outdoor activities?

_____
_____
_____
_____

17. Did today's experience affect your perspective and answer for Question 17?

_____
_____
_____
_____

Additional Comments:

_____
_____
_____
_____

Sucker Brook Self-Guided Nature Walk and Paper Booklet Survey

We appreciate you filling out this survey. Your input helps us build better programs.
Thank you!

1. Age (please circle one)

<15   16-20   21-25   26-30   31-35   36-40   41-45   46-50

51-55   56-60   61-65   66-70   71-75   76-80   80+

2. Gender (please circle one)

Male   Female

3. How many people were in your party (including yourself)? _____

For questions 4 through 13 please choose the number that best represents your opinion on each statement.

Question	1 Completely disagree	2 Somewhat disagree	3 Neutral	4 Somewhat agree	5 Completely agree
4. The self-guided nature walk added to my experience at the Adirondack Interpretive Center.					
5. The self-guided nature walk was enjoyable.					
6. After my experience on the nature walk, I would <u>not</u> recommend it to others.					
7. The self-guided nature walk improved my knowledge and understanding of the role water plays in the Adirondack ecosystem.					
8. I was aware and knowledgeable about the role of water in Adirondack ecosystems <u>before</u> the self-guided nature walk.					
9. I am now aware and knowledgeable about the role of water in Adirondack ecosystems <u>after</u> the self-guided nature walk.					
10. I believe the information provided in the self-guided nature walk is important.					
11. It was difficult to use and understand the paper booklet.					
12. I was able to use the paper booklet to answer any questions I had.					

Question	1 Completely disagree	2 Somewhat disagree	3 Neutral	4 Somewhat agree	5 Completely agree
13. If given the opportunity to use the paper booklets available for the other trails at the center, I would.					

14. At how many of the stops that you visited did you use the paper booklet?

      None   Some   Most   All

15. How do you feel about incorporating technology such as handheld devices into recreational and outdoor activities?

_____
_____
_____
_____

16. Did today's experience affect your perspective and answer for Question 17?

_____
_____
_____
_____

Additional Comments:

_____
_____
_____
_____