

A Summative Evaluation of Roadside Heritage

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INTRODUCTION

The National Science Foundation funded Roadside Heritage (RH) to produce three major deliverables during this project:

- STEM-rich audio stories for the traveling public that highlight the science associated with Highway 395;
- Traveling festival kits that highlight major STEM features of the Eastern Sierra landscape; and,
- The RH website, a STEM-rich site highlighting the natural and cultural landscape associate with Highway 395.

During the project's final year, WestEd conducted summative evaluation activities targeting each of these deliverables.

METHODOLOGY

AUDIO STORIES

RH distributed a two-CD set of audio stories, *Extreme Environments*, in spring 2010. This set was distributed at a variety of locations and events throughout the Eastern Sierra along Highway 395. Examples of distribution points include the Laws Railroad Museum, Mammoth Lakes Visitor Center, Lone Pine Interagency Visitor Center, the Banff Film Festival, the Mono Lakes Interpretive Center, Rainbow Festival, and the Mammoth Ski Museum. Recipients of the CDs were asked to provide their contact information to participate in an online survey about the CDs. In all, RH received the names and email addresses of 508 people who received CDs. As an incentive to complete the survey, each person WestEd contacted was told that by completing the survey, they would be eligible to receive an iPod that would be awarded to a randomly selected survey respondent.

WestEd prepared an online survey designed to gather feedback about the *Extreme Environment CD*. The survey contained questions about both the content of the CDs and their quality. Appendix A is a copy of that survey

FESTIVAL KITS

Staff from the Lawrence Hall of Science (LHS) at UC Berkeley spent most of the grant period developing, testing, and refining 11 festival kits. During Year 3 of the grant, they finalized the kits, which were then used during a Roadside Heritage Science Festival held at Pine Street School in

Bishop on the evening of March 10, 2010, from 5:30 p.m. to 7:30 p.m. Two WestEd evaluators participated in the Science Festival and the activities held that day to prepare for it. Our activities included the following:

- Observing a scientist from LHS as he worked with staff from the Eastern Sierra Institute for Collaborative Education (ESICE), orienting them to the kits and how to set them up in the field;
- Observing children and adults as they worked with the festival kits during the Festival; and,
- Interviewing a sample of children after they had visited each of the festival stations.

We used an observation form during the Festival to record every 15 minutes how many people were at each of the 11 stations as well as their level of engagement and affect they displayed at each station. We rated engagement on a four-point scale ranging from low to high, and rated affect noting whether we saw any of these following during an observation: pleasure, displeasure, frustration, neutrality, intrigue/interest, and excitement.

To judge the impact of the stations, we randomly selected children who were between ages 9 to 12 after they had visited all 11 stations. Although the station descriptions were written at the level of middle school students, we choose to interview somewhat younger students because they were in the grade range the school was targeting that evening. We conducted a short, structured interview with students about the Science Festival, asking six short questions:

- How would you rate the science stations overall?
- Please rate how much you learned from the stations overall.
- Which activity did you enjoy the most?
 - Please rate how much you enjoyed that activity.
 - Please rate how much you learned from that activity.
 - Tell me something you learned from the activity.

ROADSIDE HERITAGE WEBSITE

WestEd conducted interviews to gather perceptions and impressions of the RH website. The online survey about the Extreme Environments CDs included an item that asked respondents if they had visited the RH website. Twenty-three people who received the CD indicated they had also visited the RH website. WestEd evaluators contacted these 23 people and invited them to participate in a telephone interview about the RH website. Eight agreed to be interviewed. WestEd conducted these interviews over a two-week period with interviews lasting between 20 to 30 minutes. Each individual received a \$35 stipend for participating. Interviewees were asked the following questions:

- What are/were your first impressions of the website? How long did you spend on the site?
- What did you do once you accessed the website?
- Looking at/thinking about the home page, what do you see there?
- What did you think this website is about?
- What do you expect to be able to do here?
- Who is the best audience for this website?
- Did you access a map and listen to an audio story? If not, please do that now. Go to the location on the homepage where it says “Explore Listen” and read the accompanying text. Visit the interactive map.
- How does the map help you explore the content of the audio story?
- Does the map/audio story suggest places you would like to visit?
- Did you learn interesting science concepts from the website?
- How intriguing did you find the science content of the website?
- How helpful was having the map as you listened to an audio story?
- What was your overall impression of the quality of the website
- After having visited the website, what might you want to explore further?
- What would have improved the experience for you?

We also reviewed statistics from Google Analytics about the website’s use during a four-month period, March – June 2010, about the RH website. The statistics we examined included number of visits, number of unique visitors, average time on the site, and average number of pages viewed. Additionally, we looked at whether visitors came directly to RoadsideHeritage.org or were referred to it by a different website.

EVALUATION FINDINGS

We divided our findings into three sections, focusing first on the audio stories followed by results from the festival kits. We conclude our findings by discussing what we learned from interviewing users of the RH website and reviewing statistics on the websites use.

AUDIO STORIES

The following section presents the results from the online survey completed by people who received the *Extreme Environments* CDs. Exhibit 1 presents information about the survey’s response rate. As noted earlier, RH collected the names and email addresses of 508 people who received the CDs. Sixty people were removed from the evaluation because their provided invalid email addresses when they receive the CDs, were out of town, or were unable or unwilling to complete the survey. Of the remaining 448 people, 157 responded to the survey for a response rate of 35.0 percent.

Of the 157 people who responded to the survey, 8 (5.1%) did not remember receiving a copy of the CDs. Of the remaining 149 who remembered getting the CDs, 24 (16.1%) had not listened to the CDs at the time they were asked to complete the survey. Their reasons for not listening to the CDs included not having time (37.5%), having misplaced the CDs (20.8%), the CDs would not play (8.3%), they were too long (8.3%), and individual reasons such as the lack of a CD player, loaning the CDs to others, or waiting to listen to the CDs until an upcoming trip to the Eastern Sierra.

Exhibit 1: Survey Response Rates

	Number	Percent
Name and Email Received	508	100.0
Invalid Emails/Unable to Complete the Survey	60	11.8
Responded to the Survey	157	35.0
Did not Remember Getting the CDs	8	5.1
Did not Listen to the CDs Yet	24	16.1
Completed the Survey	125	79.6 ¹

Often, people responding to the survey indicated others also listened to the audio stories with them. In all, the 125 people who completed a survey indicated an additional 155 adults and 35 children listened to the CDs with them. This finding implies that the reach of the project may expand well beyond just those individuals who obtain a copy of the audio stories. Additionally, nine people provided written comments specifically mentioning their loaning the CDs to other friends or family

¹ Percentage calculated based on number of people who responded to the survey.

members planning to visit the Eastern Sierra, or because the CDs would interest them into going to the area.

The survey asked respondents to indicate their level of agreement with several statements about the CDs. Ratings were made on a five-point scale where 1 = “Strongly Disagree” and 5 = “Strongly Agree.” Two questions were directly related to the science information provided on the CDs and tied to the informal science education impact categories of understanding and engagement (Friedman, 2008). We asked about whether listener learned interesting science concepts from the CDs and whether the science content was intriguing. Exhibit 2 presents the mean responses to these questions. The mean for the question about learning interesting science concepts was 4.5 while the mean related to intriguing science content 4.4. Both of these means are quite high and indicate the RH audio stories were very successful in helping listeners learn interesting science concepts that they found intriguing.

Exhibit 2: Mean Ratings for Science-Related Survey Questions (n=125)

Survey Item	Mean
I learned interesting science concepts listening to the CD.	4.5
The science content of the CD was very intriguing.	4.4

The survey about the *Extreme Environment* CDs included items about topics such as CD quality, ease of understanding, enjoyment from listening, and their contents’ suitability for children. Exhibit 3 presents the mean ratings of survey items relating to these areas. Overall, the highest rating was for

Exhibit 3: Mean Ratings for Survey Questions (n=125)

Survey Item	Mean
The quality of the CD was very good.	4.7
The information on the CD was easy to understand.	4.6
The local anecdotes included on the CD made the stories more engaging.	4.6
I enjoyed listening to the CD.	4.6
I would encourage my friends to pick up a copy of the CD on their trip.	4.5
The information presented on the CD was useful.	4.5
Listening to the CD made my trip in the Eastern Sierra more enjoyable.	4.5
Other people who have heard the CD enjoyed it.	4.1
I stopped at one of the locations suggested on the CD.	4.0
Children will enjoy listening to the CD.	3.8

the quality of the CDs themselves (mean = 4.7), followed by ease of understanding the information presented (mean = 4.6), enjoyment of the local anecdotes (mean = 4.6), and respondents' overall enjoyment of listening to the CDs (mean = 4.6). Like listeners' ratings about the scientific content of the CDs, these ratings are very positive. The only item whose mean rating was less than 4.0 was whether children would enjoy the CDs (mean = 3.8).

Participants were asked to comment about what they thought was the most interesting thing they learned from listening to the CD. Twenty-nine people indicated the appeal of the geology and volcanology of the region, and another 17 enjoyed learning about the history of the region. Other aspects of the CD people reported learning about included the process of forming mountains and the Owens Valley (n = 12), native animals (n = 11), the weather (n = 9), flora/fauna (n = 8), local areas described on the CDs (n = 7), and Mono Lake (n = 7). Some specific comments included:

The formation of the mountains & plate movement section was great.

I think I enjoyed the historical geology the most, perhaps because it was what I knew the least about.

The facts about the creatures that are able to survive in these harsh climates were interesting. Also the amount of information that was provided about each subject was clear and was easy to follow.

I really enjoyed learning about the volcano and how it came to be. The imagery used on the CD made it seem like I was there watching the [tectonic] plates move and create the volcano.

I appreciated listening to the overview of the regional geology, and the life history strategies employed by various plants and animals.

The survey also provided an opportunity to provide additional comments. Of the 68 people who provided comments, 44 (64.7%) were compliments describing the high quality of the CDs, their usefulness, and the enjoyment of listening to the CDs. Sixteen people also mentioned that listening to the CDs improved their travels along Highway 395. Eight people hoped additional CDs would be produced and six people indicated the CDs identified places they would like to visit. Along with the compliments, there was a small number of complaints such as poor or mispronunciations by speakers, the audio stories went too slowly or did not provide enough information, the content was not presented in a cohesive order, or the CDs would not play. Some people also mentioned topics they would like to learn more about, such as the mining towns and local history.

Although many people believed the CDs were not intended for children, some parents commented how much their children enjoyed the CD. One parent indicated they could not listen to the second CD because their daughter wanted to listen to the first one again, and one parent stated:

I wish the funders of this project could see the notebook that my five year old daughter filled on the way home from our Owens Valley trip with drawings of obsidian rocks, granite mountains with fault lines underneath pushing them up, volcanoes (internal and external

views, with magna and lava carefully detailed - plus a magic magma-surfing submarine for her and her class to ride in, complete with special cold suits of course!), desert habitats, etc, all inspired by what she saw on the trip and heard on the CD on the way home. Thank you for this wonderful experience.

FESTIVAL KITS

RH developed a number of tabletop science stations that highlight major STEM features of the Eastern Sierra landscape. This section describes these stations and a Science Festival that involved each of these stations and presents the results from WestEd's evaluation activities conducted the evening of the Science Festival.

Staff from the Lawrence Hall of Science (LHS) developed 11 festival stations for RH that focused on topics related to the science inherent in the landscape of the Eastern Sierra. The topics of these stations included the following:

- Mountain building;
- Mountain climates;
- Tree rings;
- What lives in a stream;
- Archeology;
- Mono Lake;
- Rocks and minerals;
- Desert leaves;
- Mountain driving;
- Animal adaptations to extreme environments; and
- Sagebrush.

Each station includes several hands-on activities. Some activities are very simple such as small cross-sections of trees where one can count the rings of a tree. Other activities though are more elaborate, for example, a climate tunnel where one can see how rain is produced as clouds go up a mountain. Activities were developed for use in settings that would include children of multiple ages as well as adults and went through an extensive development process that included formative evaluation. The level of writing for them was oriented to students attending grades 6 to 8.

LHS delivered the festival kits to ESICE on the morning of the Science Festival when an evaluator from WestEd was present as the lead developer from LHS worked with ESICE staff. It was clear that extensive thought and preparation went into the development of each station. Each station came in its own packing tub that included every component needed to set up the station, spare parts that could be needed such as a light bulb or filter paper, instruction for repacking the station, and an

extensive, individual manual for the station. The manual includes information about the following:

- Electrical, water, and table requirements.
- A list of what materials need to be prepared one month, one week, and one day before the station is set out.
- Instructions on how to set up the station. Pages are in black and white, but a master manual that includes the individual manuals of all 11 stations includes a CD with color pictures that could be printed out.
- Instructions on how to lead the activity including suggestions of what to ask participants and what to have them do when they visit the station.
- Safety information that covers both people who might visit the station as well as the safety of the materials at the station such as items that might break easily.
- Background information about the station's topic.
- Information that might be needed should one need to repair the station.
- Information about where one could order materials when restocking a station.
- Information about clean up and packing the station. Packing instructions indicate the order in which items should be placed in a tub and include photographs that show where items go.

Some station manuals also include a section on terminology and a section about frequently asked questions. Staff from ESICE reviewing the manuals felt the information they provided was very complete and well organized.

WestEd evaluators were present and observed docents when they set up and took down stations at Pine Street School before and after the Science Festival. Although some of the stations seemed complex, docents had no trouble setting them up. Clean up and packing was finished 30 minutes after the Festival ended.

ROADSIDE HERITAGE SCIENCE FESTIVAL, MARCH 10, 2010

RH sponsored a Science Festival at Pine Street School the evening of March 10, 2010 from 5:30 p.m. to 7:30 p.m. Children from kindergarten through grade 5 attend the school, which has a total enrollment of about 800 students. The festival was held the same evening the school held an event for families in the school's bilingual education program allowing families the opportunity to participate in both events. The Festival was held in the school's large multi-purpose gymnasium/cafeteria. Ten tables were set up in a circle around the sides of one-half of the room. The eleventh station was placed inside the circle, about one-third of the way toward the center because it did not fit in the circle perimeter with the other stations. The Festival was designed with the intent that visitors would stop at each station.

ATTENDANCE AND ENGAGEMENT

The strategy of holding the Science Festival and the bilingual event on the same evening was a plus for the Festival and resulted in a good turnout with people coming and going throughout the two-hour Festival. We tallied the number of people at each station every 15 minutes beginning at 5:40 p.m., noting their level of engagement as well as their affect. Two WestEd evaluators conducted the observations with one person observing stations one through six during the first hour while the second person covered stations seven through 11. After the first hour, the evaluators switched which stations they were observing. This way, our observations were not biased because the same person made every observation at each station.

At the busiest point of the Festival, 6:10 p.m., 82 people were distributed among the 11 stations. Otherwise, we counted between 43 and 67 people at the stations when we made our observations except at 7:25 p.m., just before the end of the Festival, when 28 people were working with activities.

We tallied the total number of people at a station across our eight observation periods and computed the mean level of engagement that we observed. The totals presented in Exhibit 1 represent counts of what was occurring at eight very short points in time during a two-hour period. The reader should not infer the counts represent the total number of people who visited a station. The counts are just the sum of eight brief snapshots of what was occurring during the Science Festival.

The results in Exhibit 4 show that Desert Leaves and Mountain Driving were the two most well-attended stations at our observation points, with about a total of 60 people observed at each station. We counted a total of between 40 and 50 people at the stations for Archeology, Mountain Building, What Lives in a Stream, and Mono Lake. The remaining stations tallied between 20 and 30 total observed visitors during the observation period. We totaled the fewest people at the station on Sage Brush. This low tally was likely because there was only room for 10 stations in the main circle of

Exhibit 4: Number of Observed Visitors and Level of Engagement

Station	Total Number of Visitors Observed	Mean Level of Engagement
Mountain Driving	59	3.9
Desert Leaves	62	3.8
Archeology	47	3.8
Rock & Minerals	24	3.6
Mountain Building	42	3.5
Mono Lake	40	3.5
Animal Adaptations	28	3.5
Sage Brush	20	3.4
Mountain Climate	25	3.4
What Lives in a Stream?	47	3.4
Tree Rings	25	3.3

stations. Sagebrush was located inside the circle. Its low tally suggests that many people may not have realized the station was there.

We rated how engaged people were when we observed them at each station. We assigned one rating at each station during each observation period using the following four-point scale with one equal to low engagement:

- Low. Visitor makes cursory stop with minimal engagement with activities (e.g. sitting down, talking with facilitator &/or quickly touch manipulatives).
- Moderate, low. Visitor engages with facilitator or focuses on activities, but with low interest (e.g. tries the activity, but may not complete).
- Moderate, high. Visitor engages with facilitator or activity, but with medium interest (e.g. "goes through the motion" to do activity, but does not take further).
- High. Visitor fully engaged with facilitator &/or activities (e.g. demonstrates prolonged engagement with the activity, appearance of directed focus or discussion related to activity, actively completes the activity, repeats, repeats it multiple times or does related activity).

Overall, the festival kits were moderately high to highly engaging. We calculated the mean level of observed engagement at each of the 11 stations, summing the level of engagement we saw at each observation point during the Science Festival. Exhibit 5 shows these means ranged from a high of 3.9 for Mountain Driving to a low of 3.3 for Tree Rings. Mountain Driving seemed particularly popular because one of the activities at that station was designed to show how going too quickly around a curve on an icy road could cause a car to slide off the road, thanks to centrifugal force and the slippery road. The station included a manually operated turntable (road) that little toy cars could travel. As the turntable increased speed and centrifugal force increased, cars were thrown off the "road." Children were particularly attracted to this station with many boys having great fun with the cars as they spun the turntable. An older group of students might have found the activity less engaging, but it seemed well-suited to elementary students.

During the evening, we never observed a station where interest seemed low, and only rated a station moderate, low in 3 of 88 observations. There were four stations with mean interest ratings of 3.5 or 3.6: Rocks and Minerals, Mountain Building, Mono Lake, and Animal Adaptations. Ratings for the remaining four stations were either 3.4 or 3.3.

As we rated how engaged people were when visiting the science stations, we also observed the level of affect participants showed at each station. We watched for seven different states: pleasure, displeasure, frustration, neutral, surprise, interest/intrigue, and pleasure and recorded which types of affect we saw when making each observation. Exhibit 5 shows the number of times we observed each of four types of affect at each station. We excluded displeasure, frustration, and surprise from the table because we did not observe any instances of these during the Science Festival.

Exhibit 5: Observed States of Affect

Station	Neutral	Pleasure	Interest/ Intrigue	Excitement
Mountain Driving	0	8	6	6
Desert Leaves	0	5	6	0
Archeology	0	2	7	3
Rock & Minerals	1	1	6	0
Mountain Building	1	2	7	1
Mono Lake	2	3	6	2
Animal Adaptations	0	1	6	0
Sage Brush	2	2	7	1
Mountain Climate	0	4	5	1
What Lives in a Stream?	2	3	8	0
Tree Rings	1	0	4	0

Overall, the science stations generated a combination of pleasure, interest, intrigue, and excitement among the children and adults who attended the Science Festival. This positive combination suggests the festival kits successfully attracted visitors’ attention and then delivered their science content in a way that frequently took that interest into excitement or pleasure as people interacted with the kits’ science content. Sometimes, visitors appeared neutral at some of the stations, but we observed neutral no more than one or two times at a station. We did not see any instances where people appeared to experience displeasure, frustration, or surprise during the evening.

Interest and intrigue were the most common affect participants at the Science Festival displayed. We observed interest and intrigue more than we saw any other affect except at the station for Mountain Driving. At that station, we saw more instances of pleasure reflected in people’s faces and an equal number of instances of both interest/intrigue and excitement. The high number of times we saw both pleasure and excitement at this station is likely a function of the station’s appeal to children, as we noted earlier. We observed experiences of pleasure at all but one of the stations and excitement at six stations. These findings suggest that each station offered valuable experiences that visitors found engaging.

ENJOYMENT AND LEARNING

During the Science Festival, WestEd evaluators interviewed children about their reactions to the science kits. Interviews were very short and included only a few questions to gauge whether visitors enjoyed the science stations and learned science content from them. Interviews began with two general questions about the festival kits:

- How would you rate the science stations overall on a scale of 1 to 5 where 1 is “I didn’t enjoy them at all” and 5 is “I enjoyed them a lot?”
- Please rate how much you learned from the stations overall on a scale of 1 to 5 where 1 is “I didn’t learn anything” and 5 is “I learned a lot?”

We then asked which station the visitor enjoyed the most and how the visitor would rate that station in terms of enjoyment and learning using the two scales above. Lastly, we asked the visitor to tell us something he or she learned from the activity at the station.

We targeted fourth and fifth grade children for interviews during the Science Festival because this was the grade level that was the school’s focus for the evening. We randomly selected children to interview after they had visited each of the science stations and asked if we could ask them a few brief questions, including their age. In all, we completed 16 interviews during the evening, ten with boys and six with girls. Exhibit 6 shows the children’s mean responses to the questions about enjoying and learning from the festival kits.

The children responded very positively to the festival kits. Mean ratings of how much they enjoyed the science stations and how much they learned were very high for both the stations overall and for the activities children enjoyed the most. All but three of the children rated their overall enjoyment of the stations at 5, enjoying them “a lot” while the other three children rated the stations at 4, yielding a mean rating of 4.8. Children’s rated level of learning was not quite as high. Fourteen children rated their level of learning at four or five, and two children rated it as 3 (mean = 4.4).

Exhibit 6: Children’s Mean Ratings of Science Activities (N=16)

Question	Mean Rating
How would you rate the science stations overall?	4.8
Please rate how much you learned from the stations overall.	4.4
Please rate the activity you enjoyed the most.	4.6
Please rate how much you learned from the activity you enjoyed the most.	4.6

The mean of children’s ratings of the activity they enjoyed the most, 4.6, was slightly lower than their rating of the science stations overall. Additionally, they mentioned many different activities as the activity they most enjoyed. The activities and stations they mentioned were:

- Mountain Clouds
- Rocks
- Arrowheads
- Mountain driving
- Bristlecone pines
- Fish
- Insects
- Mono Lake

- Leaves
- Archeology

These responses show that there was diversity in what most appealed to children. Children also learned many different facts as they visited the science stations. Among the things they cited about what they learned were the following:

- Rock density;
- Telling the age of stone from the stone's hydration;
- Where fish like to hide;
- Some insects put sand in their bodies in order to sink in water;
- The amount of salt in water affects the buoyancy of objects in the water;
- Clouds dissipate as they go over mountains;
- Rocks wear down over time;
- Mountains may be wet on one side by dry on the other; and
- One has to drive more slowly on wet, icy pavement than on dry pavement.

Overall, these findings show that the festival kits are interesting to children in the 8 to 12 year age range. This seems very positive, especially since the writing on the displays was oriented to the reading level of middle school children, but the children we spoke with grasped some complex concepts from visiting the science stations.

SUMMARY

The Science Festival was a well-attended success. People appeared very engaged as they visited the science stations and were interested/intrigued by them, often experiencing pleasure and excitement at the stations. We targeted children in the upper elementary grades to interview about how much they enjoyed the stations and what they learned. Overall, they rated their enjoyment and level of learning as high, with mean ratings between 4.4 and 4.8 on a five-point scale where 5.0 was the most positive possible rating. Questions about what children liked and what they learned showed that even at ages 8 to 12, children learned some complex scientific concepts from interacting with the activities at the science stations. Our findings suggest that the festival kits will be valuable science education tools with a wide age-range of children and adults.

Viewing the LHS scientist as he worked with ESICE staff as he oriented them to the festival kits and observing how the festival kits were packaged and documented was very helpful to the evaluation team. The kits are packaged well and are accompanied by excellent, comprehensive documentation. The documentation facilitated both setting up and taking down the science stations, processes that appeared to be relatively easy to do. Docents who staffed the stations seemed able to function in this role with relatively little orientation. All of these factors indicate it would be easy to

use the festival kits in a variety of settings. They functioned well together as a science festival in Bishop, providing a multi-faceted learning experience that covered many topics related to the Eastern Sierra. Each of the 11 science stations, too, is self-contained, which means a single station could be used on a stand-alone basis to supplement a classroom unit about a specific topic. Thus the festival kits could be used in multiple contexts.

Since the Science Festival in March 2010, ESICE has used a single station at a park in Bishop, and plans to do so again summer 2010 in Bridgeport. Their future plans include using some kits at small, outdoor events in Bishop and Lone Pine, and conducting full science festivals in Lone Pine, Bishop, and Death Valley. These developments are positive and show the kits will most likely continue to be in use after the project's NSF funding period.

ROADSIDE HERITAGE WEBSITE

IMPRESSIONS

First impressions of the website were mostly positive. Interviewees often stated that the site looked professional and beautiful, was well organized, and informative. They also had many of the same impressions of the overall quality of the website. Additionally, several interviewees felt the website was of high quality because of its unique features, like the ability to customize CDs and its graphics.

The largest elements of the homepage stood out most for the users. The picture of the mountains, the Highway 395 road sign, and the YouTube video in the center of the screen made the boldest impression on the interviewees. While many interviewees did engage with the material located on the tabs at the bottom of the homepage, these elements did not stand out to them. Several interviewees stated they had to scroll down to see what was on the tabs. This is likely why the "Scenic Science," "Mono County," "Inyo County," and "Customize Tour" portions of the homepage were not as readily described when interviewees spoke about the homepage.

INTERACTIONS

Users appeared to employ three approaches to interacting with material when they visited the RH website. Three users "experimented" on the website, selecting different elements in an unordered manner. The other two approaches were more structured. A third of the interviewees accessed the website having listened to a RH audio CD. They were interested in accessing additional audio stories and learning more about the information presented on the CD. The last third of interviewees interacted with the website based on elements of the homepage. The top navigation bar guided several users' explorations of the site as they reported going through the "About" and "Stories" sections listed in the bar. Only the respondent with a child explored the "Kids Corner" section. She reported that her eight-year-old daughter spent time in this section and played a couple of games

there. A few interviewees also reported playing the YouTube video that was so prominently displayed on the homepage.

Once users accessed the website, they engaged with nearly every aspect of it. They listened to audio stories and a few even downloaded stories and made custom CDs. The users interviewed also looked at the pictures, video, and maps. A feature that none of the interviewees fully utilized was the set of maps with accompanying audio stories found on the bottom tabs of the homepage.

Interviewees usually clicked on the “Download Audio Story” instead of the map. Those who did click on the map did not realize that an audio story could accompany it and that different pictures on the map would automatically pop up as the audio progressed. It was only when we directed interviewees on how to use this feature for the purposes of the interview that they fully realized how to access it. This finding is unfortunate since the developers of the website indicated to WestEd that the interactive maps was a major innovation of the website.

The users interviewed reported wanting to explore a variety of activities and topics further after visiting the website. Several wanted to explore specific points of interest in the Eastern Sierra around Highway 395, like Devil’s Post Pile, that they learned of anew from the RH website. One interviewee specifically stated he wanted to see what was off the beaten track of Highway 395. Others were interested in activities that they could do in the region, such as hiking, camping, and visiting museums. The website inspired less active exploration for one user as she wanted to listen to all of the audio CDs.

EXPECTATIONS

Users held certain expectations about what the RH website was about, what they could do on it, and who was the website’s best audience. There were two main expectations of what the website was about. One expectation was that the website was created as a supplement to the audio CD and that it contained more information about items on the CD. The majority of users thought the site was about the Eastern Sierra and the region around Highway 395.

Expectations about what activities in which one could engage were largely informed by prior use of an audio CD. Interviewees expected to download audio and view pictures that accompanied the stories from the CD. Also, there was the expectation that there would be even more information on the topics discussed on the audio CD. One user thought the RH website would provide interactive video and maps that allow virtual tours of the region so that one could see the area without actually needing to visit it.

When it came to identifying the best audience for the website, interviewees overwhelmingly identified travelers to the area. This audience group was subcategorized into campers and families planning vacations. A third of the users interviewed had a more educational perspective as they stated kids and teachers or educators would be good audiences. A couple of interviewees selected residents of the area as they felt the website could give background history and more in-depth

information about the whole area. As well, audio book listeners were seen as a good audience since they could download the audio stories.

MAP AND AUDIO STORY

Once users understood the full relationship between the map feature of the website and audio stories, they really enjoyed the map. Most found this feature to be very helpful. It helped people orient themselves to where things are in the area based on the object's positioning on the map. Interview participants said it also helped with visualization when preparing for a trip. Many also felt that the map and audio story suggested new places they would like to visit. They saw places they did not know about and this piqued their interest in visiting those areas. A couple of website users commented that it was not useful for when you are actually driving on Highway 395. They thought that perhaps audio or a DVD for those who have a DVD player in the car could better share the information to travelers who were en route exploring Highway 395.

The map helped the interviewees explore the audio story in several ways. It provided a framework of where something was that was being discussed during the audio. Also, several website users liked it that the map could show the magnitude of items, such as the spread of ash from a volcanic eruption or the size of a large natural structure. Interview participants appreciated the pictures that popped up on the map as they added more visuals of what was being discussed. Overall, everyone liked the accompaniment of the visuals to the audio.

SCIENCE CONTENT

There were mixed results from interviewees about the science content on the website. Some said they did learn a few new interesting things, like about volcanology and alpine flora and fauna. But several said that they did not learn anything new, as they were familiar with the topics presented due to their science backgrounds.

These mixed results were evident when website users were asked how intriguing they found the science content of the website. Several found it intriguing because of the presentation of the science content. They said it was presented in a way that one would not get bored with it. A few likened it to talking to the experts or listening to a good radio show. The website's science content was better than a textbook because of the video and audio. Additionally, the material presented was not too challenging and thus felt to be user friendly. It seems there is a tension between difficulty of the science concepts and their user friendliness. Less challenging material is easier for the lay user to digest and appreciate, but it does not hold the interest of those who are more knowledgeable about science beyond an elementary level.

IMPROVEMENTS

While the interviewees were primarily quite satisfied with the website, they did describe multiple ways the RH website could be improved to further heighten future users' experiences. There were a variety of technical aspects of the site that the users felt did not work properly. A few interviewees had problems with videos on the site. One user said that because of her wireless connection in the campground site where she lived, data takes a long time to download. While on sites like YouTube, one has the option to pause the video and let it fully download before it plays, there is not the same option for video on the RH website. This resulted in what users described as choppy video that starts and stops as it downloads in segments. This particular interviewee would like to see a feature similar to YouTube where video can be paused so that it can download fully. Another user noted some features did not seem to work properly despite having the most current version of Internet Explorer. This user also felt text contrast in some places, like the thin black lettering over the mountains on the homepage, made it a little difficult to read the content.

Several points of feedback were offered around content. Users wanted to see more photos and more video of the area. One user wanted to see more content that referenced modern and historical topics relevant to the Eastern Sierra. A couple of interviewees wanted to see more resources on the website. They discussed resources like books and articles about the area and links to other relevant websites. One person felt the children's content could be more engaging. This individual also felt the map design could be more engaging as he thought it looked too much like a plain Google map. Two interviewees wanted more connection between the CD and the website. One felt that all information discussed on the CD should be available on the website. Also, more in-depth detail about topics on the CD should be available on the website, too.

Some users had ideas for unique additions to the website. One felt that video of locals talking about the area would be engaging. Another discussed an improvement to the Custom Tour section. Currently, one sees a screen with cogs turning that reads "Please wait while we burn your CD" when a custom CD is being created. This user felt a more engaging addition would be a map highlighting the areas selected for the custom CD. Such a graphic would be more visually appealing and it would provide an added bonus of helping the user visualize the location of the places he or she chose to create a CD about in relation to one another. Featuring places that were off the beaten track of Highway 395 was another content suggestion an interviewee made. Adding a calendar of events in the area was another comment.

Lastly, there were a few comments made about the design of the page. While most interview participants felt the website was well organized and easy to navigate, one wanted a list of videos so that they could be more easily accessed. A couple of users felt there was some redundancy on the site as the same content could be reached in multiple ways. Because everyone did not understand how the map and audio story worked, several interviewees asked for clearer instructions about this

content so it would not be missed. A final design comment was ensuring all material was kept current and up-to-date.

WEBSITE TRAFFIC

WestEd obtained statistics produced by Google Analytics for about the level of traffic on the RH website over a four-month period, March through June, 2010. This period coincides with the time that the *Extreme Environments* CDs were released. Exhibit 7 presents several statistics about use of the website including the number of times the site was accessed, the average length of time visitors remained on the site, and the average number of page views. The exhibit indicates that between about 400 and 750 people visited the website between about 550 and 1,000 times each month. Visitors remained on the site for an average of two to three minutes and viewed two to three pages of content.

Exhibit 7: Roadside Heritage Website Statistics, March-June, 2010

Month	Number of Visits	Number of Unique Visitors	Average Time on Site (in Minutes)	Average Number of Pages Viewed
March, 2010	983	756	2:29	2.0
April, 2010	557	392	2:44	2.4
May, 2010	597	425	2:04	2.0
June, 2010	788	598	3:02	2.7

Reports from Google Analytics provided information about the top sources of the traffic to the RH website. We compiled these for March through June 2010 and display these in Exhibit 8. The information helps understand how many visitors are coming directly to the site because they are aware of it possibly because of RH brochures or a reference on a CD of audio stories (direct access) or are coming to the site through a different means. We see from Exhibit 8 that about 30 percent of visitors to the RH site are coming directly to it through www.roadsideheritage.org. The other sources of traffic vary by month. In March, about as many visitors came to the site through the *Los Angeles Times* website as accessed the site directly. But that site ceased to be a source of visitors after March. Csmmania.com and Google were sources of traffic to the website each of the four months. CSSMania is a website that displays other sites. LHS staff had posted the RH website to CSSMania in early January 2010. Two sites that complement CSSMania, creattica.com and SquareBoxStudio.com, developer of the RH site, also were sources of referrals to it.

Exhibit 8: Sources of Referrals to Roadside Heritage Website, March-June, 2010

Top Traffic Sources	March	April	May	June
Direct Access	292 (30%)	167 (30%)	132 (22%)	254 (32%)
Travel.latimes.com	265 (27%)			
cssmania.com	138 (14%)	66 (12%)	70 (12%)	51 (6%)
Google	67 (7%)	51 (7%)	61 (10%)	94 (12%)
creattica.com	27 (3%)			
lonepinechamber.org		40 (7%)	91 (15%)	
AOL		39 (7%)		
squareboxstudio.com			80 (13%)	
dot.ca.gov				159 (20%)
Scenic395.com				37 (5%)

As spring progressed, traffic to the RH site came from three more local sites: the Lone Pine Chamber of Commerce, the California Department of Transportation (dot.ca.gov), and Scenic395.com. These traffic patterns with different, more local sites referring traffic to the RH site in different months show the value of projects like RH forming relationships with multiple organizations.

SUMMARY

Overall, the RH website was well received by the nine users we interviewed. They felt the site was very professional, well organized, informative, and offered engaging content, like video, audio, and photos, as well as unique features like the map and audio stories. Spending 15 to 20 minutes per average visit to the site, users looked for content related to the audio CD and the major elements of the homepage. Website exploration in turn piqued interviewees' interest in exploring more of the region.

In many ways, users' expectations about the site were met. It discussed the Eastern Sierra, areas around Highway 395, and corresponded to the audio CDs. They were able to download audio and see video, maps, pictures, and information related to the audio CDs and other topics. Expectations about the best audience for the RH website primarily identified travelers, audio book enthusiasts, residents of the region, children, and educators.

The map and audio story combination was one of the most captivating elements of the website. Interviewees felt it brought the audio to life by showing them the area that was being described in the audio. Additionally, these stories showed them areas they began considering for future travels and visits.

Website users had mixed feelings about the science content. Some enjoyed the content because it was not too challenging and incorporated audio and visuals. Others were not as interested or intrigued by the content because they already knew the information.

While most interviewees had many positive comments about the RH website, they did offer a few points of feedback. There were technical difficulties experienced that users felt could be addressed. Interview participants also identified additional content that they wanted to see added to the site. As well, there were design elements that website users felt could be refined.

The RH website would have benefited from more complete user testing as the site was being developed. The testing would have identified a number of the issues that users cited during interviews about the site. These issues include the lack of understanding about the map feature and how the maps could add to a user's experience of the website and the technical problems users encountered downloading the audio associated with the maps. Since the website is still accessible, we encourage the project's partners to address these issues if they wish to maximize the website'.

REFERENCES

Friedman, A. (Ed.). (2008). *Framework for evaluating impacts of informal science education projects*. Arlington, VA: National Science Foundation.

APPENDIX A
LISTENER SURVEY FOR
EXTREME ENVIRONMENTS

Roadside Heritage Listener Survey for *Extreme Environments*

You recently received a copy of our audio CD, *Extreme Environments*, when you were traveling in the Eastern Sierra (e.g., Mammoth Ski Museum, Laws Railroad Museum, Rainbow Festival, Mammoth/Mono/Bishop Visitors Center). We would appreciate your taking a few minutes to provide feedback about the audio CD related to Highway 395 and the Eastern Sierra.

Your answers will be completely anonymous and by filling out our survey, you will be entered into a drawing with an opportunity to win an iPod touch with 32GB of storage.

If you have any questions or for further information, please contact Jerry Hipps at jhipps@wested.org.

1. Do you remember receiving a copy of the CD? _____ Yes _____ No (If no, go to question 17)
2. Did you listen to the CD you received? _____ Yes _____ No (If no, answer question 2a then go to question 17. If yes, go on to question 3)
 - a. If no, why not:
 - i. Have not had time
 - ii. Lost/misplaced it
 - iii. CD would not play correctly
 - iv. CD was boring so I turned it off
 - v. CD was too long
 - vi. Other, please specify:
3. How many other adults listened to the CD (exclude yourself)? _____
4. How many people under 18 listened to the CD? _____

Please indicate your level of agreement with each of the following statements about the CD:

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Do Not Remember
5. I enjoyed listening to the CD.	1	2	3	4	5	6
6. The information presented on the CD was useful.	1	2	3	4	5	6

7. I learned interesting science concepts listening to the CD.	1	2	3	4	5	6
8. The science content of the CD was very intriguing.	1	2	3	4	5	6
9. The local anecdotes included on the CD made the stories more engaging.	1	2	3	4	5	6
10. The information on the CD was easy to understand.	1	2	3	4	5	6
11. The quality of the CD was very good.	1	2	3	4	5	6
12. Listening to the CD made my trip in the Eastern Sierra more enjoyable.	1	2	3	4	5	6
13. I stopped at one of the locations suggested on the CD.	1	2	3	4	5	6
14. I would encourage my friends to pick up a copy of the CD on their trip.	1	2	3	4	5	6
15. Children will enjoy listening to the CD.	1	2	3	4	5	6
16. Other people who have heard the CD enjoyed it.	1	2	3	4	5	6

17. Have you visited the Roadside Heritage website? _____ Yes _____ No (If no, go to 24)

Please indicate your level of agreement with each of the following statements about the website:

	Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree	Do Not Remember
18. The information presented on the website was useful.	1	2	3	4	5	6

19. I learned interesting science concepts from the website.	1	2	3	4	5	6
20. The science content of the website was very intriguing.	1	2	3	4	5	6
21. This is a high quality website.	1	2	3	4	5	6
22. I have or plan to download stories/audio tracks from the website.	1	2	3	4	5	6
23. I would recommend the site to others.	1	2	3	4	5	6

We would appreciate your telling us a little about yourself.

24. I am: _____ Male _____ Female

25. My age is:

_____ 10 or younger

_____ 31-50

_____ 11-13

_____ 51-65

_____ 14-17

_____ Over 65

_____ 18-30

_____ Decline to indicate

26. My approximate annual income is:

_____ \$0-\$10,000

_____ \$50,001-\$75,000

_____ \$10,001-\$25,000

_____ Over \$75,000

_____ \$25,001-\$50,000

_____ Decline to indicate

27. My race or ethnicity is

_____ African American/Black

_____ Native American/Native Alaskan

_____ Asian/Pacific Islander

_____ White/Caucasian

_____ Hispanic/Latino

_____ Other

_____ Decline to indicate

28. The zip code where I live is _____

If you would like to participate in our raffle for an iPod touch, please provide your name and e-mail address. All of your responses will be held in strict confidence.

Name: _____ E-mail address:

Thank you for completing our survey.