Front-End, Formative and Summative Evaluations of *What's in a Name?* Harvard Museum of Natural History

Susan Sunbury, Ed.D
Smithsonian Astrophysical Observatory
November 30, 2016

This material in this report is based upon work supported by the Institute of Museum and Library Services under Grant Award Number MA-10-14-0113-14. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the IMLS.

TABLE OF CONTENTS

Introduction

What's in a Name? is an IMLS funded project consisting of a series of four exhibit kiosks (Honeybees, Jellies, Poison Ivy and Dimetrodon) created by the Harvard Museum of Natural History (HMNH). Additional components of the project include an e-book and a website. Front-end, formative and summative evaluations were conducted for each of the four exhibit components at HMNH between January 2015 and October 2016. Both quantitative and qualitative methods were used to collect data. After each round of evaluation, meetings took place between the evaluator and the exhibit team to review data and make suggestions for revisions to the exhibit components.

Front-end evaluation was conducted for each of the four components between January 2015 and August 2016 to determine what museum visitors already knew, what they didn't know (including scientific misconceptions), and what they were interested in learning about the subject matter being presented. For each kiosk, the evaluator tried to interview at least twenty visitor groups as they participated in activities (see Appendix A for a sample interview sheet). Front-end interviews were also used to establish visitor understanding of how scientists identify and name species, how systematics provides clues to help understand evolutionary relationships between organisms, and how scientists' thinking about a species can change over time when provided with new evidence. In order to make the interviews fun and non-threatening, activities (ie. sorting and matching games) were developed to engage visitors with the scientific content.

Formative evaluations for each computer-based exhibit station (four in total) were conducted with visitors between July 2015 and September 2016 to assess the success of specific exhibit elements including narratives and video pathways. The evaluations were used to ensure that each component under development was useable and understandable for the museum audience. The primary evaluation method utilized during this type of testing was interactive observation (see Appendix B for a sample observation/interview sheet). For each kiosk, at least twenty visitor groups were observed while interacting with the component and then interviewed about their experience. Visitors' actions and conversations were observed and recorded and the evaluator intervened as necessary to gather more in-depth information from visitors with regard to their learning at the component. The exhibit team met and determined that several issues should be studied during formative evaluation: usability, engagement and impact. The following questions were addressed during the evaluation of each component.

Usability:
How well do visitors navigate the interactive on their own?
Where are the places where they get stuck?
Is the path through the interactive clear?
How can we better encourage users to explore the whole interactive?

Engagement:
How interesting do they find the content?
What parts do they like best/want to see more of?
What parts would they like to see less of?
On their own, what percentage of the content do users view and for how long?
To what extent are users reading the content as compared to just clicking through?
If they leave before finishing, where do they leave? Why?

Impact:
What did they learn about each organism from this interactive?
What did they learn about scientific binomial naming system?
Anything else they learned?

Summative evaluations were conducted at each of the four interactive components: Honeybees, Jellies, Poison Ivy and Dimetrodon between July and October of 2016 to determine the extent to which the exhibit components were successful in accomplishing their intended outcomes.

Specific questions were proposed for the summative evaluation, which include:

1. Have visitors increased their knowledge about the organism itself?

2. Have visitors increased their knowledge of how scientists identify and name species?

3. Do visitors recognize how systematics can provide clues to help understand the evolutionary relationships between organisms?

4. Do visitors who using the exhibit components show increased engagement with systematics in other areas of the museum? That is, do visitors seek out additional exhibits with *What's in a Name* icons?

5. Do visitors increase their understanding of the critical role that historic collections, alongside modern technologies, play in the study of systematics (for Dimetrodon)?

For each kiosk, twenty visitor groups were observed while interacting with the component and then interviewed about their experience (see Appendix C for sample Observation/Interview sheet).

Honeybees

Front -End Evaluation

Two rounds of front-end evaluation were conducted in the Arthropods: Creatures That Rule gallery. The first round was open-ended. During this round, visitors were asked to list as many things as they could that came to mind when they heard the word bee. They were then asked about their experiences with bees and if they had seen anything on TV or the internet about bees. Visitors were asked if they had any questions about bees or if there were things they wanted to know about bees. These questions were followed with a sorting game. Cards with pictures of twelve species of arthropods were provided to visitors to sort without names (see Appendix D). These included:

1. *Apis mellifera*	European Honeybee
2. *Apis dorsata*	Himalayan honeybee
3. *Apis florae*	Dwarf Honeybee
4. *Bombus humilis*	Brown Banded Carder Bee (bumblebee)
5. *Bombus terrestris*	Buff-tailed Bumblebee
6. *Eristalis tenax*	Eastern Hoverfly (dronefly)
7. *Agapostemon splendens*	Sweat Bee
8. *Vespula maculifrons*	Eastern Yellowjacket
9. *Leucospis affinis*	Parasitic Wasp
10. *Coelioxys inermis*	Sharp-tailed Bee
11. *Atanycolus sp.*	Emerald Ash Borer
12. *Prenolepis impairs*	Winter Ant

After the initial sort, visitors were asked why they chose those piles and why they put the images that they did into each category. Visitors were then asked a few questions about scientific names and why they think scientists use these names when there are common names available. They were then given a pile with the same images but with scientific names and asked to sort them again (see Appendix E). After the sort, visitors were asked if they changed any of the piles and if so why.

During the first round of testing, twenty-five groups of visitors (34 visitors in total) were interviewed in January of 2015. When asked what words they associate with the word bee, most chose: honey, pollen, getting stung or yellow and black. Their most meaningful experiences with bees revolved around getting stung. They get their information about bees from: school, books, beekeepers (at school or field trips, fairs), and museum exhibits.

During the first round of sorting, most visitors made two piles of cards in what they believed to be bees and non-bees. Some also sorted into groups that they thought were types of insects (bees vs hornets, wasps, or yellow jackets). Finally, many visitors, including young visitors sorted into several piles by appearance: color, stripes, body shape or appearance of wings.

When asked why scientists use these names they indicated:
"To be specific."
"It's logical."
"To make a distinction."
"To be more specific."
"So everyone can recognize it as the same."

Questions visitors wanted to know about bees included:
"Do they all sting?"
'How do they make honey?"
'What do we get from bees other than honey?"
'How do they relate to other insects (wasps, yellow jackets, hornets)?"
"What are the types of bees?"
"Why are they dying?"

The results of this round of front-end evaluation led to a second round. Visitors were first shown an image of a honeybee and asked what it was. The back of the image contained information (including the scientific name) of the insect (see Appendix F). Then they were asked what they knew about honeybees and what questions they have about honeybees followed by a choice of three questions. Visitors were given three sheets of paper each with a question and asked to rank these questions in order of interest from 1-3 with 1 being most interesting and 3 the least interesting. The questions were:

How do you know I am a bee and not a fly?
Who are my closest relatives?
How did I get my name (*Apis mellifera*)?

Visitors were then asked if they would like to know the answer to any of these questions. If so, they could turn each sheet over for more information (see Appendix G). Finally, visitors were asked what questions they have about bees.

During the second round of testing, sixty-six visitors were interviewed in February of 2015. When shown the image of a hone bee, fifty-nine percent knew that it was a bee and ten percent indicated that it was a honeybee. Others thought it was a bumblebee, a wasp, a yellow jacket, a hornet and even a flea. When asked what they knew about honeybees, twenty-five percent said they sting, fifteen percent indicated that they were involved in pollination, and fifteen percent said that they built hives. An additional twelve percent knew that they were involved in making honey and that there were different types of bees (queen, worker, drone). Others suggested that they communicate and a few adults mentioned colony collapse disorder.

When asked what questions they have about honeybees, responses were very similar to those visitors mentioned during the first round of testing. They wanted to know all about stinging:

"Why do they need to sting?"
"Where does the sting come from?"
"How do they make poison in stingers?"
"Do stingers pulse after they sting?"
"Why do they die after the stinger comes out?"
"Do bumblebees sting?"
'How many different bees have stingers?"
"How can you avoid getting stung?"
"How do you take care of a sting?"

They also wanted to know how bees make honey and how they make their hives, how they communicate and why populations are being reduced.

Of the three questions posed, the question about the relatives (Who are my closest relatives?) was rated slightly more interesting than bees vs. flies (How do you know I am a bee and not a fly?). Both had higher interest levels than the name question (How did I get my name (*Apis mellifera*)?).

	Bee not fly	Relatives	Name
Ranked 1st	33%	45%	22%
Ranked 2nd	32%	38%	30%
Ranked 3rd	35%	17%	48%

This information was provided to the exhibit team and a computer interactive was built incorporating many of the features of these games.

Formative Evaluation

Two rounds of formative evaluation were conducted to study of the Honeybee prototype computer interactive. The evaluations took place in the Arthropods: Creatures That Rule gallery during the spring of 2016.

The prototype was comprised of an introductory page followed by a matching game consisting of two sections. The first part asked visitors to look at four species and decide which of these was most closely related to the honeybee. The second round provided a single image of an arthropod and asked visitors to guess how closely related this was to a honeybee. After each guess, visitors could see these relationships on a family tree.

Eleven visitor groups (19 visitors total) were observed as they interacted with the Honeybee component. Follow-up interviews were conducted when appropriate.

Results were very positive for this interactive. All visitors completed the entire game. Most visitors seemed to go through the first section without reading the instructions and just randomly chose an order for the relationship of the organisms. During the second part of the game, groups often worked together and talked through organisms' relationships and their reasons for making their choices. When parents participated, they often read the directions/descriptions of bees (or gave hints) to their children. Also during the second part of the game, a few groups really studied the family tree and used it for clues for the next round. Two groups even used the word *Apis* as a clue for matching the names and images.

After playing the game, visitors were asked to rate their interest in the game on a scale from 1-5 with 1 being not interested at all and 5 being very interested). The average rating was 4.0.

Visitors were then asked what they had learned from playing the game. Many of the responses were directly related to relationships between bees and other insects including:

"Bees have lots of relatives."
"Bees are related to ants and beetles."
"Wasps and bees are closely related."

And more specifically, visitors spoke about how the organisms are connected on the family tree:

"What is closely related and distantly related to bees."
"How they are connected."
"Looking at a Genus name helps to see if something is related."

While reviewing this data with the exhibit team, suggestions for revisions were made including splitting the game into two games. This led to the development of a second version of the component and a second round of testing during the spring of 2016.

The new version included a redesigned first section of the game. Visitors still had to drag and drop four insects into four boxes choosing from closest to most distant relative of the honeybee. The second game allowed them to build a family tree of insects showing which are closely related and which are distantly related to honeybees.

Twelve groups of visitors were observed and then interviewed after interacting with the component. Ten of the twelve groups completed the first game, while two groups left during the game. There was some confusion about using a drag and drop method but once explained, visitors had no difficulty and enjoyed trying to determine the order of relatedness.

Seven of the ten groups who played the first game, continued on to play at least part of the second game. Three of the seven groups completed the second game. Only one group that completed the game chose to use the information button to learn more about the insects.

Some of the visitors randomly guessed on the game screen as to which box to place an image until they got the right answer. There was some confusion as to what to do on the family tree page (here visitors can learn more about each of the organisms). Very few visitors read the text that appeared when they made the correct selection. Overall, those who completed the game enjoyed playing and commented that they learned a lot about bees and their relatives.

Several modifications were suggested to the exhibit team for the final exhibit component including adding clearer instructions and clues for visitors in the first game, less text on the family tree page and placement of buttons on the screen.

Summative Evaluation

A summative evaluation was completed during the summer of 2016. The final *What's in a Name?* Honeybee interactive was installed in a kiosk in the newly renovated Bee exhibit in the Arthropods: Creatures That Rule gallery (see Appendix H). The final component was similar to the computer prototype in that it opens with a matching game in which visitors "drag and drop" four organisms into four boxes in order from most closely related to least closely related to a honeybee. Information is provided for each organism when they are correctly selected. These four arthropods are then placed on a family tree by the computer indicating the relationship between these organisms and honeybees. Each level of the family tree is labeled (Phylum, Class, Order, Family, and Genus) to help visitors understand the relationships between these organisms. The second part of the game asks visitors to complete the family tree. Individual organisms appear on the screen and visitors are asked to determine if they are in the same Genus, Family, Order or Class as a honeybee. When a choice is correctly selected, the organism is placed on the family tree and visitors can press a button to learn more about the organism they select. After five rounds, the family tree is complete.

Twenty groups (38 visitors in total) were observed interacting with the component and then interviewed.

All visitors who approached the kiosk looked at the direction page. Ninety-five percent of visitors chose to continue playing the game. Eighty-nine percent of these visitors completed the first portion of the game (dragging and dropping four organisms into boxes). Of these, thirty-seven percent read information about at least one of the organisms when they correctly selected its relationship to a honeybee. Of those who completed this part of the game, sixty-five percent completed the second portion of the game – completing the family tree, while thirty-five percent of visitors left the kiosk during the game. Of these visitors who left during the game, sixty-

seven percent left after the first round and thirty-three percent completed four of the five rounds. These individuals were often drawn away from the interactive by another visitor (often an adult family member). Of the visitors who participated in the second part of the game, sixty-five percent read at least some information about the organisms on the family tree (interestingly – these were not the same sixty-five percent that finished the game).

When visitors were asked to name their favorite part of the activity, answers varied but most enjoyed playing the games and the challenge of trying to figure out which organisms are most and least closely related to honeybees. They also enjoyed learning about honeybees. Comments included:

"Dragging the pictures." (part one of the game)
"Trying to find all the subcategories."
"Filling in the gaps." (part two of the game -completing the family tree)
"The family tree."
"Sorting out bees and wasps and insects."
"Looking for one bee in particular."
"When they showed the bee names and insects."
"Learning about the bees."

When asked what they had learned about bees during this activity, visitors mentioned facts about certain types of bees and other insects, that there are different types of bees and that bees are related to different types of insects.

"There are stingless bees."
"Digger wasps look different from other wasps."

"There are a lot more species than I originally thought."
"There are more than two different kinds of bees."

"Bees are related to many different animals."
"Wasps are related to bees."
"Ants are part of the bee family."
"There are different types of bees and insects, some are more related than others."
"Some looked like they weren't bees but there were."

Visitors also learned specific information about scientific names from this activity. In addition to comments above, visitors said:

"I didn't know there were scientific names before this, just knew about common names."
"All the different scientific names."
"There are all in Latin."

Visitors were asked why they think scientist use scientific names instead of common names. They have a good working knowledge of this concept. Answers included:

"They are more specific for scientific purposes."
"To have a clear order and everything fits somewhere in the order."
"To show families of insects (like the bees)."
"To help categorize."
"So they can be specific and not be confused with all the common names we have for them."
"Since the common names can be confusing."
"It's like a SSN – defines one specific bee."
"They are like common names across the world."
"Latin names are international."

And of course:
"People want to have them after themselves."

Finally, to determine if visitors could make connections between the *What's in a Name?* components, visitors were asked if they had visited the Marine Life exhibition and if so if they had played the Jellies game. Only fifteen percent had visited the exhibit and none had played the game.

Jellies

Front-End Evaluation

A front-end study about Jellies was completed in the Arthropods: Creatures That Rule gallery during Spring 2015. Fifteen groups of visitors (36 visitors in total) were interviewed using two games to learn what they know about the animal and its relatives, and what they are interested in learning about.

Visitors were first shown an image of the Lion's Mane jelly (*Cyanea capillata*) and asked: What's my name? (see Appendix I). Most visitors knew that it was some sort of jellyfish.

On the back of the page the text read: My scientific name is *Cyanea capillata* but some people call me The Lion's Mane Jelly – can you guess why? Visitors suggested that it looks like a lion or a lion's mane or that its tentacles look like a lion's mane.

They were then asked what they know about jellies or what experiences they have had with jellies. The most popular comments were about stings:

"They sting."
"They are poisonous."
"Not all species sting."

Other described the consistency of jellies:
"They are squishy."
"They are soft."
"They are between a solid and a liquid."

A few visitors described what they look like:
"Sometimes you can see through them."
"Some have a little helmet on top."
"Some glow in the dark."

Finally, some visitors provided scientific facts such as:
"They are invertebrates,"
"They eat plankton."
"They don't have hearts or brains."
"They use tentacles to catch food."

During the first game, visitors were asked to match names (common and scientific were provided) of jellies with images of these jellies. There were two rounds of this game available to play. The first round consisted of four images (cannonball jellyfish, moon jelly, blue button jelly, fried-egg jelly) and their matching names (See Appendix J). Forty percent of visitors got the answers completely correct, thirty-five

percent got them partially correct (2 of the 4 answers correct) and twenty-five percent got them mostly incorrect (1 or less correct).

Seventy-five percent of visitors agreed to play a second round of the game with a different set of pictures (sea wasp, crown jellyfish, warty comb jelly, flower hat jellyfish) and matching names (see Appendix K). During this round, only twenty-six percent of visitors got the answers completely correct, thirty-seven percent got them partially correct (2 of the 4 answers correct) and thirty-seven percent got them mostly incorrect (1 or less correct).

Visitors were then asked how much they enjoyed playing this game on a scale from 1-5 with 1 being not fun at all and 5 being very fun. Even with incorrect answers, visitors' average rating was 4.1. During both rounds of this game, visitors spent a great deal of time trying to match the images with their names. There were great conversations and based on their comments, children definitely were practicing science skills (careful observing, describing, predicting).

Visitors were then asked to play a second matching game. They were shown an image of a jelly and provided with three names. They tried to match the image with the correct name (See Appendix L). During the first round of the game, only sixteen percent were able to correctly match the image to its name. All visitors chose to play again with a new image and set of names. During this round, twenty percent matched correctly.

Even though most of the visitors got the answers incorrect, they had a fun time playing. When asked how much they enjoyed playing this game (on a scale from 1-5 with 1 being not fun at all and 5 being very fun), the average rating was 4.4.

Finally, visitors were asked if they had any questions about Jellies. Their responses ranged from the popular stinging to what they eat. Additional questions were asked about their size, habitat and their families.

Overall, visitors really enjoyed playing the games and most stayed to play all of them. They were very interested in looking at the images and the seeing the vast array of jellies that were depicted. They often laughed at the names and even when they guessed incorrectly, visitors were not disappointed. This was definitely a great way to get visitors started on a path to learning about names.

The exhibit team met to review the findings and to determine how to incorporate these activities into the prototype of the computer interactive.

Formative Evaluation

A formative evaluation study of the prototype Jellies computer interactive was completed in the Arthropods: Creatures That Rule gallery during Summer 2015.

The prototype consisted of several pages. First, visitors were introduced to the Lion's Mane jelly by asking them to try to guess its name. Visitors then played an introductory matching name game similar to the first game in the front-end evaluation (matching four images with four names). For each of the images, visitors could choose to learn more about the jelly but touching an information button. This matching game was followed by a page with information about naming using the Purple People Eater jelly as an example. After this page, visitors were directed to a menu with two options: continue to play the jelly name game or explore a jelly family tree.

Fifteen visitor groups were observed as they interacted with the Jellies component. Follow-up interviews were conducted for all visitor groups.

All of the visitors tried the first activity. Half of them got the answer correct on the first try. The other half tried again after answering incorrectly. All moved on to the second activity. Here, twenty-six percent answered correctly on the first try. The others were not deterred and tried again until they got all four answers correct. Forty percent of visitors utilized the more information button for at least one of the jellies presented during this game.

All fifteen groups at least scanned through the Purple People Eater information page (about half of them spent long enough on this page to read the information thoroughly). One third of the visitors chose to end the session after this page.

Two thirds of visitors proceeded to the menu page. Of these, sixty percent chose to keep playing the jelly name game and forty percent chose to explore the jelly family tree. It was interesting to note that such a large number of visitors chose to look at information about the jelly family tree instead of playing another game. However, all of those who chose this path skimmed the pages quickly and did not go any further after this (that is - they did not return to the menu to play the game).

The majority of visitors who continued to play the naming game guessed incorrectly but tried again (the hint using the scientific name was a big help to these groups). After they completed three rounds of play, half stopped the session and half chose to look at the family tree link.

After playing the games, visitors were interviewed. They were asked what they learned new about jellies and about scientific naming from playing this game.

Visitors mentioned:
"Some jellies don't sting."
"Moon jellies are harmless."
"There are lots of different kinds of jellyfish."
"Some move using rows of hairs, these are not considered true jellies."

Others indicated that:
"Jellyfish have different names."
"There are two main lineages of jelly-like animals."

With regard to learning about naming, visitors said they learned that:
"Some people use Greek and Latin names."
"Scientists use Greek and Latin roots."
"The names are related to the way they look and their body structure."
"They have two names in different languages."

Several suggestions were made to the exhibit team while reviewing this data and these changes were incorporated into the final exhibit component.

Summative Evaluation

The *What's in a Name?* Jellies kiosk was installed in the newly renovated Marine Life exhibition in the Putnam Family Gallery (see Appendix M). A summative evaluation of the Jellies kiosk was completed in this gallery during the summer of 2016. The component is similar to the prototype. The first half of the interactive is linear in nature. Visitors can view an image of a Lion's Mane jelly and guess its name. Visitors are then directed to a drag and drop matching "name game" followed by information about common names (and how many different names can be used for the same organism) using the Purple People Eater as an example. Visitors are then referred to a second "naming game". Finally, visitors are provided with a menu with three options: *Check out cool jellies* (activity 1), *Explore family tree* (activity 2) and *Who invented scientific naming?* (activity 3). By breaking up the information into three activities in the latter half of the component, visitors are provided with an opportunity to choose their favorite activity. *Check out cool jellies* allows visitors to learn more about the animals utilized in the name games. *Explore a family tree* depicts the relationships between different species of jellies and shows visitors how jellies and comb jellies are not directly related. Finally, *Who invented scientific naming?* provides visitors with information about Carl Linnaeus and how Latin names and binomial classification are used for scientific naming

Twenty groups (45 visitors in total) were observed as they interacted with the Jellies component. Each observation was followed up with an interview.

All of the groups stayed for the introductory activity, guessing the name of the Lion's Mane jelly. Three groups left after the introductory activity. Of those who stayed to play the first jelly name game, eighty-eight percent continued to the Purple People Eater page while twelve percent chose to leave the kiosk. The Purple People Eater page was simplified from the prototype with less text and more interaction. This seemed to improve holding time at the component as eighty-seven percent of visitors continued to engage at the interactive beyond this page (as compared to sixty-six percent at the prototype). Thirteen percent of visitors chose to stop playing here (down from thirty-three percent during the formative evaluation).

Four rounds of play were available to visitors in the second "name game". Forty-six percent of visitors played all four rounds, while eleven percent played three rounds. Twenty-three percent of visitors played one round and an additional twenty-three percent played two rounds. Many visitors (seventy-seven percent) chose to leave the kiosk after this game while twenty-three percent stayed for the final set of activities. Thirty-three percent of visitors who stayed participated in only one activity (*Check out cool jellies*). The remaining sixty-seven percent completed all three activities.

When asked about their favorite part of the activity, visitors enjoyed the beautiful images of the jellies, the "game" nature of the interactive and learning the scientific names. Comments included:

"The images."
Looking at the pictures of jellies."
"Trying to match jelly names and pictures."
"Guessing the relatives."
"It was informative and fun."
"Learning the scientific names."
I liked learning about the different types/names liked Fried Egg jelly."

Visitors were also asked what they learned from this activity. Their answers ranged from learning about the scientific names to learning information about the jellies themselves. Comments included:

"They have Latin names."
"There are many different genera and species."
"Odd names of jellyfish."
"I learned who invented the names."

"There are so many kinds of jellies."
"There are many cool species."
"Portuguese man-o-war not a jelly."
"Lion's Mane is the biggest jellyfish."

Visitors were asked if they learned anything new about scientific names for this activity. Those that answered knew that the name of an organism consists of a genus and a species. Comments included:

"There are two names to identify it."
"Names comes with two parts: the first name like a family name and then the specific name."
"They start with the same name if the are "like sisters" it is the family name and then the second name is the specific type of jellyfish."

This question was followed-up with a question about why they think scientists use these names when there are already common names available. Visitors understood that common names can be misleading and that there can be more than one common name for a single species (as presented in the Purple People Eater page). Comments included:

"Common names are misleading – this can be specific."
"So you don't mix them up."
"Sort out into groups so that nothing gets mixed up or confused."
"There are many different common names for the same jelly, the scientists settle on just one scientific name."
"Certain jellies have many common names."
"So many different common names so be specific with scientific name (but they are hard to learn)."
"Lots of common names so they (scientists) need one name for it".
"It makes it easier to identify the jellies (even if they are hard to pronounce)."
"Distinguishes them from one another."
"Gives a common way to describe these animals."
"To help classify them."
"Standard across all languages."

Finally, visitors were asked if they had visited the Bee exhibit and if so if they have played the *What's in a Name?* Honeybee game. Thirty percent of visitors had visited the bee exhibit and of these, thirty-three percent played the game. Visitors did not connect the fact that these are both *What's in a Name?* activities and that they both contain family trees.

Poison Ivy

Front-End Evaluation

A front-end study about Poison Ivy was completed in the Arthropods: Creatures That Rule gallery during Spring 2016. Twenty-one groups of visitors (47 visitors in total) were interviewed using a "poison ivy game" to learn what they know about the plant and its relatives, and what they are interested in learning about.

Visitors were first shown an image of poison ivy and asked what they thought it was Thirty-nine percent knew that it was poison ivy (most of these visitors were children). When asked how they knew it was poison ivy, most said because of the leaves or the fact that it has three leaves. Forty-three percent indicated that it was some kind of plant, bush, tree or shrub and eighteen percent had no idea what it was. Visitors were then asked what they knew about poison ivy. Most did not have a comment. A few mentioned that it was in their yard, that they were allergic to it or that it causes a rash.

The first game visitors played was called "Which one is Poison Ivy". Visitors were shown six pairs of plants and had to guess which was a variation of poison ivy (see Appendix N). On the back of each card was information about the plant. Seventy percent of visitors tried all six pairs.

	Percent played	Guessed correctly	Guessed incorrectly
Pair 1 woody poison ivy	100%	53%	47%
Pair 2 poison ivy with berries	100%	32%	68%
Pair 3 Spring version of poison ivy	100%	83%	17%
Pair 4 Long middle leaf	85%	61%	39%
Pair 5 Poison ivy with butterfly	85%	41%	59%
Pair 6 Mitten shaped poison ivy	70%	58%	42%

Visitors were not deterred when they guessed incorrectly and enjoyed playing the game. They were very surprised by Pair 1 and Pair 2. While many adults were familiar with the woody version of poison ivy, many of the younger visitors did not know that this is a variation of the plant. Most visitors (young and old) did not know that poison ivy has berries. Visitors were asked on a scale of 1-5, (with 1 being not fun at all and 5 being very fun) how much they enjoyed the game. The mean was 4.03.

The second game visitors played was called "Who Is My Closest Relative?" Visitors were given three choices and had to guess which plant was most closely relate to poison ivy. Scientific names were provided on the front of the card (see Appendix O).

Forty percent of visitors completed all of the second game while twenty percent completed only part of the game. Of visitors who did not complete the second game, half left after the first group of choices and half left after the third group. The remaining forty percent of visitors did not stay to play the second game.

Several of the visitors who completed the entire game commented that they like this game better than the first one.

	Correct first try	Incorrect First try
Group 1 laquer	46%	54%
Group 2 cashew	37%	63%
Group 3 mango	26%	74%
Group 4 pistachio	39%	61%
Group 5 mahogany	41%	59%
Group 6 maple	44%	56%

When asked on a scale from 1-5 (with 1 being not fun at all and 5 being very fun) how much visitors enjoyed the game, the mean was 4.7

All of the groups who completed the game tried a second time to get the correct answer. For some groups, just to make it interesting, after they made their first selection, (especially if two different choices were put forth) the evaluator took away one if the incorrect answers and asked if they wanted to stick with their original choice or pick the other one. This allowed groups to discuss why they chose

their selection. Those that got the first one correct often made reference to the scientific names on the card (same genus).

The order that was chosen for this round of testing may have influenced visitor choices. For example, once visitors realized that the cashew was closely related to poison ivy, some picked mango and pistachio right away because of allergies to these products. Others talked about the ivy selections. Some thought that was too easy so it couldn't be the right choice. Others (especially younger visitors) thought the ivies should all go together. Some visitors guessed the big trees because they thought they could never be the correct answer so maybe they had to be the answer.

The exhibit team reviewed this information and recommendations were made for the development of the computer interactive including less text and better quality images.

Formative Evaluation

A formative evaluation study of the prototype Poison Ivy computer interactive was completed in the Arthropods: Creatures That Rule gallery during Summer 2016. The prototype consisted of an introductory page followed by three activities. The first, *Outsmart a tricky plant,* was based on the first activity of the front-end evaluation and asked visitors to determine which of two plants is poison ivy. Information about the plant accompanied each variation of poison ivy. The second activity, *Be a science detective,* asked visitors to choose the closest relative to poison ivy from three candidates. When the correct response was given, the screen changed to display a family tree indicating the relationship between the chosen plant and poison ivy. A magnifying glass was available for visitors to use see scientific names for each plant. Finally, in *Fun facts about Poison Ivy,* visitors could choose from six options (More potent poison, Ivy Misnomer, Odd cousins, Irritating Oil, Favorite Fruit or Human Problem) to learn about the plant.

Twenty-one groups (34 visitors in total) were observed interacting with the component and then interviewed.

Most visitors skimmed over the first page and quickly moved to the activities. Visitors could choose between the three activities. Eighty-one percent began with *Outsmart a tricky plant,* fourteen percent began with *Be a science detective* and five percent began with *Fun facts about Poison Ivy.* Over half of visitors (fifty-seven percent) participated in all three activities.

Activity 1 (*Outsmart a tricky plant*)

Most visitors completed the entire activity and the majority got at least half of them wrong but continued to play (many selected the correct answer after choosing the incorrect one). Many visitors got the first round incorrect but the last round correct. About half of the visitors playing this game moved onto next round without reading

the information (correct or incorrect). Some used prior knowledge of poison ivy ("that can't be right – it has five leaves") to help with their decision-making.

Activity 2 (*Be a science detective*)

Of those that played this game, most completed the activity. About half used the magnifying glass for some or all of the choices. One visitor mentioned, "It would be very hard to tell without the clues." A few visitors used magnifying glass for answers but not for poison ivy itself. Visitors did spend time looking at the family tree page and many were surprised about the foods (cashews, mangos) "I thought people ate cashews?"

Activity 3 (*Fun facts about Poison Ivy*)

About half of visitors completed this activity and most read at least some of the text. Of those that participated:

36% began with Human problem
29% began with More potent poison
21% started with Irritating oil
7% stated with Odd cousins
7% started with Ivy Misnomer

36% looked at all of the choices
36% looked at 3 of the choices (irritating oil, favorite fruit, human problem)
14% looked at 4 of the choices
7% looked at 2 choices
7% looked at 1 choice

Visitors were asked about their favorite part of the activity. Answers varied across all three activities but the majority indicated that their favorite was *Be a science detective,* commenting that they enjoyed "making the family tree", getting to "do detective work" and "learning about different plants that are related to poison ivy."

Visitors were also asked what they had learned about poison ivy playing these games. Many indicated that they now know that "It's related to cashews, mangos and pistachios." Others now know to "look at the middle leaf to see if it's longer." Those who completed *Fun facts about poison ivy* were surprised to learn that "other animals can eat it," and that "chimps and humans are allergic to it."

The exhibit team met to review these finding. Several minor recommendations were made for the development of the final computer interactive.

Summative Evaluation

The final exhibit kiosk was completed during the summer of 2016 and installed as part of the New England Forests exhibition in the Zofnass Family Gallery (see Appendix P). A summative evaluation of the Poison Ivy kiosk was completed in this gallery.

The component is similar to the prototype computer interactive developed for the formative evaluation. An introductory page is followed by three activities. The program does not follow a linear path and visitors can choose which activity in which to engage. *Outsmart a tricky plant* (activity 1), asks visitors to choose which of two plants is poison ivy. If the visitor chooses the correct response, information about poison ivy appears. The order of pairs was changed slightly from the prototype version. *Be a science detective* (activity 2), asks visitors to choose the closest relative to poison ivy from three candidates. When the correct response is given, the screen changes to display a family tree indicating the relationship between the chosen plant and poison ivy. The family tree in the final version is more linear than the prototype and presents relatives first in the same genus, then family, then order and then class. Finally, in *Fun facts about Poison Ivy* (activity 3), visitors can choose from the same six options (More potent poison, Ivy Misnomer, Odd cousins, Irritating Oil, Favorite Fruit or Human Problem) as the prototype to learn more about the plant. In addition to the computer interactive, two physical models of the poison ivy plant (one as a vine crawling up a maple tree and the other – a plant with red leaves in a case) have been placed near the kiosk. These are referenced in the *Outsmart a tricky plant* activity on the computer.

Twenty groups (28 visitors in total) were observed interacting with the component and then interviewed.

All visitors glanced at the introductory page with the directions for the game. Groups then self-selected what they found interesting and chose to play.

In total, sixty-five percent of visitors tried activity 1, sixty percent tried activity 2 and forty-five percent tried activity 3. Fifty-five percent of visitors participated in only one activity. Of those, thirty-six percent participated in activity 1, forty-six percent in activity 2 and eighteen percent in activity 3. An additional twenty percent of visitors tried two of the three activities. Of those, fifty percent played games 1 and 2 and fifty percent played games 1 and 3. Finally, twenty-five percent of visitors engaged with all 3 activities.

Sixty-five percent of visitors who walked up to the Poison Ivy component participated in activity one, *Outsmart a tricky plant*. Of those visitors, sixty-four percent played all rounds while thirty-six percent stopped during the activity.

Most visitors, even those that did not complete the activity, read the information about poison ivy when they got it correct and read some of the information about another plant when they got it incorrect.

Of those that participated in Activity 2, *Be a science detective*, (sixty percent of visitors at the Poison Ivy component) most completed all six rounds and read the information about poison ivy on the family tree page. A few visitors indicated that they used the clues from this page to help them solve the next challenge. A few visitors also used the magnifying glass for clues. This activity led to the most knowledge about family relationships for visitors. This was also a favorite activity (of the three) as noted by visitors in the follow-up interview.

Forty-five percent of visitors who interacted with the Poison Ivy component tried activity three (*Fun Facts about Poison Ivy*). Those that did this activity were actively engaged. Only thirteen percent read only one fact. Twenty-five percent read four facts and an additional twenty-five percent read five facts. Thirty-seven percent of visitors interacting with the section of the component read all six facts about poison ivy.

When asked about their favorite part of the component, visitors enjoyed playing both games and learning new facts about the plant. Comments included:

"Finding out which one was poison ivy." (Outsmart a tricky plant)
"Getting more familiar with identifying the plant." (Outsmart a tricky plant)
"Learning how poison ivy is related to almonds." (Be a science detective)
"Learning about allergies." (Fun Facts about Poison Ivy)

Visitors also learned a great deal about poison ivy playing this game. Comments ranged from those related to allergies to evolutionary relationships between poison ivy and other plants:

"The allergy aspect of poison ivy."
"What makes the skin irritant or what is the poison."
"Although 85% of humans develop an allergic reaction when in contact with it, some animals use it as food."

"It has lots of relatives."
"Mango is in the same family."
"I didn't know the relation to common edibles like mangos and cashews."
"That it's not really ivy."

With regard to what they learned about scientific names, visitors mentioned:

"I didn't know the names for these plants before this game."
"Showing the names on the family tree helped me understand how they are related."

When asked why scientists use scientific names instead of common names, visitors said:

"I feel it's because everywhere there are plants with similar common names. There are substrains that are more easily identifiable by a scientific name."
"To be very clear to which species they are referring."
"To clarify ontology/phylogeny and relationships."
"Because they have such a diversity of things to name."
and of course:
"Because they need to sound smart."

Finally, visitors were asked if they had visited the galleries hosting other *What's in a Name?* components. Fifty percent had visited Bee exhibit in Arthropods and forty percent of those who visited Bees played the *Honeybees What's in a Name?* Game. Only one visitor group mentioned that this game was "kind of like the bee game."

At the time of data collection no visitors had visited the Marine Gallery exhibition and so had not played the Jellies computer game. Visitors did mention that they would visit this gallery later in their visit.

Dimetrodon

Front End Evaluation

A front end study about Dimetrodon was completed in the Romer Hall of Vertebrate Paleontology during the summer of 2016. Twenty-four groups of visitors (44 visitors in total) were interviewed to ascertain what they know about the creature and its relatives and what they are interested in learning about.

Visitors were first shown two pictures of Dimetrodon, one of real bones and a second image of what Dimetrodon might have looked like and asked if they knew what this was. The majority of visitors indicated that it was some kind of dinosaur or a lizard. A few visitors knew that is was Dimetrodon.

Visitors were then provided with six images (Komodo Dragon, Crocodile, Triceratops, Chicken, Grey Wolf and Archaeopteryx) and asked which of these is most closely related to Dimetrodon (see Appendix Q). The most common response was a Komodo Dragon, followed by a Crocodile and then Triceratops. Many visitors who believed that Dimetrodon was a dinosaur thought that either the Crocodile or the Chicken were descendents of Dimetrodon. Most visitors enjoyed the activity and tried several times before arriving at the Grey Wolf.

Visitors' ideas about Dimetrodon's closest relatives:

	Komodo Dragon	Crocodile	Triceratops	Chicken	Grey Wolf	Archaeopteryx
Guess 1	**37%**	26%	26%	7%	0%	4%
Guess 2	20%	**24%**	8%	**24%**	8%	16%
Guess 3	12.5%	21%	12.5%	21%	8%	**25%**
Guess 4	10%	5%	24%	14%	19%	**28%**
Guess 5	18%			25%	**32%**	25%

It was determined that this was a successful approach to introduce the exhibit content. It was engaging, allowed visitors to make predictions, and allowed them to think about evolutionary paths.

Visitors were then provided with a diagram of Dimetrodon (see Appendix R) and asked which features of Dimetrodon they would like to learn more about. Each body part (Sail, Tail, Shoulders and Hips, Teeth and Eyes) was presented as a paper flip label. Visitors chose body parts and turned over the paper to learn more. Not surprisingly, the sail was extremely interesting to visitors of all ages and chosen more than any other attribute – by eighty-three percent of visitors. Visitors were also interested in the teeth – wanting to know more about what and how Dimetrodon ate.

Popularity of Dimetrodon features:

	Sail	Tail	Shoulders and Hips	Teeth	Eyes
Choice 1	**83%**		7%	7%	3%
Choice 2	11.5%	8%	11.5%	**50%**	19%
Choice 3		21%	14%	36%	29%
Choice 4		75%		25%	
Choice 5			50%	50%	

In addition to presenting information about Dimetrodon, its relatives and evolutionary paths, the exhibit team was interested in presenting several key concepts about Dimetrodon to the public through this interactive. Therefore, visitors were asked to rate their interest (on a scale from 1-5 with 1 being not interested and 5 being very interested) in several topics including those related to Dimetrodon's behavior, its use as type specimen, and the story of its discovery. Visitors were most interested in finding out why Dimetordon was not classified as a dinosaur, what it ate, and common relatives. Visitors were least interested in how it moved. Many visitors indicated that they thought they knew or could figure out how it moved by looking at images of the animal. Comments included:

"It just walked."
"I can probably guess."
"I already knew that."

Visitor interest levels (on a scale of 1 to 5) for following questions:

	1	2	3	4	5
What do I have in common with you?	3%	6%	25%	**20%**	**46%**
Why am I not a dinosaur?	3%	3%	25%	**9%**	**60%**
What did I eat?	0%	6%	25%	**38%**	**31%**
What did my environment look like?	0%	22%	33%	15%	30%
Why am I a particularly important fossil specimen to scientists?	19%	9%	12%	22%	38%
How did I move?	22%	30%	30%	6%	12%
What's the story of my discovery?	7%	13%	28%	24%	28%

How do scientists determine they've found another of my same species?	0%	13%	39%	28%	20%

Finally, visitors were asked what questions they have about Dimetrodon. Questions ranged from those about behaviors:

"Could it fly?"
"Does it swim?"
"How fast did it move?"

To those about its body:

"Why did it have such a large tail?"
"Why such tiny legs?"
"Why is the sail so big?"
"Did it have different kinds of teeth (like sharks)?"

Visitors also asked about how it reproduced:

"How do they know if it is a male or female?"
"How did it mate?"
"How did it reproduce?"
"Did it lay eggs or have live births?"

And how it interacted with others:

"Was it social or not social (packs)?"
"Did it travel in packs?"
"Did it live in groups or alone?"

And finally, they were interested in learning about when it lived:

"What period did it live in?"
"What was its lifespan?"
"How did it become extinct? "

The exhibit team met to review this information and to plan the prototype computer interactive.

Formative Evaluation

A formative study of the prototype Dimetrodon computer interactive was completed in Romer Hall during the fall of 2016. The prototype consisted of an introductory activity (similar to the paper activity above) in which visitors had to guess which animal is most closely related to Dimetrodon followed by an introductory video. Once visitors watched the entire introductory video, they were offered three

additional activities: *What Am I*? a video about Dimetrodon and its relatives; *I'm Your Type*, a video explaining Dimetrodon's use as a type specimen; and *Stories From My Bones* an interactive map of Dimetrodon in which visitors could select from several body parts on the touch screen and learn more about them.

Fourteen groups (26 visitors in total) were observed using the activity and then interviewed. All 14 groups tried the opening activity (selecting the closet relative to Dimetrodon) and all groups watched at least some part of the introductory video. A little over half of visitors (fifty-seven percent) chose not to watch the entire intro. video. Of the three additional activities, visitors were equally interested in the videos and the body activity.

This component is not as interactive as the other three *What's in A Name?* components but serves the purpose of introducing type specimens and connections to Harvard scientists. The first page is interactive and visitors were surprised to learn that Dimetrodon is more closely related to mammals than to dinosaurs or lizards. The introductory video provided quite a bit of information about Dimetrodon including information about relationships to other organisms, which was important for visitors who left before viewing the entire video.

Recommendations were made to the exhibit team for minor changes to the component. These included adding next buttons so visitors could move to another activity even if they had not completed an entire video, and highlighting and labeling body parts for the *Stories from My Bones* interactive body map activity. These changes were quickly made and the interactive was installed into the exhibit kiosk before the summative evaluation.

Summative Evaluation

The *What's in a Name?* final computer interactive for Dimetrodon is located in an exhibit case in the Romer Hall of Vertebrate Paleontology near the case with Harvard's Dimetrodon skeleton (see Appendix S). The case, installed during the fall of 2016 consists of the computer interactive, additional label copy about Dimetrodon on the left side of kiosk and a glass case containing specimens on the right side of the kiosk. The interactive is similar to the one developed for the formative evaluation with only slight modifications. The component still opens with an introductory activity in which visitors guess which of four animals (a lizard, a mouse lemer (mammal), a dinosaur, and a bird) is most closely related to Dimetrodon. This activity is followed by a video introducing Dimetrodon including its relationships to other animals (living and not), the environment in which it lived and information about specific body parts (like the sail). It also introduces Harvard's Dimetrodon skeleton as a type specimen. The video serves as an overview of the activities to come and a general review of the animal for visitors who choose not to stay to participate in additional activities. A new feature was added (a button the on touch screen) to allow visitors to skip to the end of the video. At the end of the video, a menu page allows visitors to choose from three activities: *What Am I*? (activity 1) a

video about Dimetrodon and its relatives; *I'm Your Type* (activity 2) a video describing Dimetrodon as a type specimen; and *Stories From My Bones* (activity 3) an interactive map of Dimetrodon in which visitors can select body parts on the touch screen and learn more about them. A button for each activity allows visitors to skip to the end if they want to try something else.

Twenty-two groups (47 visitors in total) were observed interacting with the component and then interviewed.

All of the visitors tried the introductory activity. Like in the prototype version, many were surprised that the mammal is the closest relative. Thirteen percent of visitors left the kiosk after the introductory activity. The remaining visitors all watched at least part of the introductory video. Of these, fifty-three percent skipped to the end during some part of the video and forty-seven percent watched until the end. Twenty-one percent of visitors chose to leave after the introductory video. As mentioned above, this video is comprehensive and visitors receive a great overview of Dimetrodon and its importance to scientists as a type specimen.

In total, sixty percent of visitors tried activity 1, twenty-six percent tried activity 2 and sixty-seven percent tried activity 3. Sixty percent of visitors participated in only one activity. An additional twenty-six percent of visitors tried two of the three activities. Finally, thirteen percent of visitors engaged with all 3 activities.

Of the sixty percent of visitors who tried activity 1 (*What Am I*?), thirty-seven percent watched the entire video and sixty-three percent skipped to the end of the video. Half of visitors watched all of video in activity 2 (*I'm Your Type)* and half skipped to the end of the video. For activity 3 (*Stories From My Bones)*, seventy-five percent of visitors looked at only one body part (of these, half looked at the sail and half looked at the skull). The remaining twenty-five percent of visitors viewed two body parts (all looked at the skull and sail). While these results were somewhat different from the formative evaluation, the sample size was small. Given a larger sample, it is likely that more visitors would chose to view all of the different body parts available.

Visitors were asked what they learned from interacting with the activities. Comments ranged from learning about its relatives to its importance to science. Comments included:

"That it is not a dinosaur."
"It's related to mammals."
"I learned about the different body parts."
"It lived before the Jurassic."
"Scientists are still studying it now."

Visitors were also asked why scientists use scientific names instead of common names. Many did not know but those who did answer indicated that:

"It's the same for every language."
"Common names can be used for multiple species."
"To identify constants over a long evolutionary line."

Finally, to determine if visitors could make connections between this kiosk and other *What's in a Name?* exhibit components, they were asked if they had visited any of the other kiosks. Five percent had visited the Marine Gallery but none had played the Jellies game; thirty percent had visited the Bee exhibit and of that twenty-five percent played the honeybee game. None of the visitor groups made a connection between the Honeybee interactive and the Dimetrodon interactive. No visitors had visited the New England Forests exhibit yet.

Conclusions

Front-end Evaluations

Overall, visitors really enjoyed playing the games developed as part of the front-end evaluation for each topic and most visitors stayed to play all of them, providing the evaluator with rich information. Permutations of many of the activities developed during the front-end evaluations were ultimately used in the final exhibit components. Visitors had many preconceived notions and questions about each of the four topics. There was a clear divide between those visitors who had studied at least some biology and were aware of nomenclature and those who had not.

The exhibit team was pleased to learn that visitors were interested in several topics related to bees including their relationships to other animals, their anatomical features and how scientists and others name them. With regard to jellies, visitors were very interested in the vast array of sizes and shapes of jellies and the unusual common and scientific names given to them. The most common question asked by visitors during each round of interviewing was: which one of these can sting? Visitors participating in poison ivy activities were most interested in the allergic nature of the plant and its relationship to foods we eat such as pistachios, mangoes and cashews. They also liked the use of poems (leaves of three… let it be) to help them identify the plant. Dimetrodon isn't a dinosaur! This was extremely surprising to visitors, which sparked a number of questions regarding their closest relations. Visitors were also extremely interested in knowing when they lived, and what the sail was used for.

Formative Evaluations

Formative evaluation was extremely helpful in determining how well information presented in the front-end games could be translated into computer interactives. Many of the activities were well suited for a computer screen including drag and drop games and building family trees. The games were engaging for all visitors and the images (especially the jellies) were beautiful. These evaluations were also useful in determining what activities visitors would choose on their own without being cued by the evaluator (as in the front-end evaluations) and how long visitors stayed at each component. Based on observations and interviews with visitors, several recommendations were made for slight by significant modifications to text, images or pathways through activities. These led to increased engagement and learning outcomes observed at the final exhibit components during the summative evaluations.

Summative Evaluations

Visitors interacting with each of the final computer kiosks learned a great deal about the organisms being presented. It was clear from their comments while playing as

well as from interviews after their interactions that they learned new information about each of the organisms. For example:

"There are different types of bees and insects, some are more related than others."
"I learned new names for different kinds of insects."

"I learned the names of different jellyfish."
"They have two names - genus and species." (at the Jellies component)

"The fact that many animals are not allergic to it."
"They (the names) helped me understand the relationships between the plants."

"That it is not a dinosaur."
"The importance of this creature to scientists." (at the Dimetrodon component)

It is also clear that these interactives were successful in providing information about scientific names and how these names are useful to scientists. Hints during the games featuring scientific names were used often and visitors commented that knowing the scientific names allowed them to make connections (and matches) between relatives. The strategy of building a family tree was extremely successful in providing visitors with a framework to use to understand the evolutionary relationships between the chosen organism and its relatives. Finally the use of video with scientists in the Dimetrodon kiosk was a technique that helped to sustain visitor interest and allowed them to understand the role that scientific specimens – more specifically type specimens, play in studying systematics.

The one aspect that was difficult to measure given the timeline of the project was visitor engagement with systematics across the museum. Components were completed in different timeframes and therefore could not be evaluated at the same time. Visitors were asked at each of the four components if they had visited other others that were complete at that time. While many visitors did spend time in the galleries hosting these kiosks, very few of these visitors actually interacted with the *What's in a Name?* kiosks and fewer were able to make connections about naming between them. With the completion of all components and information about the four kiosks on the museum website, interactions between the exhibit components should increase.

Overall, the exhibit kiosks were well received by visitors of all ages. Based on the findings from all of the studies, the exhibit was successful in engaging visitors of all ages in the various topics presented at the four kiosks. Both adults and children spent significant time at the exhibits. They were interested in the topics presented and parents and children often worked together to figure out relationships between organisms.

Spending time with the components also led to gains in science knowledge as was observed by the evaluator during front-end and formative evaluations and from the

interviews conducted during the summative evaluation. Visitors indicated during the summative evaluation that they learned new information about each of the specific organisms and about their relationship to other organisms. They also learned about scientific naming and why using these names are important to scientists.

APPENDIX A: SAMPLE FRONT-END INTERVIEW SHEET (Poison Ivy)

1. What am I? (guesses/comments)

2. What do you know about poison ivy? What experiences have you had with it?

3. Game 1 - Which one is poison ivy?

	Correct?	Read back of correct	Incorrect	Read back of incorrect	Read back of correct	Next round or end game
Pair 1 woody						
Pair 2 berries						
Pair 3 spring						
Pair 4 Long						
Pair 5 butterfly						
Pair 6 mitten						

Notes:

On a scale from 1-5 how fun was this game:

4. Who is my closest relative?

	Correct first try	Next round or end game	Incorrect First try	Try again/ move on/end game	Correct second try	Next round on or end game	Incorrect second try	Next round on or end game
Group 1 laquer								
Group 2 cashew								
Group 3 mango								
Group 4 pistachio								
Group 5 mahogany								
Group 6 maple								

Notes:

On a scale from 1-5 how fun was this game:

5. Do you have any questions about poison ivy?

APPENDIX B: SAMPLE FORMATIVE EVALUATION OBSERVATION/INTERVIEW SHEET

Jellies Interactive: Observation Sheet

Observer: **Date/Time observation began:**

Visitor info, Adult: M F **Child(ren):** # of M _____ # of F_____
Age(s) _____

Amount of Time Observed (from beginning of activity):

Group was: _____Cued _____ Uncued

Behaviors observed:

❑ Played - What is my Name (Lion's Mane)

____correct – moved on to next game
____correct – stopped here
____incorrect – tried again
____incorrect – stopped here

❑ Played Jelly Name Game (drag and drop)

____correct – moved on to next game
____correct – learned more about the jellies
____correct – stopped here
____incorrect – tried again
____incorrect – stopped here

____had easy time dragging and dropping
____had hard time dragging and dropping

❑ Purple People Eater
___touched picture to see more names

❑ MENU (first time)

___played matching name game
___explored a jelly family tree
___found out more about jellies

❑ Name Game

___correct match - continued playing

___correct match - back to menu
___incorrect match - tried again
___incorrect match - stopped here
❑ Check out cool jellies

____how many _____
____returned to menu
____stopped here

❑ Explore family tree

____read until end of segment
____stopped on this page _____
____returned to menu

❑ MENU (second time)

___played matching name game
___explored a jelly family tree
___found out more about jellies

❑ MENU (third time)

___played matching name game
___explored a jelly family tree
___found out more about jellies

LAST PAGE VIEWED:

Interview:

1. On a scale from 1-5, how fun was this activity (1=not fun, 5=really fun)

2. What was your favorite part of the activity? Least favorite part?

3. Did you have any problems finding your way through the activity? If so, where did you get stuck?

4a. Did you learn anything new about jellies from this activity? If yes, What?

4b. Did you learn anything new about scientific names from this activity? If yes, What?

5. What could we do to make this activity better? [Probe: (If they didn't complete the activity) I noticed that you chose not to finish the activity. What could we do to make it more likely you would complete the activity?]

APPENDIX C: SAMPLE SUMMATIVE EVALUATION OBSERVATION/INTERVIEW SHEET

Dimetrodon Interactive

Observer: **Date/Time:**

Visitor info, Adult: M F **Child(ren):** # of M _____ # of F_____
Age(s) _____

Behaviors observed:

❑ Played Introductory Activity

❑ Watched opening video

____ stopped during the video

Choice page:

❑ Tried Activity 1 (What Am I?: *I might not be who you think I am…*)

____ stopped during the video

❑ Tried Activity 2 (I'm Your Type: *What does it mean to be a "type" specimen?)*

____ stopped during the video

❑ Tried Activity 3 (Stories from My Bones: *Interactive Body Map*)

_____Sail
_____Tail
_____Shoulders and Hips
_____Skull

____ stopped during the activity

LAST PAGE VIEWED:

Interview:

1. What was your favorite part of the activity? Least favorite part?

2. Did you learn anything new about Dimetrodon from this activity? If yes, What?

3a. Did you learn anything new about scientific names from this activity? If yes, What?

3b. Why do you think scientists use these names when we have common names?

4a. Did you visit the bee exhibit? If yes, did you play the computer game about honeybees?

4b. Did you visit the Marine Life Gallery? If yes, did you play the computer game about jellies?

4c. Did you visit the New England Forests Gallery? If yes, did you play the computer game about poison ivy?