

DEVELOPMENT OF AN INTERACTIVE PROGRAM ON THE JACOBSON'S
ORGAN AND DEFENSE/PREY METHODS OF SNAKES AS A MODEL FOR
TEACHING COMPLEX BIOLOGICAL CONCEPTS
TO CHILDREN IN GRADES FOUR - SIX

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by

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DEVELOPMENT OF AN INTERACTIVE PROGRAM ON THE JACOBSON'S
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IN GRADES FOUR - SIX

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The University of Texas Southwestern Medical Center at Dallas, 2008

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The goal of this thesis was to create a model for an educational interactive animated program that explains complex biological concepts to children in grades four through six. The program uses illustrations, animations, photographs, and interactive games to enhance the teaching of the Jacobson's organ in snakes and snake defense/prey methods. The program serves not only as an educational tool, but also engages the learner through its interactive games which reinforce important concepts.

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CHAPTER ONE

Introduction

Thesis Research Problem

No visual resources exist within children's biological education to teach children about the function of a snake's Jacobson's organ or about snakes in Texas and their killing methods. Is it possible to create a visual resource that can teach children these complex biological concepts and create an interactive environment?

Goal and Objectives

The goal of this thesis was to create an interactive program that taught two important biological concepts: the snake's Jacobson's Organ and Defense/Prey Methods of Texas snakes. The interactive program uses illustrations, photographs, animations, and interactive games to enhance the teaching of these two difficult biological concepts. The program was created for the Heard Natural Science Museum & Wildlife Sanctuary located in McKinney, Texas and serve as a companion to the museum's snake exhibit. The museum opened October 1, 1967 and now serves more than 100,000 visitors annually. The museum's mission is threefold: education, conservation and preservation.

The first objective of this project was to work with Roger Sanderson and Schelly Corry to create two animation scripts with a 5th grade reading level. Roger Sanderson is a director of Botanical Gardens & a wildlife biologist at the Heard Museums and is also an expert on snakes. Schelly Corry is the education department manager with the Heard Museum, and is a certified Montessori teacher and recognized as an environmental

educator by the state of Texas. In addition to the scripts, definitions of scientific terms needed to be explained not only visually but also through text and audio.

The second objective was to design and create two animations. The first animation would teach the Jacobson's organ concept and the second animation would teach the concept of snake defense/prey methods with focus on envenomation and its pathological effects.

The third objective was to focus on snakes found in Texas. One of the focal points of the defense/prey methods animation was to stress that very few snakes in Texas are venomous and dangerous to humans. The idea behind this focal point was to eliminate false pretenses about which snakes in Texas are venomous.

The final objective was to post the completed program, which contains both animations, on the Heard Museum's website and for evaluation purposes have the program posted on classroom computers for students to test and evaluate.

Background

The Jacobson's organ in snakes is an organ that helps snakes identify scents. The mechanism of how the Jacobson's organ functions can often be a difficult concept for teachers to explain to students. Current visual resources available to teachers include flat textbook illustrations that do not explain the organ's function.

There is much misconstrued information on the idea behind what snakes are venomous in Texas and which are dangerous to humans. In Texas, out of the one hundred and thirty-two species of snakes present only four species are dangerous to humans. There are two types of venom snakes can have: neurotoxic and hemotoxic. Neurotoxic

venom affects the nervous system by interrupting brain signals sent to the body, while hemotoxic venom affects the vascular system by breaking down blood vessel walls.

Significance

Majority of visual biological resources on snakes that are available to teachers and children are out-of-date black and white images that do not illustrate function or show steps to a process. The need for new illustrations to help facilitate learning of difficult to grasp biological concepts is very high. Teaching a biological concept that is difficult to understand without the help of visual aids creates a harder task for the teacher. In order for teachers to help their students in the learning process, a variety of methods such as using different multimedia and using different approaches are used effectively.¹

The program will be used by the Heard Natural Science Museum & Wildlife Sanctuary located in McKinney, Texas and serve as a companion to the museum's snake exhibit. The program is designed in such a way that it can be displayed on the Heard Museum's website or displayed on the museum's snake exhibit computers to further facilitate learning.

¹ Bell, James. "Ideas on Active Learning." Howard Community College. http://classweb.howardcc.edu/jbell/learning/active_learning.htm (accessed October 24, 2007).

Limitations

Out of the many difficult biological concepts in need of visual resources, this interactive program only contains two complex biological concepts. The program serves as a template and can be used as a model for similar interactive projects or future biological interactive animations.

Production Methods

The final product is an Adobe Flash interactive program that combines illustrations, photographs, and animations. The interactive program contains two interactive Flash animations: the Jacobson's Organ and Defense/Prey Methods.

The interactive program would be uploaded onto the Heard Museum's classroom computers in order for the program to be used and evaluated by a test group of museum students. The test group would view the final program and answered a short pretest, posttest, and questionnaire designed to assess the effectiveness the program.

Terminology

Biological

Envenomation- the process by which venom is injected into an animal

Dry bite- bite by a venomous animal in which no venom is released

Jacobson's Organ- is an auxiliary olfactory sense organ that is found in many animals

Computer

Adobe® Photoshop® – raster-based professional software designed for editing and retouching photos/images, and rendering line drawings in color for high quality production

Adobe® Illustrator® – vector-based professional software designed to create professional quality graphics and line based art

Adobe® Premiere® – professional software designed for video and audio editing

Macromedia® Flash® – professional software that creates motion graphics and interactivity for animation programs

CHAPTER TWO

Review of the Literature

Overview

In order to create a model for a useful educational interactive program, a thorough review of current material designed for teaching biological concepts to children was important. This chapter serves as a review for the written literature researched on creating an interactive learning program to explain important biological concepts, research on what biological interactive programs for children exists, and also research on using the Likert Scale with children. There have been several studies done on incorporating interactive learning programs into an educational environment. I found a few useful resources on creating interactive programs as well as a few good examples of biological interactive animated programs available to children online.

Written References

Studies on Visual Resources Used in Education

Several studies have been done specifically on creating computer gaming and interactive programs for learning. A study was conducted to decipher which teaching method, games and interactive simulations or traditional, truly dominates and under what circumstances. One study in particular found that across people and situations, games and interactive simulations are more dominant for cognitive gain outcomes.² This study also

² Vogel, Jennifer J., David Vogel, Jan Cannon-Bowers, Clint Bowers, Kathryn Muse, and Michelle Wright. "Computer Gaming and Interactive Simulations for Learning: A Meta-Analysis." *Journal of Educational Computing Research* vol. 4 (November 2006),

found that when students navigated through the programs themselves, there was a significant preference for games and interactive simulations. If a teacher controlled the programs, no significant advantage was found.

It can be said that good teaching is good story telling. A study that was done on eLearning found case-based teaching to be very effective. Case-based teachers teach the student what he or she needs to know at precisely the point of becoming interested in knowing the information and this information should be presented in the form of stories.³ This method of teaching is how law schools and business schools have been teaching for years. The second critical part of case-based teaching is to help the learner relate the information to real world experiences. This second concept of case-based teaching is what was applied when creating the script. The script was created in a format that kids could understand and be able to easily relate the program's information to their own experiences. By creating a friendly snake character who leads the children through the program helps give the learner the impression not all snakes are dangerous.

Movements in educational theory such as Constructivism have also supported the use of interactive strategies, which require high degrees of learner involvement to achieve the outcome.⁴ Experience is the foundation of and stimulus for learning.

<http://baywood.metapress.com/app/home/contribution.asp?referrer=parent&backto=issue>

³ Schank, Roger. "Case-Based Teaching: Four Experiences in Educational Software Design." *Interactive Learning Environments*, vol. 4 (December, 1990), <http://www.informaworld.com/smpp/content~content=a739631771~db=all>

⁴ Hedberg, J. and Harper, B. (1996). Interactive educational technologies: Effective design and application in the classroom. In C. McBeath and R. Atkinson

Well-designed visuals can provide explanation to learners as well as help them to encode and retain content in memory as well as retrieve it for use. Visual representations of procedures, data, and concepts can clarify meaning for learners.⁵ The dynamic features of animation can cue students' attentions to meaningful elements of visuals. [2] Reports on the quality of education in the United States indicate that there is too much information being offered to students and too little attention being paid to the strategies for inquiry, learning, and problem solving.⁶ Using a variety of teaching styles can increase student involvement and can accommodate the diverse learning styles of students. [3]

The modality principle suggests that if a multimedia environment contains words and images, words should be spoken rather than written.⁷ The use of audio narration to explain a visual presentation enhances understanding. After two weeks we tend to remember a higher percentage of what we hear and see over what we just read. We tend

(eds), *Proceedings of the Third International Interactive Multimedia Symposium*, 160-168. Perth, Western Australia, 21-25 January, Promaco Conventions.
<http://www.aset.org.au/confs/iims/1996/ek/hedberg2.html>

⁵ Ju, Choi, and Lauren Cifuentes. "Children learning from artfully designed, three-dimensional computer animation." *Information Technology in Childhood Education Annual*, (January 1, 2002), http://goliath.ecnext.com/coms2/gi_0199-1559360/Children-learning-from-artfully-designed.html.

⁶ Bell, James. "Ideas on Active Learning." Howard Community College.
http://classweb.howardcc.edu/jbell/learning/active_learning.htm
 (accessed October 24, 2007).

⁷ Dunsworth, Qi, and Robert Atkinson. "Fostering multimedia learning of science: Exploring the role of an animated agent's image." *Computers & Education* 49 (2007): 677-690.

to remember an even higher percentage of what we say and do.⁸ This concept is important to remember when creating an educational interactive program. By adding text along with audio, and creating interactive animated games along with animated buttons engages the learner.

Studies on the Likert Scale

Studies have shown that the Likert scale is recommended for use in questionnaires for children.⁹ In one particular study children preferred the Likert scale to the simple Visual Analogue Scale and numeric scale, and also found it easiest to complete. This study recommended the Likert scale for use in questionnaires for children.⁵

Visual References

Current visual resources that are in circulation that explain either the Jacobson's organ or defense/prey methods concepts are only in print form. Resources that were used for visual reference of the Jacobson's organ included the books called *SNAKE: The Essential Visual Guide to the World of Snakes* by Chris Mattison and *Biology the Dynamics of Life* by Alton Biggs. The biological visual aids found pertaining to the Jacobson's organ were strictly anatomical images with no visual explanation of function.

⁸ Edgar, Dale. *Audio-Visual Methods in Teaching*. International Thomson Publishing, 1969.

⁹ Laerhoven, H van. "A comparison of Likert scale and visual analogue scales as response options in children's questionnaires." *Acta Paediatrica*. (2007): 830-835.

Current visual resources that were located pertaining to defense/prey methods were limited to photographs and anatomical illustrations of snake fangs. Visual aids that explained the physiological effects of envenomation were unavailable. Both concepts not limited lack visual resources that are up-to-date and to flat illustrations.

The Dallas Museum of Nature and Science in Texas has a couple interactive programs. The interactive programs available to guests allow the user to choose their own path through the program. One in particular demonstrated what new technology may already be in the creation process for the near future. The user could click on several items in a scene to view the new electronics or visit another part of the world to view their future inventions. Another interactive program accompanied the dinosaur exhibit and allowed the user to view which species in today's day and age were comparable in running speed to the Tyrannosaurus Rex. The program gave the user control of choosing different options in order to learn new information regarding the species. Animations and live video footage accompanied the program so the user was able to relate the prehistoric dinosaur to species that still exist today.

Online Resources

No current interactive program that teaches either Jacobson's organ or prey/defense methods exists. However, there are many websites that have educational interactive programs available for use such as [Ace on the Case: Secrets@sea](#), BrainPOP®, and [Interactive BioTech](#).

Secrets@Sea is an online education adventure covering topics in Ocean Science. The program is completely interactive where the user can navigate through the program

and choose their own adventure depending on which interactive options they choose. The program is set up as a story where the user is a detective and the idea is to solve a mystery by collecting clues and traveling to different places. This program is a good example of case-based teaching where the user learns from a story-based adventure.



Figure 2-1. Screen shot of Secrets@Sea website.
<http://www.secretsatsea.org/story/4a.html>

BrainPOP ® is an example of a website that allows you to access over a hundred Flash animated movies on multiple educational topics. BrainPOP ® creates animated, curriculum-based content that supports educators and engages students in grade 3-12 and above. BrainPOP Jr. ® provides educational movies and homework help for K-3 students. Each animated movie has activities, games, vocabulary, and quizzes that are all

interactive for kids.¹⁰ The animations themselves are not interactive however. BrainPop® animations combine animated cartoon tour guides, audio, sound effects, and text.



Figure 2-2. Screen grab from BrainPop®.
<http://www.brainpop.com/science/diversityoflife/reptiles/preview.weml>

The Children's Museum of Indianapolis is the largest children's museum in the world. Whenever possible, the museum's exhibits are "hands-on" or participatory in nature. The museum provides games on their website for grades PreK-8th for online users to access. *Bones: An Exhibit Inside You* is an example of one of the museum's programs

¹⁰ FWD Media, Inc. "Science." BrainPop®.
<http://www.brainpopjr.com/science/animals/classifyinganimals/>

aimed at students in grades 3rd-5th. The program gives the user the option to choose between six interactive games that involve problem solving and games.

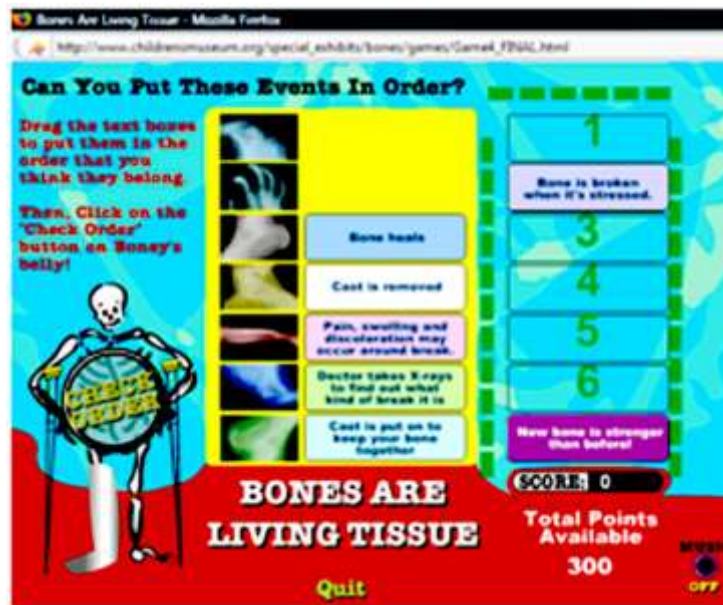


Figure 2-3. Screen shot from one of *Bones: An Exhibit Inside You* interactive games. http://www.childrensmuseum.org/special_exhibits/bones/games/Game4_FINAL.html

Conclusion

Based on my literature review I found that even though there are educational interactive programs in circulation, none of them educate learners on the concept of the snake's Jacobson's organ or their defense/prey methods. Most students rely on print images in textbooks. An educational interactive program may help in the teaching of these two biological concepts.

CHAPTER THREE

Methodology

Concept and Research Collection

The goal of this project was to create an educational interactive program that would teach two biological concepts about snakes, the Jacobson's organ and defense/prey methods. In order to accomplish this goal a series of objectives are developed. These objectives were used to establish the process for completing the model. After determining the necessary content and cartoon style for the interactive program, a script was created from previous research for a kid-friendly narrator to deliver within the program. A storyboard was then illustrated to include interactive games and animations. The two biological concepts were divided so two separate interactive animations could be created within the program. The final animations, once completed, were then joined into a single interactive program and exported as a *.SWF file*. The final interactive program was shown to students at the Heard Museum who evaluated the program.

Target Audience

The target audience chosen for this project was 4th-6th graders who attend the **Earth Trek III—Living on the Planet** homeschool science class at the Heard Natural Science Museum & Wildlife Sanctuary in McKinney, Texas. This class studies where and how animals live on Earth in their respective ecosystems around the world as well as a few other biological concepts. The class includes a nature hike to explore the museum's surroundings, which is ideal for relating classroom information to nature. All of the

visual, audio, and textual elements were designed to relate to topics the students would be learning in the class or were partially familiar with already.

Pre-Project Planning

In initial meetings with Schelly Corry and Roger Sanderson, we made many decisions about the script content and what points are most important to illustrate in the animations to ensure the students would fully understand both concepts. The Jacobson's organ would be very straightforward and be the only focal topic, since each concept would have its own interactive animation within the program,. However, the defense/prey method interactive animation would include a few concepts including defense/prey killing methods, envenomation, and which Texas snakes are dangerous to humans.

Prior to the creation of the script and storyboards, a tour guide for the animation needed to be decided upon. Ideas for a tour guide included several birds such as a red tail hawk and a bald eagle. A snake tour guide deemed appropriate for this program considering it was going to be written in story form. By creating a friendly persona for Sammy, it would help enforce the idea that not all snakes are dangerous. With Sammy the snake as the program's tour guide, the Texas snakes introduced in the animations were referred to as Sammy's relatives to tie in the idea of evolution and the snakes as all being part of one big family.



Figure 3-1. Sammy the Snake.

Production responsibilities were divided among four individuals. One of my responsibilities was to create a script that was detailed and explained both concepts at a 5th grade reading level. Schelly Corry provided a few suggestions for both biological concepts. Roger Sanderson, who is a snake expert at the Heard Museum, provided script content expertise. Nicholas Cammilleri, cofounder of Madvantage Films© provided the script voice of Sammy the snake, the program's tour guide. The script was recorded on an Apple iPhone and sent via email. I organized and coordinated the project, and provided the art direction and produced all illustrations, animations, and interactivity of the program.

The script was the first element that was developed. The script created for the Defense/Prey Methods concept was written in a chronological story manner. The idea was to create a story that would show the progression and evolution of the snake's killing methods through time. Envenomation was the more important concept of this second animation, so further detail was implemented into the script on this concept over the other snake killing methods. I had a several teachers who teach at a 5th grade level or below

read over the script to assure it read at a 5th grade reading level. The script was revised several times by the Schelly Corry, content supervisor, and by Roger Sanderson, Heard Museum's snake expert to ensure the concepts were clear and accurate.

The program's interactivity was taken into consideration when creating the script. The purpose of including interactivity was to further instill important concepts and engage the user. The interactivity would include interactive animated buttons along with interactive games.

The storyboards were the next step that needed to be completed before production of the program's illustrations. (See Appendix A & B) Only one interactive game was decided upon for the Jacobson's Organ animation due to its shorter playtime. This interactivity included three animated buttons within one scene that the user could click on and help the snake reveal what prey it was smelling. The animated buttons were designed to visually represent prey scent particles moving around in the air and reinforce the concept that each animal gives off a certain scent.

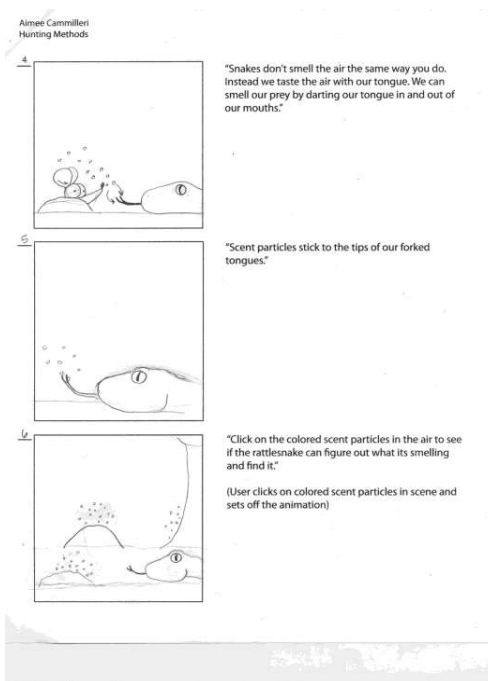


Figure 3-2. Jacobson's Organ interactivity storyboard scene.

Five interactive elements were created for the Defense/Prey Methods animation. Each of the five elements were created to reinforce each killing style method and awareness of what snakes in Texas are venomous. The first game illustrates the concept that non-constrictors can only capture certain prey due to their killing method. The interactive scene contains four different prey species that are interactive buttons. The viewer is asked to select the prey he/she believes the Racer snake can capture.

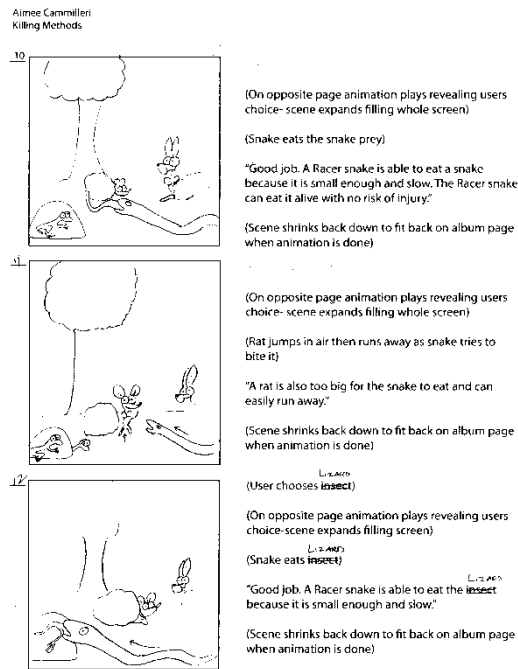


Figure 3-3. Defense/Prey Methods Racer snake interactivity storyboard scene.

The second game illustrates the concept of how Rat snakes use constriction to kill their prey and how the rat's internal organs such as the heart and lungs are affected. The viewer is presented with a *SQUEEZE* button within the scene. Each time the viewer clicks on the button the Rat's Life Meter decreases. After the 4th click the rat dies and the viewer is presented with the option to *Play Again* or *Continue* through the program.

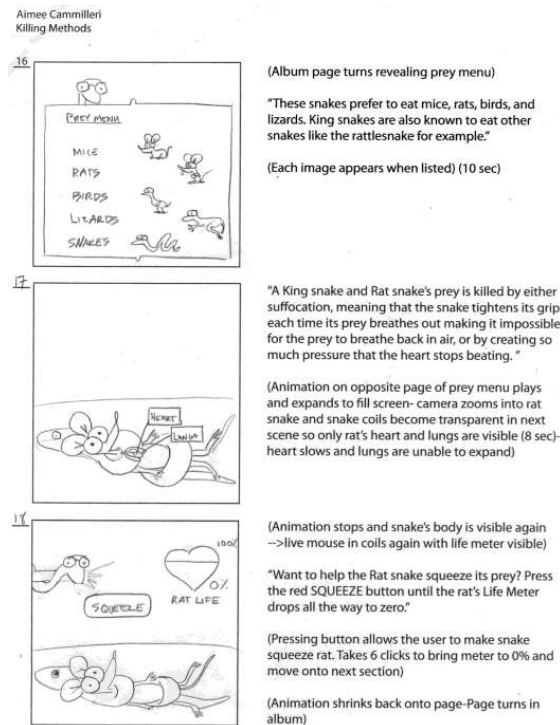


Figure 3-4. Defense/Prey Methods Rat snake interactivity storyboard scene.

The third game illustrates the concept of how Hognose snakes use their toxic saliva and specialized teeth to pop and kill their toad prey. The viewer is presented with *CHEW* button within the scene. Each time the viewer clicks on the button, the Hognose snake chews its toad prey causing the toad to deflate. After the third button click, the user is given the option to *Play Again* or *Continue* through the program.

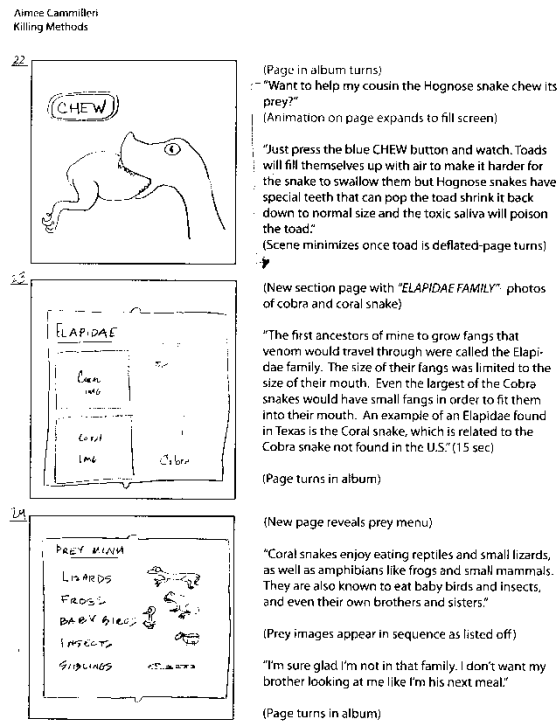


Figure 3-5. Defense/Prey Methods Hognose snake interactivity storyboard scene.

The fourth game illustrates the concept of how Coral snakes squeeze their venom gland to inject venom into their prey. The Coral snake's venom gland comes into view on top of the snake's illustration, and viewer is asked to *Press* on the to release the venom into the prey. The animation continues once the viewer has pressed the gland button.

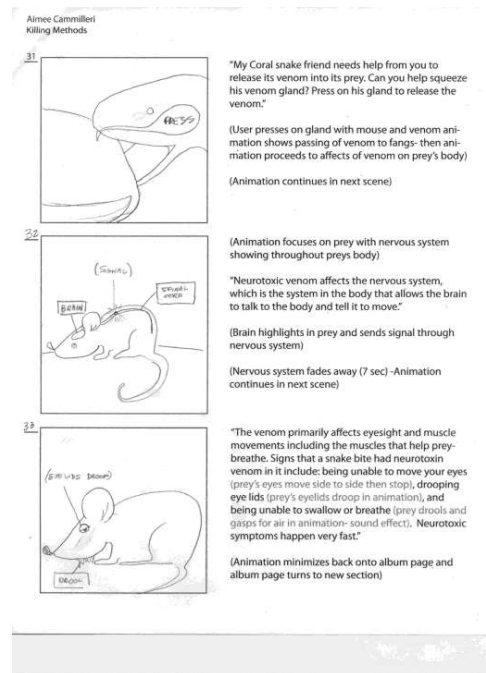


Figure 3-6. Defense/Prey Methods Coral snake interactivity storyboard scene.

In the final game, the viewer chooses between eight different Texas snakes to decide which ones are venomous and dangerous to humans to reinforce the idea of which snakes one should be aware of and which are less dangerous to humans. Each album page in this scene presents two snake photographs and asks the viewer to choose which snake is the venomous one of the two. A message presents itself to inform the viewer if their decision is *Wrong* or *Right*.

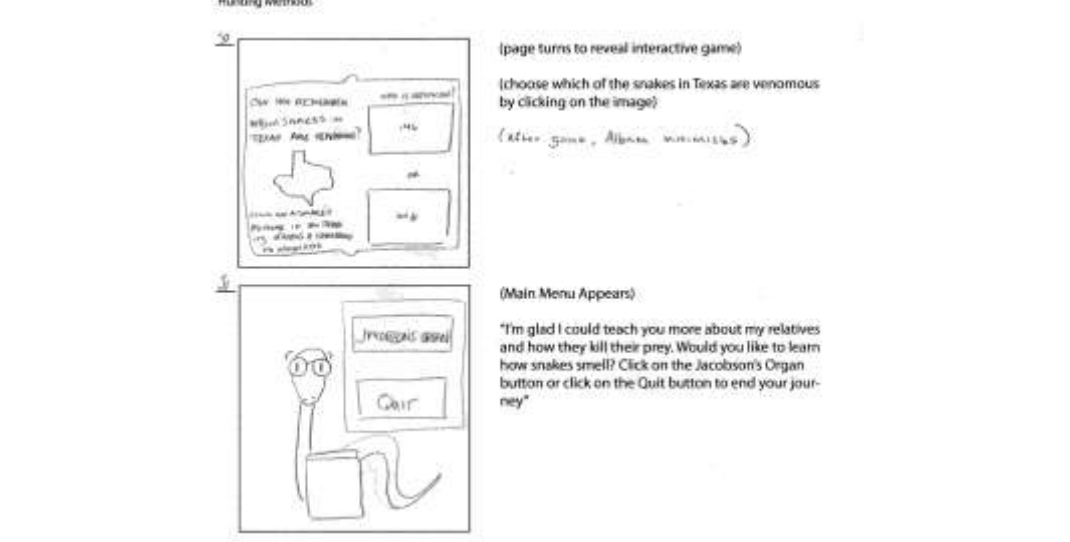


Figure 3-7. Defense/Prey Methods venomous snake interactivity storyboard scene.

Illustrations

All of the illustrations used in the interactive program began as line drawings in Adobe Illustrator®, were rendered in color and had detail added in Adobe Photoshop® and exported with a minimum of 150dpi. The completed illustrations were imported into Adobe Flash® as *PDF* files. The imported illustrations were animated in Adobe Flash®.

An illustration style needed to be decided upon prior to production of the illustrations. Since real snake photographs would be incorporated into the program, a realistic cartoon style was chosen. The purpose of choosing this type of illustration style was so the user could easily relate the illustration to the snake's photograph. A more stylized form was chosen to illustrate the prey and predators. The idea behind keeping the prey and predators in this type of style was to not detract from the main focus, the snakes, and to make the animations fun and enjoyable to watch.

Texas Snakes

In addition to the snake photographs taken at the Heard Museum, illustrations of each of the snakes were created in a realistic cartoon style. A complete amount of tone with full color and detail was used to render each illustration in Adobe Photoshop®. Photographic references were used to create each snake illustration. The Hognose snake, which is not on display at the Heard Museum, was also illustrated along with the cobra snake, which is not found in Texas. Each illustration started as a line drawing in Adobe Illustrator®, was rendered in color in Adobe Photoshop® and imported into Adobe Flash® where the finalized illustration was animated.

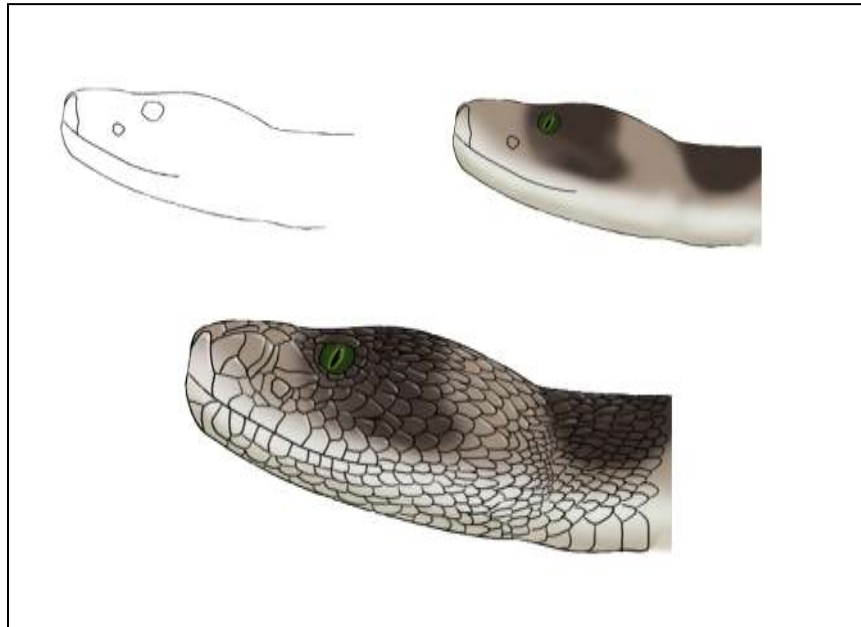


Figure 3-8. Copperhead snake. This series shows the illustration process: line drawing, color, and details.

Snake Anatomy

In addition to the snake illustrations, certain snake anatomical features were illustrated for both the Jacobson's Organ and Defense/Prey Methods animation. Those illustrations included a rattlesnake skull and Jacobson's organ. The rattlesnake skull illustration was used to illustrate the snake's fangs motion in the Defense/Prey Methods animation, while the Jacobson's organ was used in the Jacobson's Organ animation.



Figure 3-9. Rattlesnake skull.

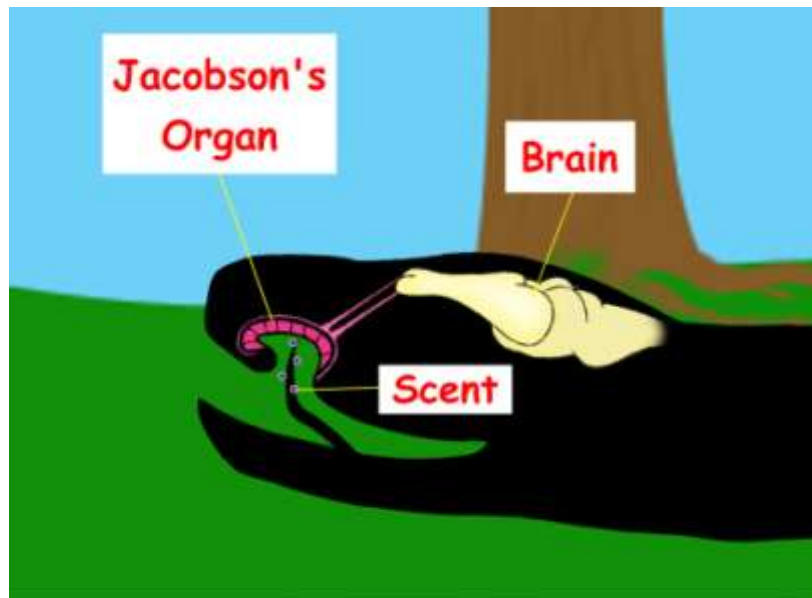


Figure 3-10. Screen shot from Jacobson's Organ animation illustrating the Jacobson's organ anatomy.

When animating the snake's Jacobson's organ it was important that animation focused on the organ. Originally, the organ was faded into the scene on top of the snake illustration, but the scales on the snake's illustration were distracting. So a new technique was attempted and found to be more successful. Instead of having the Jacobson's organ fade on top of the snake, a black silhouette of the snake fades into view and the organ becomes visible on top.

Prey and Predators

The snake's prey and predator illustrations were created in a more stylized cartoon manner. Each of the snakes' prey along with some the snakes' predators

including the hawk, fox and human were illustrated. Certain prey anatomical features were illustrated also, such as the rabbit vascular system and a rat's vital organs, to show the impact of the snake's killing method during the animation. Each illustration started as a line drawing in Adobe Illustrator®, was rendered in color in Adobe Photoshop® and imported into Adobe Flash® where the finalized illustration was animated.



Figure 3-11. American Toad. This series shows the illustration process: line drawing, color, and details.



Figure 3-12. Comparison of program's snake illustrations and predator/prey illustrations.



Figure 3-13. Screen shot from Defense/Prey Method animation of rabbit vascular system.

When animating the rabbit's vasculature system it was important that animation focused on the vessels and beating heart. Originally, the vasculature system was faded into the scene on top of the rabbit illustration, but the colors in the rabbit illustration took away from vasculature illustration. So the same technique was applied to this scene in the Defense/Killing Methods animation as was applied in the Jacobson's organ scene. A silhouette of the rabbit was used as the background of the vasculature so the vessels were more prominent and became the focal point of the scene.



Figure 3-14. Illustration of rat brain and spinal cord.



Figure 3-15. Illustration of rat heart and lung anatomy.



Figure 3-16. Screen shot of Defense/Prey Methods of rat tissue anatomy.

In addition to the narration, illustrations, and interactivity, photographs were taken of the live snake specimens on display at the Heard Museum. Photographs of a Racer, Coachwhip, Rat snake, King snake, Rattlesnake, Cottonmouth, Copperhead, and Coral snake were taken with the help of Roger Sanderson. The photographs would serve as a useful reference tool. Different methods of displaying wildlife photographs, such as enlarged rollover images and links to its own page where an enlarged copy of the photo was displayed were investigated. These methods were not successful in displaying the photographs as larger images.

Many ideas were considered on how to tie in the illustrations and photographs so the user could easily relate the two. The idea of creating an album that Sammy would refer to as his family album was decided upon to introduce each snake species and type of defense/killing method.

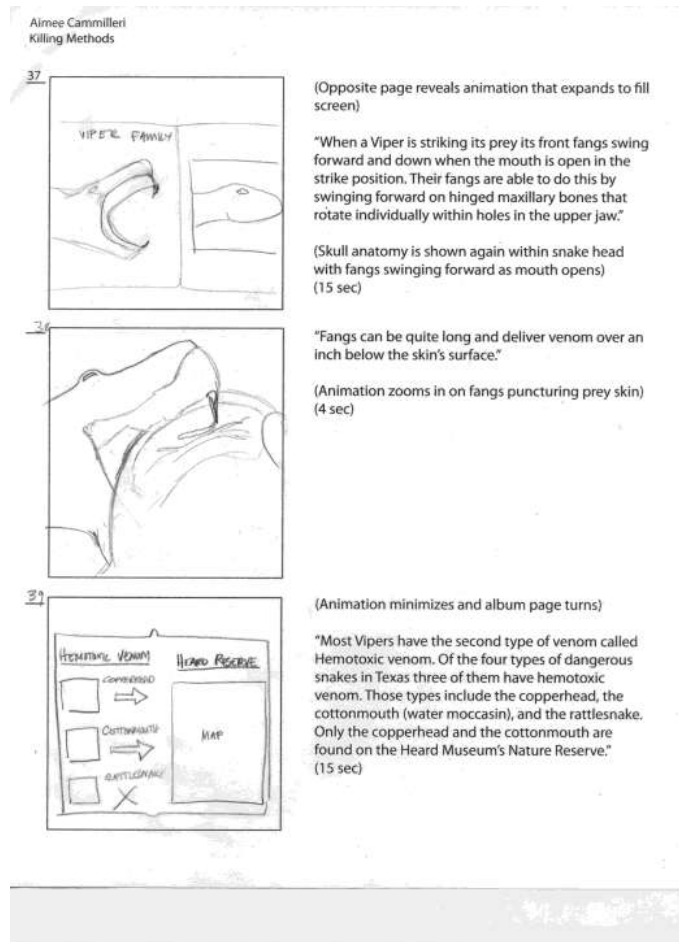


Figure 3-17. Storyboard layout.

The final media components of the project were the two animations: the Jacobson's Organ and the Defense/Prey Methods. The first animation would show how snakes smell and the function of the Jacobson's organ.

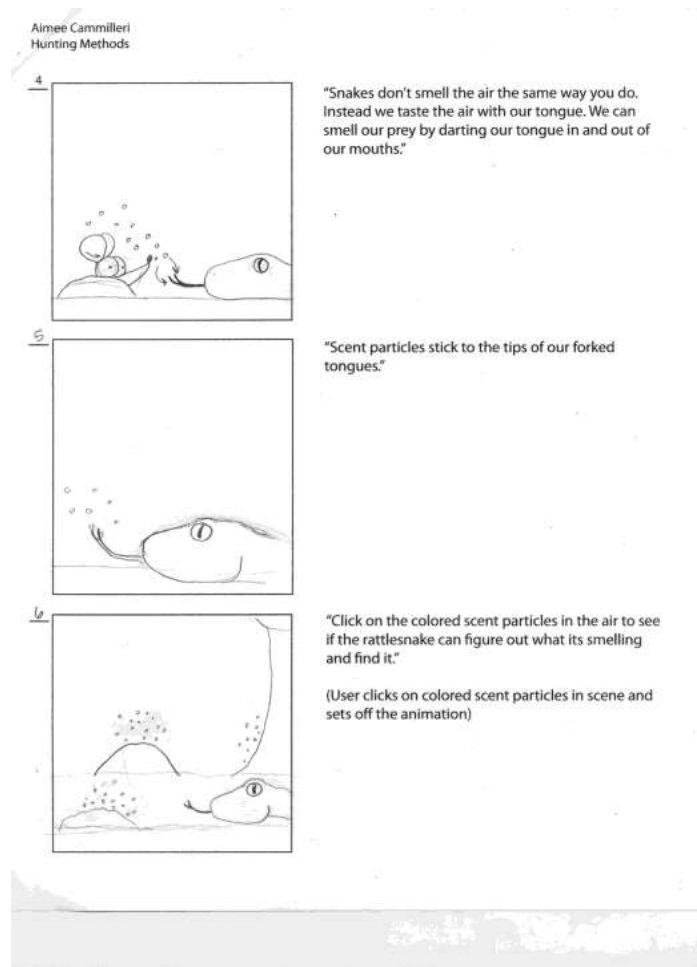


Figure 3-18. Storyboard of scent particles used to illustrate concept Jacobson's Organ.

The second animation would show the evolution of snakes' defense/prey killing methods from non-constriction up to envenomation. Both animations would be included within a single interactive program and be led through the program by a cartoon tour

guide named Sammy the Snake. A snake tour guide with a friendly persona deemed most appropriate and could relate to the snakes introduced within the program.

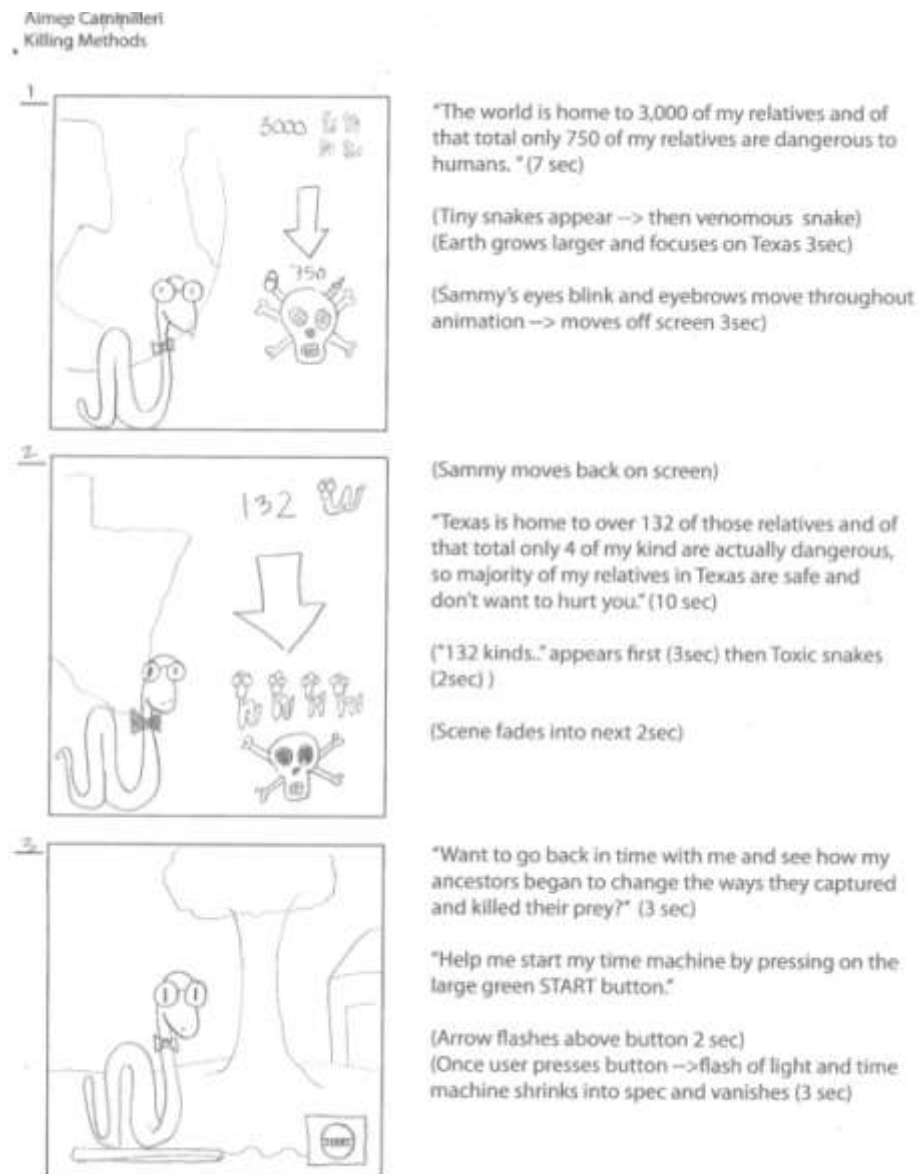


Figure 3-19. Storyboard of Defense/Prey Method animation with Sammy the Snake.

Animations

Jacobson's Organ

One of the objectives of this project was to create two animations. The first called the *Jacobson's Organ* which explains the concept of how snakes smell prey and how the Jacobson's Organ functions. The Flash® video size was 550 x 400 pixels. The size of the file was appropriate for the web and gave the Heard Museum the option to upload the completed program onto their website. Illustrations that were previously rendered in Adobe Photoshop® were imported into the animation's library in Adobe Flash® as *PDF* files. The illustrations were animated in Adobe Flash® and the interactive animated buttons were created in Flash®. The result is an interactive animation that depicts the function of the Jacobson's Organ and teaches how snakes are able to smell.

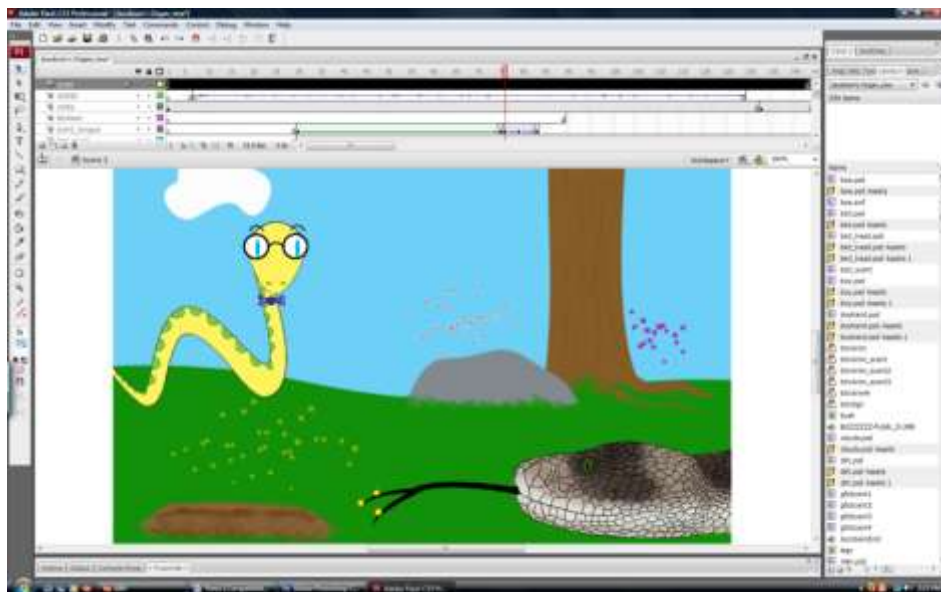


Figure 3-20. Screen shot of Jacobson's Organ's animation scene in Adobe Flash®.

Defense/Prey Methods

The second animation named *Defense/Prey Methods* explains the evolution of snakes' defense and killings methods. The Flash® video size was 550 x 400 pixels. The size of the file was appropriate for the web and gave the Heard Museum the option to upload the completed program onto their website. Illustrations that were previously rendered in Adobe Photoshop® were imported into the animation's library in Adobe Flash® as *PDF* files and the snake photographs were imported as *JPGS*. The illustrations were animated in Adobe Flash® and the interactive animated buttons were created in Flash®. The result is an interactive animation that depicts snake defense/prey killing methods and enforces the idea that most snakes found in Texas are non-venomous.

Adobe Flash®

Each of the two animations consisted of several scenes linked together. Each scene contained several still illustrations that were animated, and perhaps an action-scripted button(s).

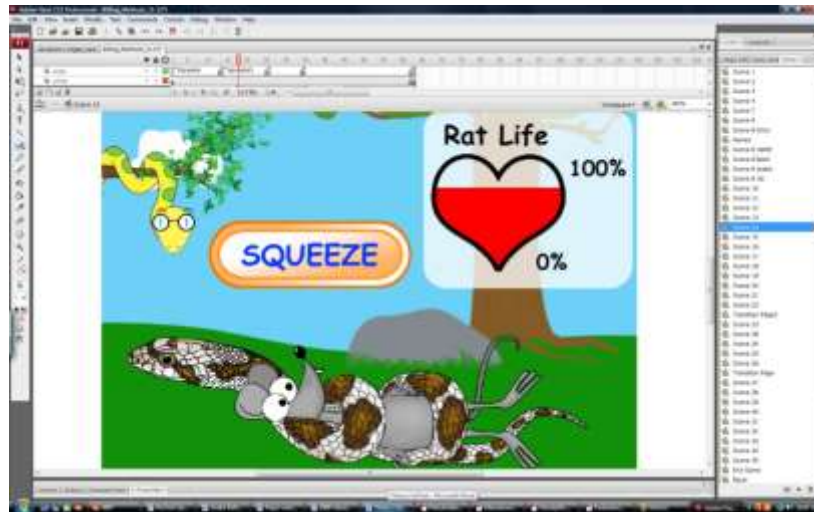


Figure 3-21. Screen shot from Defense/Prey Methods scene in Adobe Flash®.

When the animations were completed, a main menu was created to introduce the two animations that the user would have the option of choosing between.



Figure 3-22. Screen shot of Main Menu scene in Adobe Flash®.

Distribution

The interactive program was designed for the Heard Museum's website, and also designed to be displayed on computers within the museum's snake exhibit. Since the museum offers several science classes it could also be deemed as useful teaching resource.

Testing

The program was presented to the **Earth Trek III—Living on the Planet** homeschool science class at the Heard Natural Science Museum & Wildlife Sanctuary in McKinney, Texas for testing and evaluation. The class is composed of seventeen students. The class consisted of one 4th grader, five 5th graders, nine 6th graders, and two 7th graders. The students viewed the animations on one of the two laptops provided. One of the laptops included the use of headphones to avoid being distracted from the other user's program voice script.

A pretest and posttest were created to evaluate whether or not the users had gained knowledge from use of the program. The pretest and posttest consisted of seven multiple questions on information from both the Jacobson's animation and defense/prey methods. Schelly Corry was consulted with during the creation of the seven questions to make sure each question was appropriate for the knowledge level of the test group.

Each student was given a pretest to complete prior to viewing the program. The purpose of the pretest was to evaluate the user's previous knowledge on the Jacobson's

organ and Texas snakes. The pretest consisted of seven multiple choice questions. (See Appendix C)

Immediately following the student's completion of the program, each student was given a posttest and a questionnaire. The posttest consisted of the same seven questions on the pretest. The pretest and posttest results were compared to each other to evaluate if the students knowledge improved after viewing the program.

The evaluation was created using the Likert scale which studies have shown to be the most successful form of scaling. The questionnaire consists of eleven statements designed to evaluate how successful the user found the program to be in delivering complex biological information. (See Appendix E)

The first time the program was tested, time allotted for eleven of the seventeen students to complete the program along with the pretest, posttest, and evaluation successfully. The program includes the use of navigation buttons so the user can move through the program at their own pace.

Following the first round of testing, there was feedback and comments made in the nature of formative evaluation. Roger Sanderson and Schelly Corry made some suggestions regarding editing the program and some of its information. Navigation buttons that allowed the user to return to a previous section were also deemed necessary for the Defense/Prey Methods animation in order for the user to review a previous section. Those changes were completed prior to the second round of testing of the remaining six students.

The second round of testing may provide new results and may even provide insight as to whether or not the changes affected how the students tested on the posttest.

The remaining six students followed the same process as the first group by taking the pretest, viewing the program, and then completing the posttest and questionnaire.

Students were verbally asked their opinion on the program as to what they liked or disliked upon completion of the program and any further input or remarks. The results are discussed in the following chapter.

CHAPTER FOUR

Results

Pretest and Posttest

The interactive animated program was created to educate students on the Jacobson's Organ and the Defense/Prey Methods of snakes. In order to successfully test whether or not the students learned new information from the program, pretests were given to each of the sixteen students to test their current knowledge of the subjects. The students who participated were in Grade levels 4-7. The **Earth Trek III—Living on the Planet** homeschool science class at the Heard Natural Science Museum & Wildlife Sanctuary is composed of seventeen students. The class consists of one 4th grader, five 5th graders, nine 6th graders, and two 7th graders.

On the first day of testing, time allotted for only eleven of the seventeen students to test the program and evaluate it. This first test group consisted of students in grade levels 4th - 6th: one 4th grader, five 5th graders, and five 6th graders. Upon completion of the first test group, suggestions were received by Schelly Corry and Roger Sanderson to make a few changes to the program. Those changes included script editing such as clarifying that Coral snakes have grooved fangs and not hollow fangs, and to clarify that the projections Hognose snakes use to pop toads are located in the back of the jaw. Program changes included moving one of the Viper scenes towards the beginning of the Viper section to avoid confusion about which snakes are Hemotoxic. Navigational changes included adding a "Back" button to the scenes that included a "Page Turn" button to allow the user to return to a previous section of the animation for further review.

The second test group viewed this new version of the program with the above stated changes. This second group of student's grade levels ranged from 6th - 7th: four 6th graders and two 7th graders. However, a pretest and evaluation was never received from one of the 6th graders so their pretest was omitted from the results. The second test group's pretests, posttests, and evaluations were added to the first tests group's. This decision was made after comparing the second test group's pretest and posttest. It was decided their answers had no significant changes to suggest the program's information changed significantly enough to affect their answers. Editing the program may have affected the last test question answers, however the second test group was not large to make this conclusion.

The pretest consisted of seven questions combining both animations' educational information. (See Appendix C) The posttest consisted of the same seven questions to evaluate if the students had learned new information. (See Appendix D)

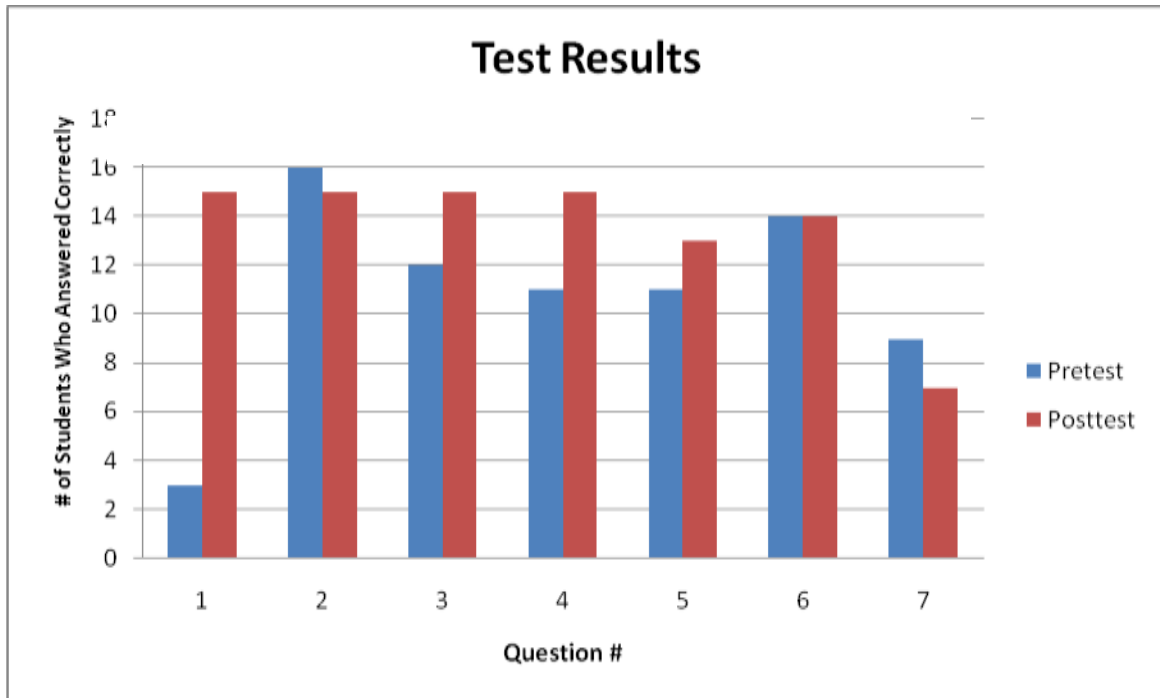


Figure 4-1. A comparison between pretest and posttest results of questions answered correctly by both test groups.

List of Pretest Questions and Answers

Questions Asked Prior to Using Interactive Program

1) The Jacobson's Organ in snakes is used to:

- A) see prey B) breathe C) smell prey D) digest prey*

Question 1: A total of 3 students answered this question correctly by choosing option **C) *smell prey***, suggesting the students were not familiar with information on the snakes' Jacobson's organ.

2) A snake's tongue is forked at the tip:

- A) so it can taste multiple things at once B) to help them see in two different directions*
C) to help them feel two things at once D) to figure out which direction a scent is coming from

Question 2: Each of the 16 students answered this question correctly with option **D) to figure out which direction a scent is coming from**, suggesting that the students are familiar with certain snake facts relating to anatomy.

3) Snakes are known to have:

- A) very good hearing B) very poor eyesight C) more than one tongue
D) very good eyesight

Question 3: A total of 12 students answered this question correctly by choosing option **B) very poor eyesight**.

4) How many types of venomous (dangerous) snakes are found in Texas ?

- A) 100 B) 4 C) 20 D) None

Question 4: A total of 11 students answered this question with **B) 4**, suggesting that less than fifty percent were unfamiliar with Texas' venomous snakes.

5) Envenomation means:

- A) venom is released during a snake bite B) venom is not poisonous
C) a snake can spit its venom D) no venom is released during a snake bite

Question 5: A total of 11 students answered this question correctly by choosing **A) venom is released during a snake bite**.

6) Neurotoxic venom affects:

- A) blood vessels B) the nervous system C) the digestive system
D) heart rate

Question 6: A total of 14 students answered correctly by choosing **B) the nervous system**, suggesting they are familiar with the two venom types.

7) Which of the snakes found in Texas have Hemotoxic venom?

- A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Question 7: A total of 9 students answered this question correctly by choosing **C) Copperheads**. Some students chose both options **A) Coral snakes** and **C) Copperheads**. Coral snakes have Neurotoxic venom so those students who marked both answers were incorrect. These responses suggest the some students know which snakes are venomous but not familiar with the type of venom each snake produces.

List of Posttest Questions and Answers

Questions Asked After Using Interactive Program

1) *The Jacobson's Organ in snakes is used to:*

- A) *see prey* B) *breathe* C) *smell prey* D) *digest prey*

Question 1: A total of 15 students answered this question correctly by choosing option **C) *smell prey***, suggesting most students gained knowledge on the snakes' Jacobson's organ concept.

2) *A snake's tongue is forked at the tip:*

- A) *so it can taste multiple things at once* B) *to help them see in two different directions*
C) *to help them feel two things at once* D) *to figure out which direction a scent is coming from*

Question 2: A total of 15 students answered this question correctly once again with option **D) *to figure out which direction a scent is coming from***. One student who answered correctly on the pretest answered incorrectly on the posttest.

3) *Snakes are known to have:*

- A) *very good hearing* B) *very poor eyesight* C) *more than one tongue*
D) *very good eyesight*

Question 3: A total of 15 students answered this question correctly by choosing option **B) *very poor eyesight*** suggesting new information was obtained from the animation.

4) *How many types of venomous (dangerous) snakes are found in Texas ?*

- A) 100 B) 4 C) 20 D) None

Question 4: A total of 15 students answered this question with **B) 4**, suggesting that the students became more familiar with which snakes in Texas are venomous.

5) *Envenomation means:*

- A) *venom is released during a snake bite* B) *venom is not poisonous*
C) *a snake can spit its venom* D) *no venom is released during a snake bite*

Question 5: A total of 13 students answered this question correctly by choosing **A) *venom is released during a snake bite***.

6) *Neurotoxic venom affects:*

- A) *blood vessels* B) *the nervous system* C) *the digestive system*
D) *heart rate*

Question 6: A total of 14 students answered correctly by choosing **B) the nervous system**, which is the same number of correct answers from the pretest suggesting no new information was obtained from animation.

7) *Which of the snakes found in Texas have Hemotoxic venom?*

- A) *Coral snakes* B) *Racer snakes* C) *Copperheads* D) *King snakes*

Question 7: A total of 7 students answered this question correctly by choosing **C) Copperheads**. Some students still chose both options **A) Coral snakes** and **C) Copperheads**. Coral snakes have Neurotoxic venom so those students who marked both answers were incorrect. These responses suggest the students know which snakes are venomous but not familiar with the type of venom each snake produces. It also suggests that the animation could be improved to stress this concept more due to fact the number of students who answered correctly did not improve since the pretest. Two of the students from the second test group who viewed the edited program version answered correctly on the pretest but incorrectly on the posttest. The decrease in the number of correct answers may suggest the information was potentially unclear.

Evaluation

A total of ten questionnaires were received from the first test group of eleven students. The student grade levels within this group ranged from 4th - 6th grade. One student omitted **Statement 2** possibly by mistake. A total of five questionnaires were received from the second test group. The student grade levels within this group ranged from 6th - 7th grade.

The questionnaire contained a total of eleven statements. Each of the eleven statements were evaluated using the following choices: *Strongly Agree, Agree, Neutral,*

Disagree, and Strongly Disagree. A space for additional comments was included after each question (See Appendix E).

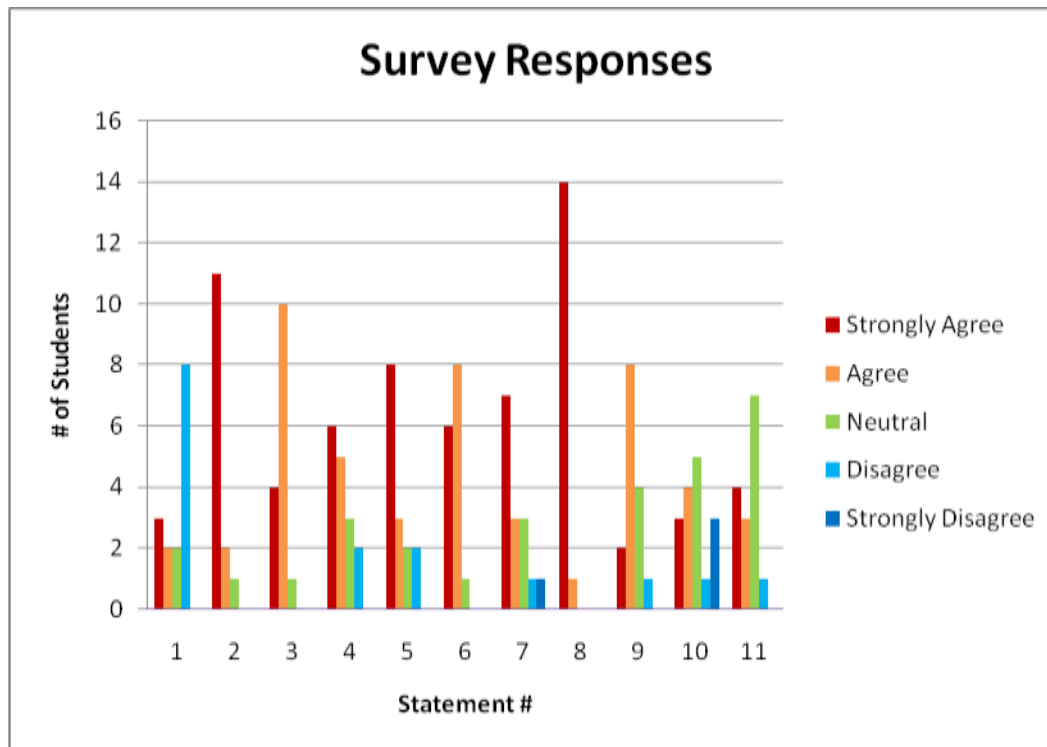


Figure 4-2. The results for each of the responses for each question. Ten people responded to the questionnaire.

The questions and responses were as follows:

Statement 1: I knew about the Jacobson's Organ before seeing the animation.

3 Strongly Agreed, 2, Neutral, 2 Disagreed, 8 Strongly Disagreed. This statement's responses are consistent with the responses to the Pretest's Question 1, which asked what the Jacobson's organ was used for. Majority of the students answered Pretest Question 1 incorrectly. The idea behind asking this question was to see if the students were familiar with any part of the Jacobson's organ concept and not just its function.

Statement 2: I feel like I learned something new about snakes.

11 Strongly Agreed, 2 Agreed, 1 Neutral, and 1 omitted. Majority of the students "Strongly Agreed" to this response suggesting that the program was successful in teaching something new about snakes. Overall, there was a positive attitude towards the information within interactive program. One student commented that he/she would like to see new information in the program because they were already familiar with the information the program presented. Another student commented, "I really didn't know about snakes". Another student added, "The program was awesome".

Statement 3: The cartoons in the animations made it fun to learn.

4 Strongly Agreed, 10 Agreed, 1 Neutral. Majority of the students found the cartoons within the program successful. This question was designed to find out how students in or close to grade 5 felt about learning new biological information with the help of cartoons. The older student who disagreed commented, "being older makes the cartoons king of kiddish". Another student commented, "I laughed because of the voice but some of the pictures were nasty". A third student commented, "They were so cute".

Statement 4: I feel like I now know more about venomous snakes.

6 Strongly Agreed, 5 Agreed, 3 Neutral, 2 Disagreed. One of the more important concepts to be learned from the Defense/Prey Method animation was the idea behind envenomation and what snakes in Texas are venomous. Roger Sanderson really wanted the animations to stress that there are few snakes in Texas that are dangerous and to be

aware of which ones are. Even though the animations were not successful in distinguishing between which of the 4 venomous snakes in Texas were neurotoxic or hemotoxic, the students were aware of which ones were venomous. One student commented, "I know that I shouldn't be very scared when I first see a snake in Texas".

Statement 5: The snake photos in Sammy's Family Album were useful.

8 Strongly Agreed, 3 Agreed, 2 Neutral, 2 Disagreed. This statement was created to get an idea of whether or not the photos were useful for identifying the snakes that were being introduced in each section of the animation. This statement received a broader range of answers to previous questions but majority found the photos useful. One student commented he/she would like to see the photos larger. The student suggested having fewer photos and bigger ones. Another student commented, "It made visual easy".

Statement 6: Sammy the snake was a good tour guide.

6 Strongly Agreed, 8 Agreed, 1 Neutral. The idea behind this statement was to understand if the students felt that having a cartoon character lead them through the program was helpful or not. Majority agreed he was a good tour guide. One student commented he/she found Sammy to be annoying. Another student commented he/she enjoyed him as the tour guide and thought he was cool.

Statement 7: Sammy was easy to understand when he spoke.

7 Strongly Agreed, 3 Agreed, 3 Neutral, 1 Disagreed, 1 Strongly Disagreed. This statement also brought a wide range of answers. Since the script was only introduced into

the animations as audio and the only written script was titles and labels, it was important to make sure the main tour guide was comprehensible. Majority agreed he was easy to understand, however the student who disagreed commented, "I could barely understand him" indicating further investigation would be appropriate.

Statement 8: The buttons were easy to find.

14 Strongly Agreed, 1 Agreed. This statement was important because the interactive program did not start with directions to how the animations functioned. The students however seemed to have no trouble at all moving forward successfully through the program. One student commented, "They were big and easy to read/find".

Statement 9: The interactive games were fun to play.

2 Strongly Agreed, 8 Agreed, 4 Neutral, 1 Disagreed. The games within the interactive animations were simple yet created for the purpose to further instill the different styles of killing methods. The students' responses suggested the games were needed to be more interactive. The student who strongly disagreed commented, "It was just clicking a button most of the time, maybe a chase the prey game". Although the games were simple in design, majority of the students found them entertaining. One student commented she didn't like the rat snake squeezing game because "the squeezing was creepy". An older student commented, "They were a little kiddish, but they were cool".

Statement 10: I learned something new from playing the interactive games.

3 Strongly Agreed, 4 Agreed, 5 Neutral, 1 Disagreed, 3 Strongly Disagreed. This statement had the biggest range of answers out of all the statements in the evaluation.

This question reflects the previous question's responses. One student in the 7th grade commented, "kind of, it was a little obvious for me". The students who commented that the games were kiddish were in grades higher than grade level five suggesting the level knowledge and interest in the program may vary due to the grade level difference. Further investigation as to how the interactive games could be improved would be appropriate.

Statement 11: I would use the interactive snake program more than once.

4 Strongly Agreed, 3 Agreed, 7 Neutral, 1 Disagreed. The interactive program introduced a lot of information. Considering how much information was taught, it may be beneficial for the student to use the program more than once. This statement was designed to judge how successful the program was as far as being entertaining and interesting to use. The previous statements along with the pre/posttests were designed to understand whether or not the program was both entertaining and educational. If majority of the students would use the program more than once then it can be suggested the program was successful in both areas. One student who responded *Neutral* commented, "I would, but he/she would get kind of boring (over & over again) if they were different then yes".

Additional Comments

Majority of the questionnaires received did not have additional comments, so the students were asked verbally what they liked and didn't like about the program. The oral discussion was successful in gathering more information on what the students thought of the program. One student commented they liked the pictures, while another thought the pictures should be bigger. Another student commented on how he like the game where the user was asked to choose between two photos and decide which of the snakes was venomous. One student who answered "Neutral" on whether or not they would use the program more than once wrote "Maybe". That same student commented that the interactive games were "Fun". One student commented he/she didn't think the albums were helpful. Another student commented he/she didn't like the rabbit bleeding.

Discussion

Due to the second test group consisting of half as many students as the first test group it's difficult to suggest that the changes made to the original program had any impact. If anything is to be suggested from the second test groups answers, it could be suggested that the changes did not clarify the hemotoxic information delivered by the animation. The final test question which asked, "Which of the snakes found in Texas have Hemotoxic venom?" did not show any change in the number of correct answers from the pretest and posttest with the first test group. The second test group's number of correct answers actually declined with all of the students answering correctly on the pretest and only three answering correctly on posttest.

The first test group did not have a single question where the number of correct answers actually declined on the posttest. This however does not hold true for the second test group that had four out of seven questions with declining numbers of correct answers on the posttest. Certain factors that can be taken into consideration when looking at the students tests responses could be the fact they viewed a different version of the program, unlike the first test group they had taken the pretest 2 weeks prior to viewing the animation, and there were half as many students in the second test group. The second test group also included students in higher grades such as 6th and 7th unlike the first test group which contained students in grade levels 4th, 5th, and 6th. Comments that were received from the second test group suggesting that the program was "kiddish" were received from students in grades higher than the target audience of 5th grade.

CHAPTER FIVE

Conclusions and Recommendations

Project Summary

The thesis research problem that I wanted to solve was "can an interactive program be created that is both educational and entertaining by combining illustrations, photographs, audio, and text and enhances the learning experience?" In order to answer this question, I created an interactive animated program involving animations, photographs, and interactive games with the use of Adobe Illustrator®, Adobe Photoshop®, Adobe Premiere®, and Adobe Flash®.

A literature review was conducted to determine what educational resources currently exist on both the concepts of the Jacobson's organ and defense/prey methods. Research was also conducted on what educational biological interactive programs are currently available. A layout of the interactive program was designed for both web delivery and to be used by visitors to the snake exhibit at the Heard Museum. A script was prepared and necessary media was created, animated, and finally made interactive within the program.

Finally, the completed program was presented to the **Earth Trek III—Living on the Planet** class at the Heard Museum in McKinney, Texas for testing and evaluation. This class is composed of 17 student including students from grades 4th - 7th. The class consists of one 4th grader, five 5th graders, nine 6th graders, and two 7th graders. The first test group consisted of students in grade levels 4th - 6th: one 4th grader, five 5th graders, and five 6th graders. The second test group viewed an edited version of the program. This second group of student's grade levels ranged from 6th - 7th: four 6th graders and two 7th

graders. However, a posttest and evaluation was never received from one of the 6th graders so their pretest was omitted from the results. The pretest and posttest would be a good evaluator for whether or not the students obtained new information from the interactive program. A concluding questionnaire was also distributed along with the posttest following the user's completion of the program.

Conclusion

The positive survey response possibly suggests that the goal and objectives for this project were successfully accomplished. However, due to a few statements resulting in some students disagreeing, this would indicate there is plenty of room for improvement. The final pretest and posttest question which asks the student to decipher between which snake has hemotoxin venom had the least improvement in the number of correct answers. It can be suggested that this section may need to be expanded upon and not condensed into a small section of a much larger animation.

The Heard Natural Science Museum and Wildlife Sanctuary is currently lacking updated computers to display interactive programs throughout its exhibits. New computer hardware would be deemed useful to enhance the visitor's experience and gain in knowledge. Online access to the interactive program from the museum's website would also be beneficial to distribute information on Texas snakes. This program could be used to help create a new budget for the museum and have it invest money into updating their hardware. The museum's mission is threefold: education, conservation and preservation. By updating their computer software and hardware they can use more educational

interactive programs to further educate the public, and promote both conservation and preservation of wildlife.

Suggestions for Further Research

This thesis sought to create a model for presenting educational biological concepts in a fun, interactive, and educational manner. The program was designed as a web based resource for the Heard Natural Science Museum and Wildlife Sanctuary's website. However, when it was presented to **Earth Trek III—Living on the Planet** class at the museum, the students tested the program on a laptop. Testing was also performed quickly and did not allow for the student to view the program more than once. The program should be tested fairly with no time constraints and tested in either a classroom setting or in the web based environment it was created for originally.

Acquiring feedback from a larger audience would prove to be most beneficial. Attaining information on how to improve the interactive program as a whole would be useful as well. Additions like movie clips, links to additional resources, educational quizzes on the subject matter, and additional interactive games could prove useful.

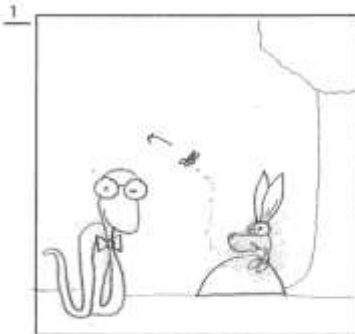
Comparing this interactive educational biological program with a program that had animation but lacked interactivity would be an useful study to see if interactivity within the biological field had its learning advantages. Further research could also be conducted by applying information presented in a program to live specimens. By creating an active learning environment to assist the interactive program may deem helpful for the learner to connect the program's information to real world experience. This study could

be done by incorporating the program into the class's curriculum in conjunction with the teaching of the two biological concepts in class.

APPENDIX A

Storyboard for the *Jacobson's Organ* Animation

Aimee Cammilleri
Hunting Methods



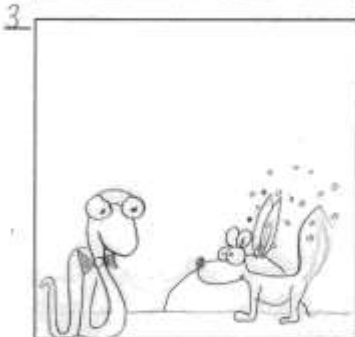
"Snakes are known to have very poor eyesight. We can only see when something when it is moving.

(Bug on rock in scene is still for first 3 sec then flies around screen followed by Sammy's eyes)



"Our noses are only used for breathing in oxygen and not for smelling. So how does a snake find prey in the wild?"

(Skunk walks into scene and animals present in scene hide- rabbit behind tree, mouse behind rock etc) (10sec)



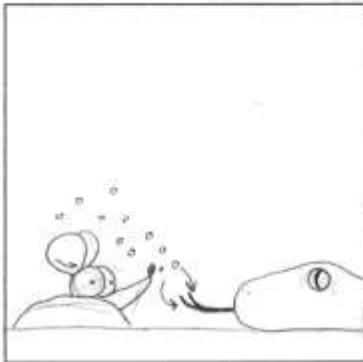
"Every animal has its own smell which is also known as a scent. An animal's scent is released into the air as tiny particle".

(Scent particles float around animals that appear in scene) (8 sec)

(Scene change)

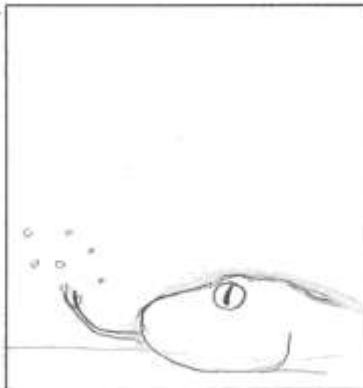
Aimee Cammilleri
Hunting Methods

4



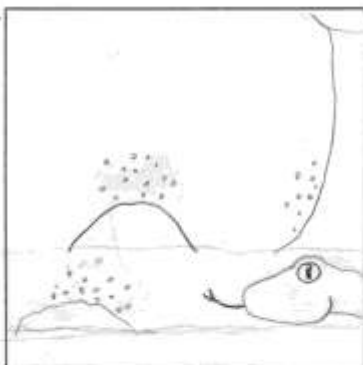
"Snakes don't smell the air the same way you do. Instead we taste the air with our tongue. We can smell our prey by darting our tongue in and out of our mouths."

5



"Scent particles stick to the tips of our forked tongues."

6

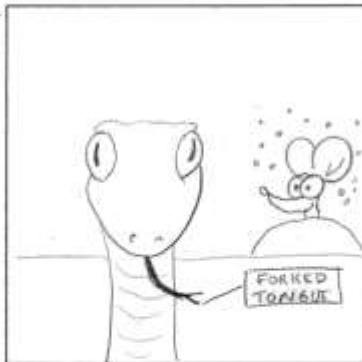


"Click on the colored scent particles in the air to see if the rattlesnake can figure out what its smelling and find it."

(User clicks on colored scent particles in scene and sets off the animation)

Aimee Cammilleri
Hunting Methods

4



"Notice that the snake's tongue is forked at the tip, for the same reason humans have two nostrils, to allow the snake to figure out which direction the scent is coming from."

5



"After a snake picks up the scent particles, it pull its tongue back into its mouth where it'll stick both tips of its tongue into two holes in the roof of its mouth. Click on the magnifying glass to see where the scent particles are traveling to."

(User clicks magnifying glass to initiate animation- anatomy of organ becomes visible in head)
(20 sec)

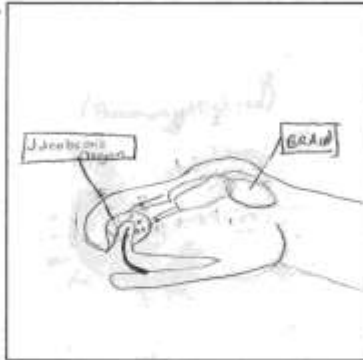
6



"Click on the colored scent particles in the air to see if the rattlesnake can figure out what its smelling and find it."

(User clicks on colored scent particles in scene and sets off the animation)

10



(Animation continues)

"The Jacobson's organ is lined with special sensory tissue. This tissue helps move the scent particles on their journey through the Jacobson's organ."
(10 sec)

11



(Animation sends signal to brain)

"Scent information is sent to the brain where the scents are identified, analyzed, and acted upon."

12



"Once a scent is identified then the rattlesnake is able to follow the prey's scent trail."

(scent identified by Sammy)

Aimee Cammilleri
Jacobson's Organ

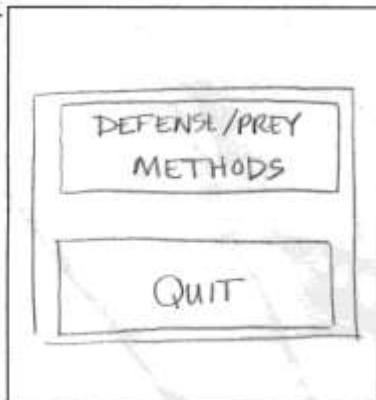
13
10



(Animation continues)

"Most snakes rely heavily on their sense of smell because they have no ears and their eyesight is poor. So the next time you see a snake flicking its tongue into the air, he may be smelling you."

14



(Main Menu Appears)

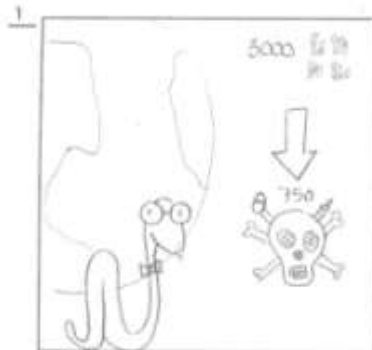
"Now that you know how snakes find their prey in the wild, would you like to learn how they kill their prey? Just click on the Defense/Prey Methods button now or click on the Quit button to end your journey."



APPENDIX B

Storyboard for the *Defense/Prey Methods* Animation

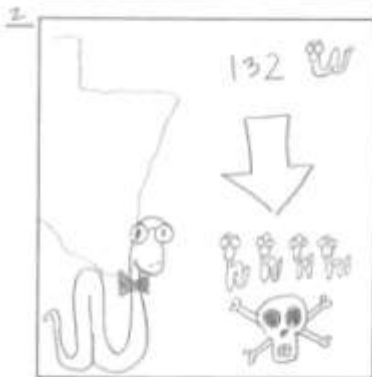
Aimee Catnipilleri
Killing Methods



"The world is home to 3,000 of my relatives and of that total only 750 of my relatives are dangerous to humans." (7 sec)

(Tiny snakes appear --> then venomous snake)
(Earth grows larger and focuses on Texas 3sec)

(Sammy's eyes blink and eyebrows move throughout animation --> moves off screen 3sec)



(Sammy moves back on screen)

"Texas is home to over 132 of those relatives and of that total only 4 of my kind are actually dangerous, so majority of my relatives in Texas are safe and don't want to hurt you." (10 sec)

("132 kinds.." appears first (3sec) then Toxic snakes (2sec))

(Scene fades into next 2sec)



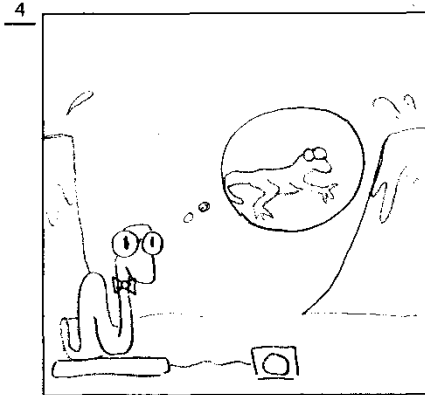
"Want to go back in time with me and see how my ancestors began to change the ways they captured and killed their prey?" (3 sec)

"Help me start my time machine by pressing on the large green START button."

(Arrow flashes above button 2 sec)

(Once user presses button --> flash of light and time machine shrinks into spec and vanishes (3 sec)

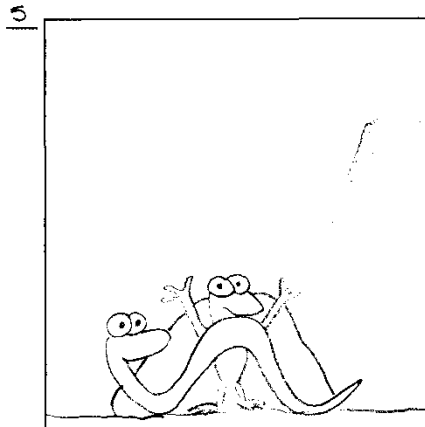
Aimee Cammilleri
Killing Methods



(Big flash on screen and machine grows into view)

"Over 20 million years ago, snakes began to change the ways they captured and killed prey. The word prey is another name for the food snakes kill and eat like a lizard for example."

^{thought into view}
(Lizard pops head out from behind rock then back down out of view) (7 sec)

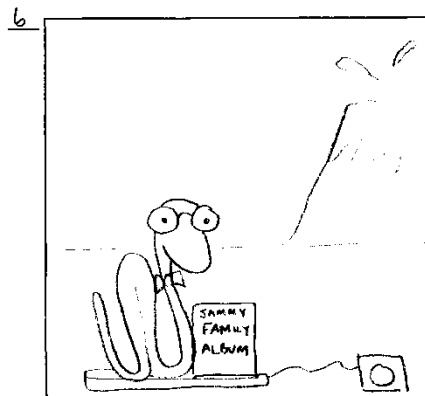


^{Scene moves over}
(Sammy comes out of time machine and camera focuses in on Racer snake squashing lizard against rock)

"Originally snakes were known as non-constrictors, meaning they kill prey, like a lizard, by pushing it against rocks or the ground. Most prey non-constrictors choose to eat is harmless and are often swallowed alive." (9 sec)

(Volcano squirts lave in background)

(Scene moves back to Sammy)



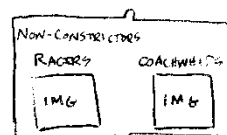
"Let's take a look in my family album and see what these two snakes look like and where in Texas they are found in present day."

(Family album reveals snake photos ~~and map and images of prey~~)

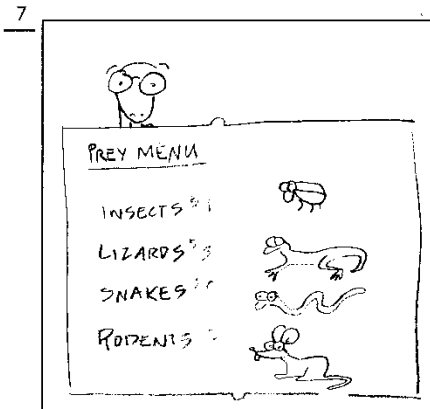
(Sammy's head pops up over album)

"Some of my non-constricting relatives in Texas that you may know of are the Racers and Coachwhip snakes."

(Page turns in next scene)



Aimee Cammilleri
Killing Methods

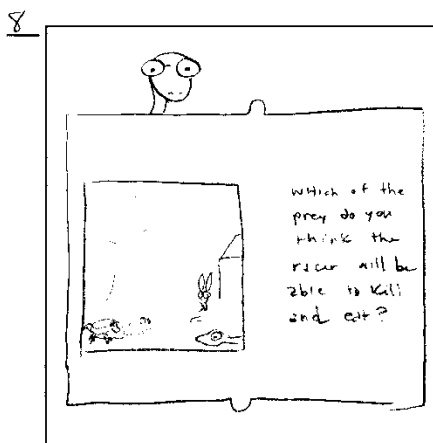


(Prey Menu revealed on next page displaying prey)

"Racers and Coachwhip snakes in Texas feed on insects, lizards, other snakes, and small rodents."

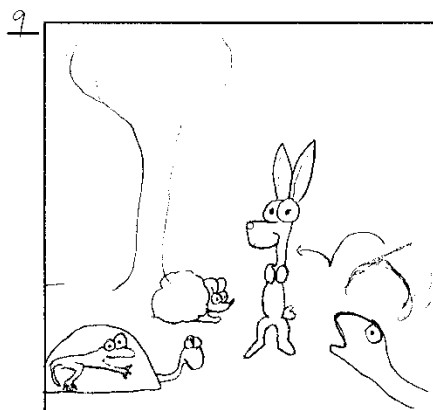
(Images appear on menu one by one 4 sec)

(Page turns in next scene)



(Next page in album reveals new prey options that user can choose from on one side)

"Which of the prey do you think the Racer snake will be able to kill and eat? A rabbit? ^{LIZARD}Grasshopper? Rat? or a snake? Click on the prey's picture and find out."



(User chooses rabbit)

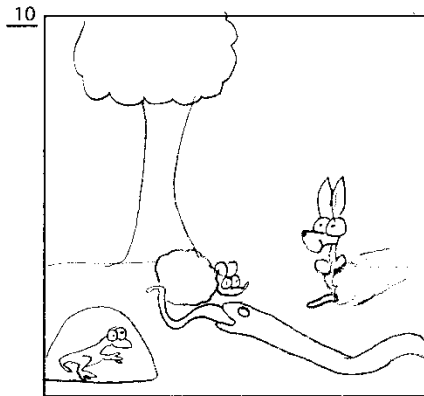
(On opposite page animation plays revealing users choice-scene expands filling screen)

(Rabbit jumps away into background)

"A rabbit is too fast and big for a Racer snake to try and eat."

(Scene shrinks back down to fit back on album page when animation is done)

Aimee Cammilleri
Killing Methods



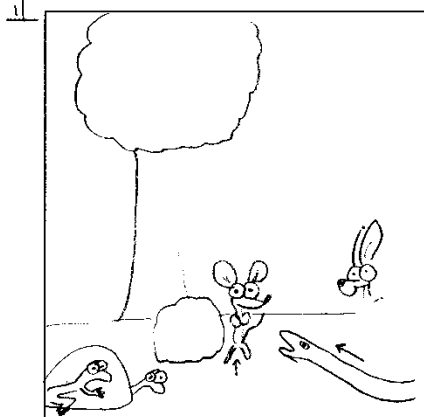
(User chooses snake)

(On opposite page animation plays revealing users choice- scene expands filling whole screen)

(Snake eats the snake prey)

"Good job. A Racer snake is able to eat a snake because it is small enough and slow. The Racer snake can eat it alive with no risk of injury."

(Scene shrinks back down to fit back on album page when animation is done)



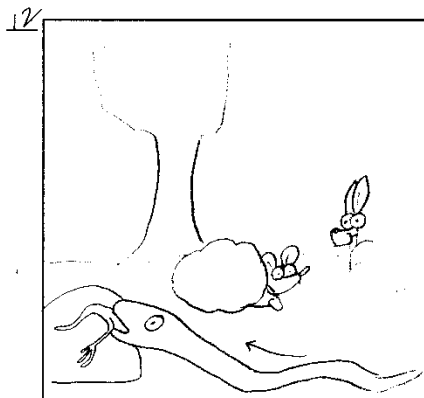
(User chooses rat)

(On opposite page animation plays revealing users choice- scene expands filling whole screen)

(Rat jumps in air then runs away as snake tries to bite it)

"A rat is also too big for the snake to eat and can easily run away."

(Scene shrinks back down to fit back on album page when animation is done)



LIZARD

(User chooses ~~insect~~)

(On opposite page animation plays revealing users choice-scene expands filling screen)

LIZARD

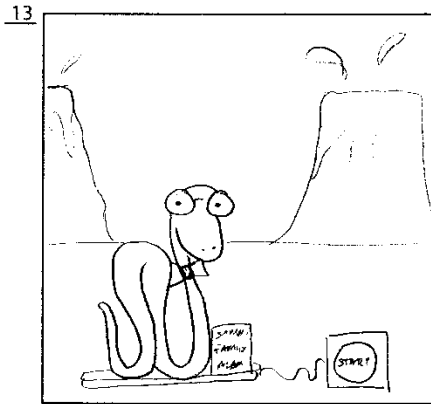
(Snake eats ~~insect~~)

LIZARD

"Good job. A Racer snake is able to eat the ~~insect~~ because it is small enough and slow."

(Scene shrinks back down to fit back on album page when animation is done)

Aimee Cammilleri
Killing Methods

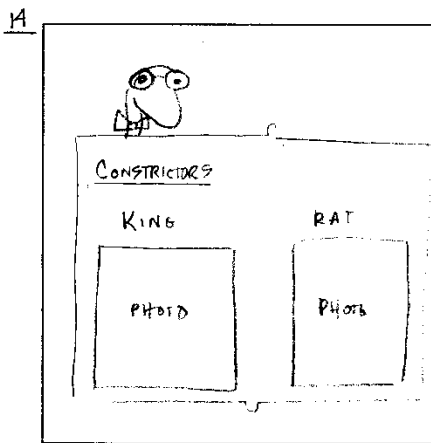


(Album closes revealing volcano scene and Sammy in time machine)

"These volcanoes are making me nervous. Can you send me back to Texas in my time machine by pressing the green START button again?"

(User presses the green start button to continue program)

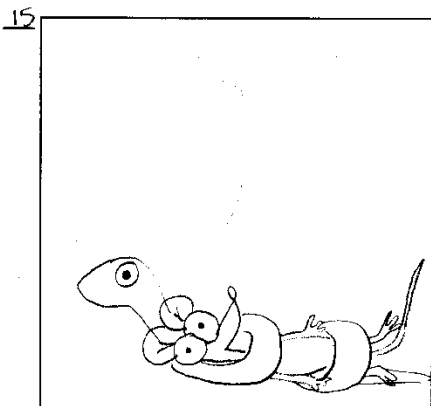
(Flash of light and time machine shrinks out of scene) SAMMY DISSOLVES



(Flash of light and door opens with Sammy ^{reappears} in Texas landscape scene in time machine)

"Now that we're back in the present day I want you to meet two other snake cousins of mine, the King snake and Rat snake. Let's take another look into my family album to see what these two constrictor snakes look like and where they are found in Texas."

(Album pops into scene and opens up)



(Animations scene expands filling whole screen)

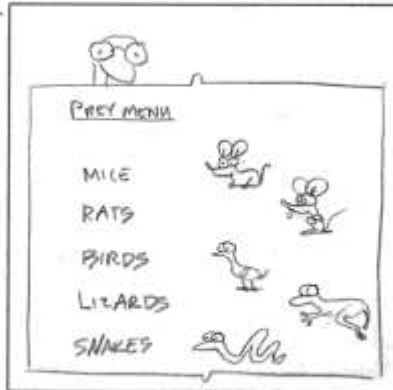
"The King snake and the Rat snake are known as constrictors, meaning they kill their prey by wrapping their body around their prey and squeezing."

(Animation plays on opposite page- snake squeezes mouse) (10 sec)

(Scene shrinks back down to fit back on album page when animation is done)

Aimee Cammilleri
Killing Methods

16

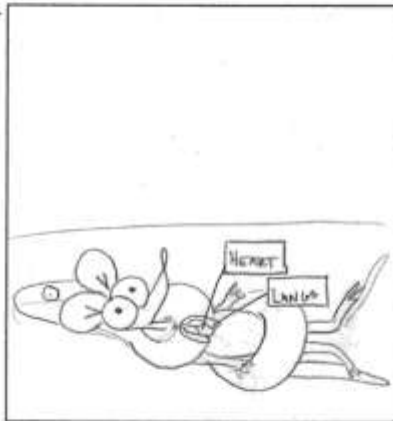


(Album page turns revealing prey menu)

"These snakes prefer to eat mice, rats, birds, and lizards. King snakes are also known to eat other snakes like the rattlesnake for example."

(Each image appears when listed) (10 sec)

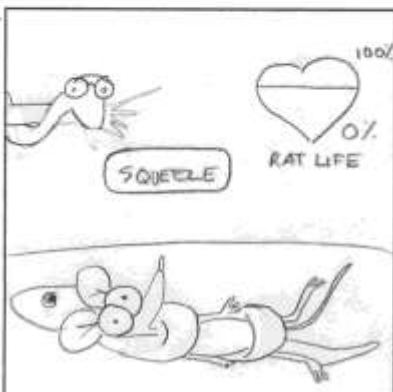
17



"A King snake and Rat snake's prey is killed by either suffocation, meaning that the snake tightens its grip each time its prey breathes out making it impossible for the prey to breathe back in air, or by creating so much pressure that the heart stops beating."

(Animation on opposite page of prey menu plays and expands to fill screen- camera zooms into rat snake and snake coils become transparent in next scene so only rat's heart and lungs are visible (8 sec)- heart slows and lungs are unable to expand)

18



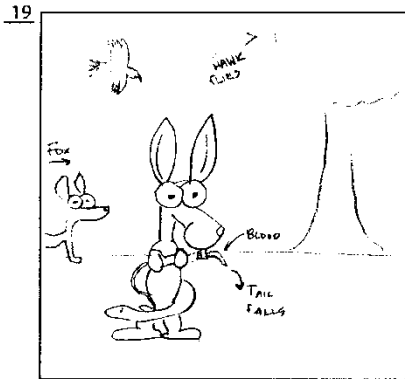
(Animation stops and snake's body is visible again --> live mouse in coils again with life meter visible)

"Want to help the Rat snake squeeze its prey? Press the red SQUEEZE button until the rat's Life Meter drops all the way to zero."

(Pressing button allows the user to make snake squeeze rat. Takes 6 clicks to bring meter to 0% and move onto next section)

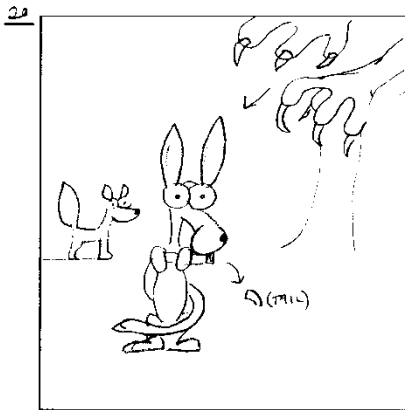
(Animation shrinks back onto page-Page turns in album)

Aimee Cammilleri
Killing Methods



(New page in album- animation expands)

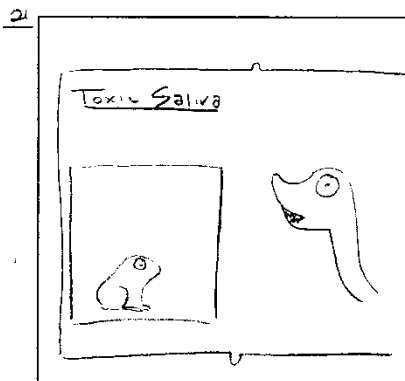
"This killing style makes it very difficult for snakes to kill large prey such as rabbits because the larger its prey is the longer it takes to suffocate them by constriction. The longer it takes to kill a prey the higher the chance of its prey hurting it with its teeth and claws and the snake could be seriously injured."



"So snakes needed to find a faster and safer way to kill their prey and protect themselves against predators who want to hunt and kill the snake like a fox or hawk."

(Hawk swoops down at snake (7 sec))

(Animation scene minimizes back onto page)

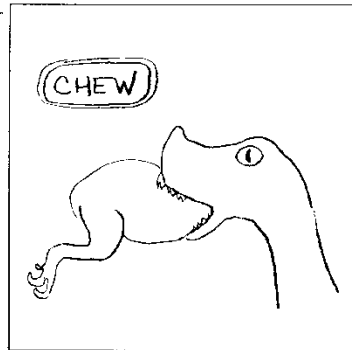


(Album pages changes to new section-showing Hognose snake)

"So some snakes began to develop toxic saliva, which is a poison that they inject into their prey by chewing on it rather than by just a single bite. My cousin the Hognose snake in Texas uses its toxic saliva to kill toads. This new way of killing helped with only struggling small prey however."

Aimee Cammilleri
Killing Methods

22



(Page in album turns)

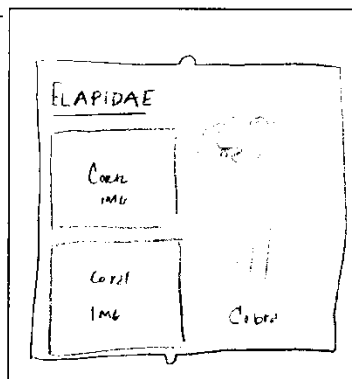
"Want to help my cousin the Hognose snake chew its prey?"

(Animation on page expands to fill screen)

"Just press the blue CHEW button and watch. Toads will fill themselves up with air to make it harder for the snake to swallow them but Hognose snakes have special teeth that can pop the toad shrink it back down to normal size and the toxic saliva will poison the toad."

(Scene minimizes once toad is deflated-page turns)

23

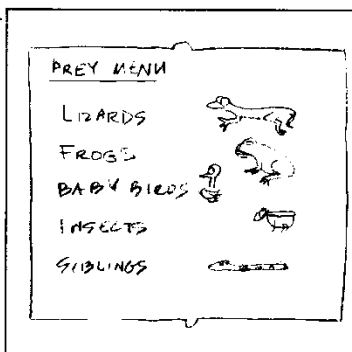


(New section page with "ELAPIDAE FAMILY"- photos of cobra and coral snake)

"The first ancestors of mine to grow fangs that venom would travel through were called the Elapidae family. The size of their fangs was limited to the size of their mouth. Even the largest of the Cobra snakes would have small fangs in order to fit them into their mouth. An example of an Elapidae found in Texas is the Coral snake, which is related to the Cobra snake not found in the U.S." (15 sec)

(Page turns in album)

24



(New page reveals prey menu)

"Coral snakes enjoy eating reptiles and small lizards, as well as amphibians like frogs and small mammals. They are also known to eat baby birds and insects, and even their own brothers and sisters."

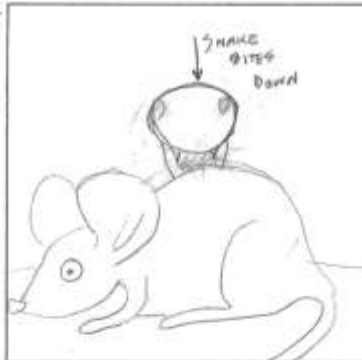
(Prey images appear in sequence as listed off)

"I'm sure glad I'm not in that family. I don't want my brother looking at me like I'm his next meal."

(Page turns in album)

Aimee Cammilleri
Killing Methods

25



(new page in album revealing new scene-animation expands fills screen)

"Coral snakes are dangerous due to their venom. Venom is a poisonous liquid and when a snake bites its prey it injects its venom through its fangs, which are its two front teeth, and into the prey's skin (tissue) where it will either remain in the skin or pass into the bloodstream." (15 sec)

26



(Animation continued)

"If the venom remains in the skin it will kill the skin turning it black but if it goes in the bloodstream it begins to affect the body in many other hurtful ways." (10 sec)

27



(animation minimizes- and opposite page fills with definition text)

"Venomous snakes have control whether or not they release their toxins during a bite. Envenomation, which means venom is released into a prey or predator during a snakebite, doesn't always occur when a snake bites. This is called a "dry bite" and occurs often." (20 sec)

Aimee Cammilleri
Killing Methods

28

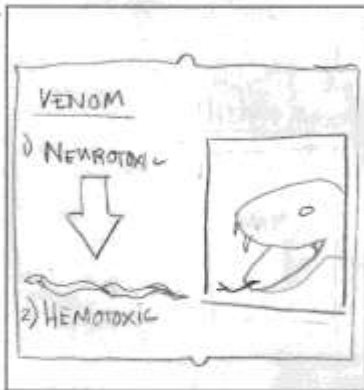


(new page in album revealing new scene-animation expands fills screen)

"Few people have been hurt by Coral snakes. If a Coral snake is left alone it will not bite a human. If a human is bitten by a Coral snake however, most of the time during a venomous bite no venom enters the skin because the snake's short fangs cannot go through thick clothing like shoes." (20 sec)

(Animation minimizes back onto album page)

29



(new page turns in album revealing new scene with text)

"There are two different types of venom: Neurotoxin and Hemotoxin. The first called neurotoxic venom is the type of venom coral snakes have."

20



"When a Coral snake's neurotoxic venom does enter its prey during a bite what happens? Let's take a closer look."

(opposite page in album revealing new scene animation expands filling scene)

"Venom is released into the fangs by an organ called the venom gland found on either side of its head."

(Organ is highlighted and illustrates flow of venom)

Aimee Cammilleri
Killing Methods

31

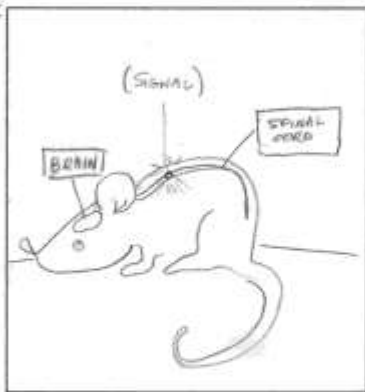


"My Coral snake friend needs help from you to release its venom into its prey. Can you help squeeze his venom gland? Press on his gland to release the venom."

(User presses on gland with mouse and venom animation shows passing of venom to fangs- then animation proceeds to affects of venom on prey's body)

(Animation continues in next scene)

32



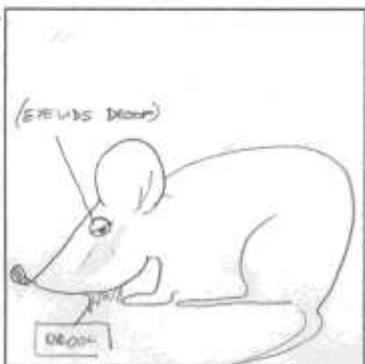
(Animation focuses on prey with nervous system showing throughout preys body)

"Neurotoxic venom affects the nervous system, which is the system in the body that allows the brain to talk to the body and tell it to move."

(Brain highlights in prey and sends signal through nervous system)

(Nervous system fades away (7 sec) -Animation continues in next scene)

33

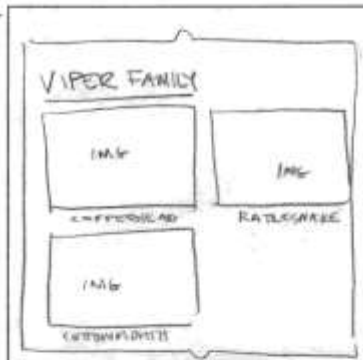


"The venom primarily affects eyesight and muscle movements including the muscles that help prey-breathe. Signs that a snake bite had neurotoxin venom in it include: being unable to move your eyes (prey's eyes move side to side then stop), drooping eye lids (prey's eyelids droop in animation), and being unable to swallow or breathe (prey drools and gasps for air in animation- sound effect). Neurotoxic symptoms happen very fast."

(Animation minimizes back onto album page and album page turns to new section)

Aimee Cammilleri
Killing Methods

34



(New album page with "VIPER FAMILY" heading)

"Snakes continued to change and the first family of snakes to have long, hollow front teeth that could fold back into slots in the roof of their mouth when their jaw was closed was the Viper family."

(Animation of snake with skull anatomy fading into head and fangs retracting) (15 sec)

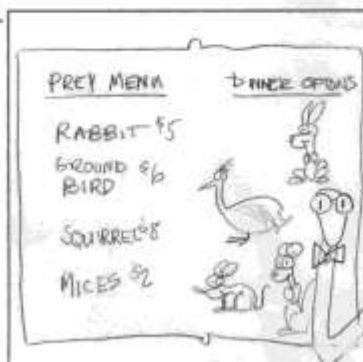
35



(Opposite page shows pictures of each snake)

A few examples of my snake relatives included in this family that are found in Texas are the Copperhead, the Cottonmouth, and the Rattlesnake." (15 sec)

36

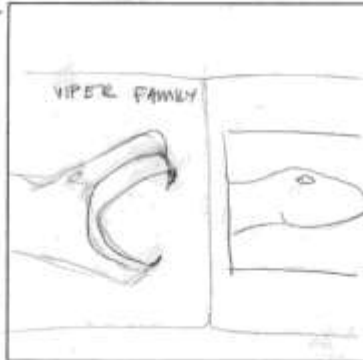


(Album page turns revealing prey menu)

"A Viper's prey of choice often includes rabbits, ground-living birds, squirrels, mice and other small rodents. Their venom is so dangerous they can kill very large animals and their bite is so fast that their prey has no time to escape."

Aimee Cammilleri
Killing Methods

37



(Opposite page reveals animation that expands to fill screen)

"When a Viper is striking its prey its front fangs swing forward and down when the mouth is open in the strike position. Their fangs are able to do this by swinging forward on hinged maxillary bones that rotate individually within holes in the upper jaw."

(Skull anatomy is shown again within snake head with fangs swinging forward as mouth opens)
(15 sec)

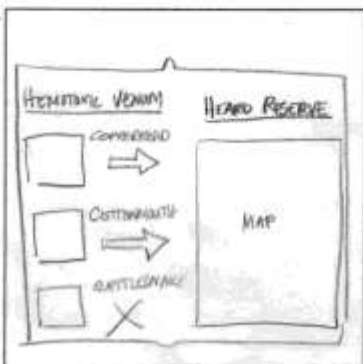
38



"Fangs can be quite long and deliver venom over an inch below the skin's surface."

(Animation zooms in on fangs puncturing prey skin)
(4 sec)

39

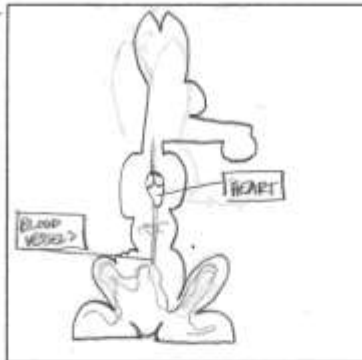


(Animation minimizes and album page turns)

"Most Vipers have the second type of venom called Hemotoxic venom. Of the four types of dangerous snakes in Texas three of them have hemotoxic venom. Those types include the copperhead, the cottonmouth (water moccasin), and the rattlesnake. Only the copperhead and the cottonmouth are found on the Heard Museum's Nature Reserve."
(15 sec)

Aimee Cammilleri
Killing Methods

40

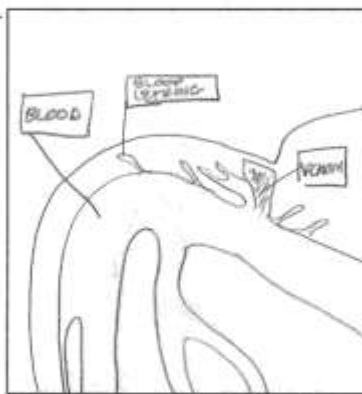


(Album page turns revealing animation that expands to fill screen)

"Hemotoxic venom affects the prey's body by breaking down blood vessels which allows blood to escape into places it doesn't belong. Blood moves throughout the body in a system of connected vessels."

(Animation of prey's vascular system) (15 sec)

41

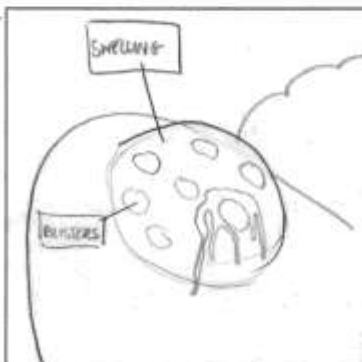


(Animation scene changes to close up of blood moving through vessel and leaking) *Zoomed in View*

"When hemotoxin venom enters the tissue it breaks blood vessel walls and allows blood cells to leak out. This fluid leaking from the vessels causes fluid build up under the skin and causes swelling and blisters to form, as well as unexpected bleeding."

(Blisters and swelling of skin in animation) (20 sec)

12

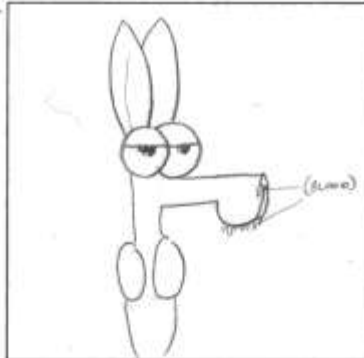


(Animation continues)

"After the blood vessel wall is damaged and the venom enters the bloodstream it starts killing red blood cells. With red blood cells dying, the body can't stop the snake bite injury from bleeding because our red blood cells are used to help stop bleeding." (15 sec)

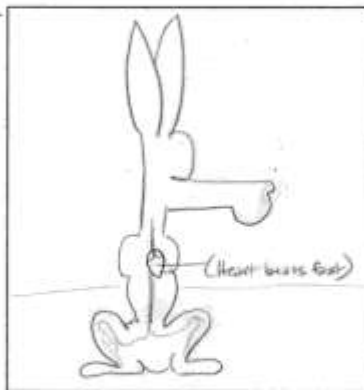
Aimee Cammilleri
Killing Methods

43



"A prey who has been bitten may start bleeding in their nose and mouth. Other painful signs may include blisters on the skin around the bite, skin around bite may turn black because it is dying."

44



"The heart may begin to beat faster because the blood isn't moving through the body as fast as it should due to the bleeding caused by the venom."

(Heart becomes visible on prey)

(Silhouette fades in)

45



(Animation minimizes and page turns to last section- New page has animation that maximizes and fills screen)

"Venomous snakes bite for a couple reasons: they are either trying to kill their prey or protect themselves against predators. Predators that hunt and want to kill snakes often include birds, foxes, coyotes and even humans." (15 sec)

Aimee Cammilleri
Killing Methods

46



(Scene change)

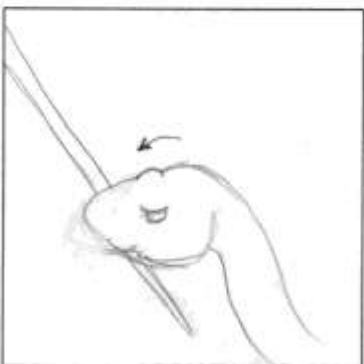
"No non-dangerous creature too big to be swallowed is ever attacked. Snakes only attack prey when they're hungry, and will only try to bite a human if they feel they are in danger." (15 sec)

47



"A frightened snake will almost always try to escape, if possible."

48



(Animation continues)

"However, if there is no time to escape, or if a snake feels trapped, it may try to bite to protect itself." (10 sec)

Aimee Cammilleri
Killing Methods

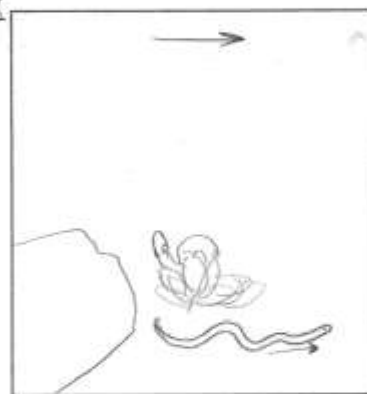
47



(Scene change)

"In the woods you need to be careful where you walk and what you move because snakes can hide anywhere." (Hand moves down, snake comes out, hand moves up + out of scene)
(cont #47)

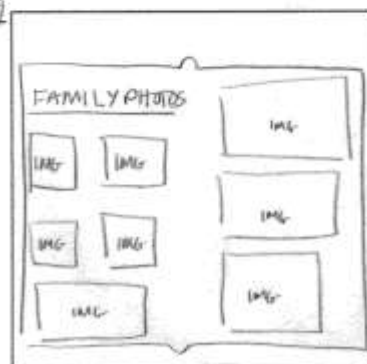
48



"So remember to always protect yourself outside by wearing shoes and not trying to pick up a snake if you see one." (Scene moves to left)

(Animation minimizes and page turns)

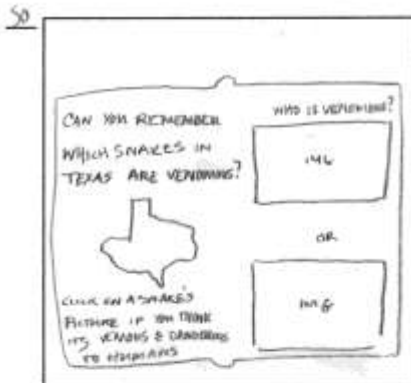
49



"You never know which relative of mine you may be meeting in the wild."

(Album closes)

Aimee Camilleri
Hunting Methods



(page turns to reveal interactive game)

(choose which of the snakes in Texas are venomous by clicking on the image)

(after game, Album minimizes)



(Main Menu Appears)

"I'm glad I could teach you more about my relatives and how they kill their prey. Would you like to learn how snakes smell? Click on the Jacobson's Organ button or click on the Quit button to end your journey"



APPENDIX C

Pretest Results

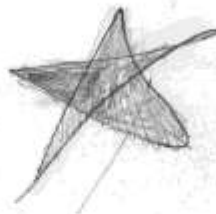
Kyra Beam

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
A) see prey B) breathe C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
A) so it can taste multiple things at once B) to help them see in two different directions
C) to help them feel two things at once D) to figure out which direction a scent is coming from
- 3) Snakes are known to have:
A) very good hearing B) very poor eyesight C) more than one tongue D) very good eyesight
- 4) How many types of venomous (dangerous) snakes are found in Texas?
A) 100 B) 4 C) 20 D) None
- 5) Envenomation means:
A) venom is released during a snake bite B) venom is not poisonous C) a snake can spit its venom
D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.



Elizabeth Wong

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
 - A) see prey B) breathe C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
 - A) so it can taste multiple things at once B) to help them see in two different directions
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- 4) How many types of venomous (dangerous) snakes are found in Texas?
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- 5) Envenomation means:
 - A) venom is released during a snake bite B) venom is not poisonous C) a snake can spit its venom
 - D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
 - A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
 - A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

Elizabeth
Elizabeth Wong
Elizabeth Wong

Emory

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
 - A) see prey
 - B) breathe
 - C) smell prey
 - D) digest prey
- 2) A snake's tongue is forked at the tip:
 - A) so it can taste multiple things at once
 - B) to help them see in two different directions
 - C) to help them feel two things at once
 - D) to figure out which direction a scent is coming from
- 3) Snakes are known to have:
 - A) very good hearing
 - B) very poor eyesight
 - C) more than one tongue
 - D) very good eyesight
- 4) How many types of venomous (dangerous) snakes are found in Texas?
 - A) 100
 - B) 4
 - C) 20
 - D) None
- 5) Envenomation means:
 - A) venom is released during a snake bite
 - B) venom is not poisonous
 - C) a snake can spit its venom
 - D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
 - A) blood vessels
 - B) the nervous system
 - C) the digestive system
 - D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
 - A) Coral snakes
 - B) Racer snakes
 - C) Copperheads
 - D) King snakes

Thank You.

Clay Adams

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____Instructions: Please circle the correct answer.

1) The Jacobson's Organ in snakes is used to:

- ☒ A) see prey B) breathe C) smell prey D) digest prey

2) A snake's tongue is forked at the tip:

- A) so it can taste multiple things at once B) to help them see in two different directions
C) to help them feel two things at once ☒ D) to figure out which direction a scent is coming from

3) Snakes are known to have:

- A) very good hearing ☒ B) very poor eyesight C) more than one tongue D) very good eyesight

4) How many types of venomous (dangerous) snakes are found in Texas?

- ☒ A) 100 B) 4 C) 20 D) None

5) Envenomation means:

- ☒ A) venom is released during a snake bite B) venom is not poisonous C) a snake can spit its venom
D) no venom is released during a snake bite

6) Neurotoxic venom affects:

- A) blood vessels ☒ B) the nervous system C) the digestive system D) heart rate

7) Which of the snakes found in Texas have Hemotoxic venom?

- A) Coral snakes B) Racer snakes ☒ C) Copperheads D) King snakes

Thank You.

Cole Hoode

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
☒ A) see prey B) breathe C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
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A) blood vessels ☒ B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads ☒ D) King snakes

Thank You.

Caleb

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
A) see prey B) breathe C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
A) so it can taste multiple things at once B) to help them see in two different directions
C) to help them feel two things at once D) to figure out which direction a scent is coming from
- 3) Snakes are known to have:
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- 6) Neurotoxic venom affects:
A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

Justin Letourneau

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
A) see prey B) breathe C) smell prey D) digest prey
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A) very good hearing B) very poor eyesight C) more than one tongue D) very good eyesight
- 4) How many types of venomous (dangerous) snakes are found in Texas?
A) 100 B) 4 C) 20 D) None
- 5) Envenomation means:
A) venom is released during a snake bite B) venom is not poisonous C) a snake can spit its venom
D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

John Peter Yamauchi

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
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A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
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D) no venom is released during a snake bite
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A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

Alex Kate Gollacher

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
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D) no venom is released during a snake bite
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A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

Katherine Michalec

Brodie Willard

PRETESTS

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
 - A) see prey
 - B) breathe
 - C) smell prey
 - D) digest prey
- 2) A snake's tongue is forked at the tip:
 - A) so it can taste multiple things at once
 - B) to help them see in two different directions
 - C) to help them feel two things at once
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 - C) a snake can spit its venom
 - D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
 - A) blood vessels
 - B) the nervous system
 - C) the digestive system
 - D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
 - A) Coral snakes
 - B) Racer snakes
 - C) Copperheads
 - D) King snakes

Thank You.

Amanda

PRETEST

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____**Instructions:** Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
A) see prey B) breathe C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
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C) to help them feel two things at once D) to figure out which direction a scent is coming from
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D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

♥ Mallory Sharp ♥

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
 - A) see prey
 - B) breathe
 - C) smell prey
 - D) digest prey
- 2) A snake's tongue is forked at the tip:
 - A) so it can taste multiple things at once
 - B) to help them see in two different directions
 - C) to help them feel two things at once
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- 4) How many types of venomous (dangerous) snakes are found in Texas?
 - A) 100
 - B) 4
 - C) 20
 - D) None
- 5) Envenomation means:
 - A) venom is released during a snake bite
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 - C) a snake can spit its venom
 - D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
 - A) blood vessels
 - B) the nervous system
 - C) the digestive system
 - D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
 - A) Coral snakes
 - B) Racer snakes
 - C) Copperheads
 - D) King snakes

Thank You.



Raven Johnston

Grade (Circle): 3rd 4th 5th (6th) 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
A) see prey B) breathe C) smell prey (D) digest prey
- 2) A snake's tongue is forked at the tip:
A) so it can taste multiple things at once B) to help them see in two different directions
C) to help them feel two things at once (D) to figure out which direction a scent is coming from
- 3) Snakes are known to have:
A) very good hearing (B) very poor eyesight C) more than one tongue D) very good eyesight
- 4) How many types of venomous (dangerous) snakes are found in Texas?
A) 100 (B) 4 C) 20 D) None
- 5) Envenomation means:
(A) venom is released during a snake bite B) venom is not poisonous C) a snake can spit its venom
D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
A) blood vessels (B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes (C) Copperheads D) King snakes

Thank You.

Taryn

Grade (Circle) : 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
 - A) see prey B) breathe C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
 - A) so it can taste multiple things at once B) to help them see in two different directions
 - C) to help them feel two things at once D) to figure out which direction a scent is coming from
- 3) Snakes are known to have:
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 - A) 100 B) 4 C) 20 D) None
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 - D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
 - A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
 - A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

David Mathews

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
A) see prey B) breathe C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
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D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

APPENDIX D

Posttest Results

AFTER

Grade (Circle) : 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
A) see prey B) breathe C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
A) so it can taste multiple things at once B) to help them see in two different directions
C) to help them feel two things at once D) to figure out which direction a scent is coming from
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A) very good hearing B) very poor eyesight C) more than one tongue D) very good eyesight
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A) venom is released during a snake bite B) venom is not poisonous C) a snake can spit its venom
D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

AFTER

Caleb

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
 - A) see prey B) breathe ☒ C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
 - A) so it can taste multiple things at once B) to help them see in two different directions
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- 4) How many types of venomous (dangerous) snakes are found in Texas?
 - A) 100 ☒ B) 4 C) 20 D) None
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 - ☒ A) venom is released during a snake bite B) venom is not poisonous C) a snake can spit its venom
 - D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
 - A) blood vessels ☒ B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
 - A) Coral snakes B) Racer snakes ☒ C) Copperheads D) King snakes

Thank You.

John Peter Vonauchi

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
 - A) see prey B) breathe C) smell prey D) digest prey
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 - A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
 - A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

Justin Le fourneaa

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
A) see prey B) breathe C) smell prey D) digest prey
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- 6) Neurotoxic venom affects:
A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

Cole Goffe

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____Instructions: Please circle the correct answer.

1) The Jacobson's Organ in snakes is used to:

- ☒ A) see prey B) breathe C) smell prey D) digest prey

2) A snake's tongue is forked at the tip:

- A) so it can taste multiple things at once B) to help them see in two different directions
C) to help them feel two things at once ☒ D) to figure out which direction a scent is coming from

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- A) very good hearing ☒ B) very poor eyesight C) more than one tongue D) very good eyesight

4) How many types of venomous (dangerous) snakes are found in Texas?

- A) 100 ☒ B) 4 C) 20 D) None

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- ☒ A) venom is released during a snake bite B) venom is not poisonous C) a snake can spit its venom
D) no venom is released during a snake bite

6) Neurotoxic venom affects:

- A) blood vessels ☒ B) the nervous system C) the digestive system D) heart rate

7) Which of the snakes found in Texas have Hemotoxic venom?

- A) Coral snakes B) Racer snakes ☒ C) Copperheads D) King snakes

Thank You.

Clay Adams

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____**Instructions:** Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
A) see prey B) breathe ☒ C) smell prey D) digest prey
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A) Coral snakes B) Racer snakes C) Copperheads ☒ D) King snakes

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

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A) see prey B) breathe C) smell prey D) digest prey
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C) to help them feel two things at once D) to figure out which direction a scent is coming from
- 3) Snakes are known to have:
A) very good hearing B) very poor eyesight C) more than one tongue D) very good eyesight
- 4) How many types of venomous (dangerous) snakes are found in Texas?
A) 100 B) 4 C) 20 D) None
- 5) Envenomation means:
A) venom is released during a snake bite B) venom is not poisonous C) a snake can spit its venom
D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
A) see prey B) breathe C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
A) so it can taste multiple things at once B) to help them see in two different directions
C) to help them feel two things at once D) to figure out which direction a scent is coming from
- 3) Snakes are known to have:
A) very good hearing B) very poor eyesight C) more than one tongue D) very good eyesight
- 4) How many types of venomous (dangerous) snakes are found in Texas ?
A) 100 B) 4 C) 20 D) None
- 5) Envenomation means:
A) venom is released during a snake bite B) venom is not poisonous C) a snake can spit its venom
D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
A) see prey B) breathe C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
A) so it can taste multiple things at once B) to help them see in two different directions
C) to help them feel two things at once D) to figure out which direction a scent is coming from
- 3) Snakes are known to have:
A) very good hearing B) very poor eyesight C) more than one tongue D) very good eyesight
- 4) How many types of venomous (dangerous) snakes are found in Texas?
A) 100 B) 4 C) 20 D) None
- 5) Envenomation means:
A) venom is released during a snake bite B) venom is not poisonous C) a snake can spit its venom
D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

Post Test

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
A) see prey B) breathe ☒ C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
A) so it can taste multiple things at once B) to help them see in two different directions
C) to help them feel two things at once ☒ D) to figure out which direction a scent is coming from
- 3) Snakes are known to have:
A) very good hearing ☒ B) very poor eyesight C) more than one tongue D) very good eyesight
- 4) How many types of venomous (dangerous) snakes are found in Texas?
A) 100 ☒ B) 4 C) 20 D) None
- 5) Envenomation means:
☒ A) venom is released during a snake bite B) venom is not poisonous C) a snake can spit its venom
D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
A) blood vessels ☒ B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
☒ A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
A) see prey B) breathe ☒ C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
A) so it can taste multiple things at once ☒ B) to help them see in two different directions
C) to help them feel two things at once D) to figure out which direction a scent is coming from
- 3) Snakes are known to have:
A) very good hearing ☒ B) very poor eyesight C) more than one tongue D) very good eyesight
- 4) How many types of venomous (dangerous) snakes are found in Texas ?
A) 100 ☒ B) 4 C) 20 D) None
- 5) Envenomation means:
A) venom is released during a snake bite B) venom is not poisonous ☒ C) a snake can spit its venom
D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
A) blood vessels ☒ B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
☒ A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please circle the correct answer.

David
Mathews

- 1) The Jacobson's Organ in snakes is used to:
A) see prey B) breathe C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
A) so it can taste multiple things at once B) to help them see in two different directions
C) to help them feel two things at once D) to figure out which direction a scent is coming from
- 3) Snakes are known to have:
A) very good hearing B) very poor eyesight C) more than one tongue D) very good eyesight
- 4) How many types of venomous (dangerous) snakes are found in Texas?
A) 100 B) 4 C) 20 D) None
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A) venom is released during a snake bite B) venom is not poisonous C) a snake can spit its venom
D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
A) blood vessels B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
A) Coral snakes B) Racer snakes C) Copperheads D) King snakes

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other Raven

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
 - A) see prey
 - B) breathe
 - C) smell prey
 - D) digest prey
- 2) A snake's tongue is forked at the tip:
 - A) so it can taste multiple things at once
 - B) to help them see in two different directions
 - C) to help them feel two things at once
 - D) to figure out which direction a scent is coming from
- 3) Snakes are known to have:
 - A) very good hearing
 - B) very poor eyesight
 - C) more than one tongue
 - D) very good eyesight
- 4) How many types of venomous (dangerous) snakes are found in Texas?
 - A) 100
 - B) 4
 - C) 20
 - D) None
- 5) Envenomation means:
 - A) venom is released during a snake bite
 - B) venom is not poisonous
 - C) a snake can spit its venom
 - D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
 - A) blood vessels
 - B) the nervous system
 - C) the digestive system
 - D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
 - A) Coral snakes
 - B) Racer snakes
 - C) Copperheads
 - D) King snakes

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Bryn Johnston

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
 - A) see prey
 - B) breathe
 - C) smell prey
 - D) digest prey
- 2) A snake's tongue is forked at the tip:
 - A) so it can taste multiple things at once
 - B) to help them see in two different directions
 - C) to help them feel two things at once
 - D) to figure out which direction a scent is coming from
- 3) Snakes are known to have:
 - A) very good hearing
 - B) very poor eyesight
 - C) more than one tongue
 - D) very good eyesight
- 4) How many types of venomous (dangerous) snakes are found in Texas?
 - A) 100
 - B) 4
 - C) 20
 - D) None
- 5) Envenomation means:
 - A) venom is released during a snake bite
 - B) venom is not poisonous
 - C) a snake can spit its venom
 - D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
 - A) blood vessels
 - B) the nervous system
 - C) the digestive system
 - D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
 - A) Coral snakes
 - B) Racer snakes
 - C) Copperheads
 - D) King snakes

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____
Amanda B.

Instructions: Please circle the correct answer.

- 1) The Jacobson's Organ in snakes is used to:
 A) see prey B) breathe ☒ C) smell prey D) digest prey
- 2) A snake's tongue is forked at the tip:
 A) so it can taste multiple things at once B) to help them see in two different directions
 C) to help them feel two things at once ☒ D) to figure out which direction a scent is coming from
- 3) Snakes are known to have:
 A) very good hearing ☒ B) very poor eyesight C) more than one tongue D) very good eyesight
- 4) How many types of venomous (dangerous) snakes are found in Texas?
 A) 100 ☒ B) 4 C) 20 D) None
- 5) Envenomation means:
☒ A) venom is released during a snake bite B) venom is not poisonous C) a snake can spit its venom
 D) no venom is released during a snake bite
- 6) Neurotoxic venom affects:
 A) blood vessels ☒ B) the nervous system C) the digestive system D) heart rate
- 7) Which of the snakes found in Texas have Hemotoxic venom?
 A) Coral snakes B) Racer snakes ☒ C) Copperheads D) King snakes

Thank You.

APPENDIX E

Questionnaire Results

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2) I feel like I learned something new about snakes. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) I feel like I now know more about venomous snakes. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Sammy was easy to understand when he spoke. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) The buttons were easy to find. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) I learned something new from playing the interactive games. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11) I would use the interactive snake program more than once. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You

Clay Adams

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2) I feel like I learned something new about snakes. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) I feel like I now know more about venomous snakes. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Sammy was easy to understand when he spoke. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) The buttons were easy to find. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) I learned something new from playing the interactive games. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11) I would use the interactive snake program more than once. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You.

Cole Gode

Grade (Circle): 3rd 4th 5th (6th) 7th 8th Other _____

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) I feel like I learned something new about snakes. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) I feel like I now know more about venomous snakes. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Sammy was easy to understand when he spoke. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8) The buttons were easy to find. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) I learned something new from playing the interactive games. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11) I would use the interactive snake program more than once. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You.

John Peter Yamauchi

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2) I feel like I learned something new about snakes. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) I feel like I now know more about venomous snakes. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Sammy was easy to understand when he spoke. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) The buttons were easy to find. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) I learned something new from playing the interactive games. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11) I would use the interactive snake program more than once. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2) I feel like I learned something new about snakes. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) I feel like I now know more about venomous snakes. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Sammy was easy to understand when he spoke. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) The buttons were easy to find. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) I learned something new from playing the interactive games. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11) I would use the interactive snake program more than once. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) I feel like I learned something new about snakes. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) I feel like I now know more about venomous snakes. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Sammy was easy to understand when he spoke. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) The buttons were easy to find. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) I learned something new from playing the interactive games. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11) I would use the interactive snake program more than once. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You.

Cdb

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2) I feel like I learned something new about snakes. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) I feel like I now know more about venomous snakes. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Sammy was easy to understand when he spoke. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) The buttons were easy to find. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) I learned something new from playing the interactive games. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11) I would use the interactive snake program more than once. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2) I feel like I learned something new about snakes. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) I feel like I now know more about venomous snakes. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Sammy was easy to understand when he spoke. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) The buttons were easy to find. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) I learned something new from playing the interactive games. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11) I would use the interactive snake program more than once. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. Comments:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) I feel like I learned something new about snakes. Comments:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. Comments:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) I feel like I now know more about venomous snakes. Comments:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. Comments:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. Comments:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Sammy was easy to understand when he spoke. Comments:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) The buttons were easy to find. Comments:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. Comments:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) I learned something new from playing the interactive games. Comments:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11) I would use the interactive snake program more than once. Comments:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2) I feel like I learned something new about snakes. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) I feel like I now know more about venomous snakes. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Sammy was easy to understand when he spoke. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) The buttons were easy to find. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) I learned something new from playing the interactive games. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11) I would use the interactive snake program more than once. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other Tsaya

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. Comments:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) I feel like I learned something new about snakes. Comments:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. Comments: being older makes the cartoons kind of boring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4) I feel like I now know more about venomous snakes. Comments:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. Comments: less and bigger pictures would be better though	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. Comments:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7) Sammy was easy to understand when he spoke. Comments: I could barely understand him	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8) The buttons were easy to find. Comments: he doesn't need to say to click the button	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. Comments: it was just clicking a button most of the time maybe a choice the pray game	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10) I learned something new from playing the interactive games. Comments:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11) I would use the interactive snake program more than once. Comments: I feel it was under age	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Thank You.

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

David
Mathews

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2) I feel like I learned something new about snakes. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) I feel like I now know more about venomous snakes. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Sammy was easy to understand when he spoke. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) The buttons were easy to find. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) I learned something new from playing the interactive games. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
11) I would use the interactive snake program more than once. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You.

RAVEN

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. Comments: I really didn't know about snakes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
2) I feel like I learned something new about snakes. Comments: I really never had the urge to learn about snakes	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. Comments: I Laughed because of the voice but some of the pictures are	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) I feel like I now know more about venomous snakes. Comments:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. Comments:	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. Comments:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Sammy was easy to understand when he spoke. Comments:	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) The buttons were easy to find. Comments:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. Comments:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) I learned something new from playing the interactive games. Comments:	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11) I would use the interactive snake program more than once. Comments:	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) I feel like I learned something new about snakes. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) I feel like I now know more about venomous snakes. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Sammy was easy to understand when he spoke. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) The buttons were easy to find. <i>Comments:</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) I learned something new from playing the interactive games. <i>Comments:</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11) I would use the interactive snake program more than once. <i>Comments:</i>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You.

Amanda

Grade (Circle): 3rd 4th 5th 6th 7th 8th Other _____

Instructions: Please mark the square that corresponds to your level of agreement with the statement to the left. Additional comments may be added after each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1) I knew about the Jacobson's Organ before seeing the animation. Comments: I got it right, but I didn't know exactly.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2) I feel like I learned something new about snakes. Comments: That program was awesome!!	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3) The cartoons in the animations made it fun to learn. Comments: They were so cute.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4) I feel like I now know more about venomous snakes. Comments: I know that I shouldn't be very scared when I see a snake.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5) The snake photos in Sammy's Family Album were useful. Comments: It made visual easy.	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6) Sammy the snake was a good tour guide. Comments: He knew his stuff.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7) Sammy was easy to understand when he spoke. Comments: He was cool.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8) The buttons were easy to find. Comments: They were big, & easy to read/find.	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9) The interactive games were fun to play. Comments: They were a little kitchy, but they were cool.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10) I learned something new from playing the interactive games. Comments: Kind of, it was a little obvious for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11) I would use the interactive snake program more than once. Comments: I would, but they would get kind of boring (over & over again) if they were different than 405!!	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank You.

You are welcome

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