

Developing an Educational Interactive Science Center Script: Process, Structure, and Content

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ABSTRACT

University of Central Florida (UCF) graduate students from the Fall 2009 semester Applied Interactive Story (DIG 6551) course attempted to conceptualize an interactive science center program to teach children and adults about the effect of environmental change on wood stork populations.

Many findings occurred during the course of the semester, including the necessity for an explicitly stated structured development process and the need for one or more theoretical frameworks to guide the process. The other major finding was the development of an iterative process for converting a traditional script to an interactive educational one. The process consisted of 1) writing a traditional script, 2) incorporating educational principles, 3) acting out the script using “Wizard of Oz” paper prototyping, 4) reviewing the process using an interdisciplinary team, 5) revising the script to remove dialogue in favor of visual, tactile, and musical/Foley cues, and 6) analyzing the narrative structure to identify beats, then further subdividing them into satellite and kernel events.

I. INTRODUCTION

Using the UCF National Science Foundation proposal “Dancing the Earth: A Mixed-Reality Science Center Program Based on Whole-Body Interaction and Virtual Docents” as a base, the DIG-6551 students began conceptualizing their class project. Several guidelines, which were taken from Dancing the Earth, served as starting points. The class project had to:

- Focus on wildlife found in Florida and must include ecologically-themed scenarios.
- Be developed for science centers and must contain educational content.
- Incorporate the use of remotely-located, virtual docents, some of which must be retirees.
- Incorporate the use of digital media technology.
- Occur in one room, based on the size and dimensions of one of the allocated rooms in the Museum of Discovery and Science in Ft. Lauderdale, Florida.
- Be similar in tone to a National Geographic-style documentary.
- Use interactivity principles that incorporate full-body movement.

At the core of this project was the development of a script, which provided context for discussions about other aspects of the project to occur. This paper is about the development of that script and focuses its content, structure, and creation process.

II. PROBLEM AND BACKGROUND

The central problem addressed was how to design an interactive science center project that is entertaining and educational. The centrality of the script became obvious during the brainstorming session near the beginning of the semester. Over 60 percent of the initial questions asked were related to story and

scripting. These questions, which appear below, can be grouped into four major categories: Educational Content, Content Presentation Design, Script “Run-Time” Production, and Script Structure.

- *Educational Content:* What is the topic? Will the experience teach visitors about the everglades? What is the cost and the educational value [of the project]? What about the curriculum, is it created in conjunction with the engineers/developers? What types of educational content should be taught and are there types of content that science centers are particularly well-suited to teach? How is science center education different from museum education or formal classroom learning?
- *Content Presentation Design:* What specific kinds of interactions do we want people to be able to perform? Will our experience be accessible to people with disabilities (e.g. movement limitations, deaf, blind)? Is our content accessible to those who speak different languages? Can we have different characters for different ages? How can we use psychology to make unknown things known?
- *Script “Run-Time” Production:* Is there an interactor? Who monitors the situation? Do we allow participants to come to consensus on the wrong answer? What do you do when you run out of script, regardless of how much training you have? How will we appeal to people who are already familiar with the topic or who simply want to be entertained?
- *Script Structure:* Is it easy to put different kinds of content in the project? How do we control the length of the experience? Are there points of specific goals involved, like a video game? How do you get the audience to know that an expert is teaching them? How can we encourage collaboration in the space? How much freedom and control should participants be given to shape the experience? How many anchor points (points that are essential to the story and cannot be changed) should appear in the story, and how does the numbers and placement of anchor points affect enjoyment of the story? How can points for evaluative feedback be built into the script design?

Addressing these questions and developing the script dominated most of the semester; in fact, the class spent

approximately 70 percent of the semester working on the script.

As the semester progressed, two additional categories of questions quickly emerged. Although there were theoretical frameworks that undergirded the Dancing the Earth grant proposal project, there was not an explicit discussion about which theoretical frameworks to use for the scripting process. We discovered that working without a framework or several frameworks, particularly when exploring novel concepts in a developing field, posed difficulties. It seems one of the most important utilities of a theoretical framework is to provide many different contexts with which to uncover different dimensions of the problem. Without this, it was difficult to truly understand the problem and to evaluate possible solutions clearly. Additionally there were many questions that centered around script development. Without a strong sense of how we should collaborate and come to consensus on issues, we were unable to quickly move forward. Questions that occurred during the semester included:

- *Theoretical Frameworks:* What makes an effective interactive story that is also educational? How many times and in how many different ways should knowledge be presented for optimal learning to occur? Which theories are helpful in guiding the development of the concept? Are there any metaphors or interactive models that we should use as a starting point for inquiry? For all ages, are differences in the ways in which children and adults learn in bodily agency?
- *Script Content Creation:* How should script development occur? What is the process for developing an interactive script? Should the process differ from a traditional script? In terms of the collaboration aspect, what is the best way to organize teams to create a script? Should the script be created using a team of scriptwriters or an interdisciplinary team that includes experts from the other processes? What are the most effective collaboration processes?

III. MATERIALS, METHODS, AND RESULTS

Near the beginning of the semester, students assigned themselves to groups based on areas of expertise and interest. Each group presented information in their area

of expertise and worked on paper prototypes and designs of their ideas, using the Wizard of Oz development approach. The Wizard of Oz approach is a method of rapid application development that leaves technical details unaddressed. Similar to the software engineering approach that takes place with wire diagrams, flow charts, and use cases, the Wizard of Oz approach allows groups to walk through the processes and find pitfalls prior to the development of a physical prototype.

Initially, the script group used classic story theory and script writing techniques to create a script about an otter family. Since the script was character-driven, two members of the team submitted ideas for characters, environments, and plot points. Background research on otter habitat was performed. The third member of the team wrote the script and the other two members served as script editors. The central characters were an otter family (Ollie, Ophelia, Odie, Odetta). The problem the otters faced was how they would escape the pollution in River Towne. Learning objectives were for participants to become aware of environmental pollution and to learn about the food web. Additional scenarios were included as well.

As the semester progressed other topics were vetted. As the class grappled with the issue of finding the right topic and in determining how their own processes would be conceptualized, script development occurred among the entire class for several weeks. During the mid-point of the semester, one of these groups created a compelling story about wood storks that the class decided to adopt for the remainder of the semester. (The wood storks synopsis appears in the wiki for the class.)



North American Wood Stork

A game was decided to be the best interactive format for the project and a basic physical gaming interface and levels were designed. The class generated content based on expertise from the research team. The educational lesson to be taught was that if wood storks fed in ponds that in one area, the food sources would soon disappear as the seasons progressed due to overfishing. Wood stork families only survive by feeding on fish in nearby AND distant ponds.

Shortly thereafter, the script team generated several scripts which appear in the appendices of this paper. Each script was a revision of, or an extension of, the previous one.

Script Draft One

The first script (found in Appendix A) focused on the development of the training scenario. The purpose of the training scenario was to teach participants:

- How to interact with the digitally augmented environment (e.g. Participants touch the wall to get food to feed the baby storks. They flap their wings to "fly" and see their environment from a higher vantage point.).
- How to role-play wood storks (e.g. Participants learn to hunt for food and feed the wood stork babies).

The first draft of the script features two friendly park-rangers (docent and staff) who help the participants (visitors to the museum) learn how to fly, fish, and feed babies. The class read through the scene. The class then assigned themselves to different roles, created paper copies of the environment and ad-libbed their way through the script while it was filmed.

The class then analyzed the script. Some of the findings follow.

- Overwhelmingly, the class felt less dialogue and more demonstration would be effective.
- Game elements, such as life and health meters, as well as other hardware, software, audio, and visual elements were developed.

- Dying baby wood storks and the inclusion of a timer created an inciting incident for game play and urgency for the participants.
- The virtual wood stork (played by a remote docent) and in-person staff member should play different roles – with the virtual stork serving as the “expert” and the staff member serving as the “helper.”

The environment was also altered so that the nest for the wood storks appeared in the center of the room.

Script Draft Two

The film of the draft script was analyzed to identify the beats and events in the scene. Dr. Moshell helped the script team to create scripts that had little dialogue. The beat/event sheet, as well as the purpose of each beat, appears in Appendix B. (A beat is a change in action.)



Wizard of Oz Script Review Session

A second script was written according the beat/event sheet (Appendix C). The script was acted out in class. The class broke the script into segments that roughly corresponded to beats. Each segment was analyzed to include comments about sound, hardware, software, audience, docents, dialogue, and length. Feedback included the following:

- Consider showing a top down view of the environment.
- The participants must face the audience so that people will be able to see them.
- To increase efficiency, the stork beaks that participants wear (which are Wii tongs) should be handed out ahead of time.

- There should be a meter that shows the amount of fish eaten. This could be called a “fish-i-cator.”

Additionally, some sections of the script were removed because in practice, they were ineffective.

Script Draft Three and Scenario Three

Based on the comments about the second draft, a third draft was written of the first scene. Additionally a second and third scene was added. The transition period between scenes included time for museum audience members to make hypotheses and discuss why baby birds died in the previous scenario. Through group consensus, museum audience members decide on the hypothesis that will determine the next scene. The hypothesis for the final scene is “guided” by the docent and staff member so that all participants make the correct hypothesis and therefore win at the end.

The class did not prototype the script, but rather was able to make comments for further study. Dialogue was almost entirely omitted from one scene because it simply was not needed. The draft of the third scene appears in Appendix D.

IV. DISCUSSION AND EVALUATION

An analysis of the script and content development is useful if we examine them against the backdrop of existing scholarship. While some of these theoretical frameworks and research were not explicitly discussed in class, some of these arose naturally out of the project. Others used intentionally in the creation of the script.

Science Center Learning Research

The Museum, Libraries, and Archives Council (MLA), which “promotes the best practices in museums, libraries, and archives,” defines learning as “a process of active engagement with experience” that “may involve the deepening of skills, knowledge, understanding, values, ideas, and feelings.” [emphasis mine.] (MLA 2009). While there are many definitions for learning, this definition emphasizes that learning has more dimensions than simple recall. This definition suggests at least two dimensions: HOW learning occurs and WHAT type of learning occurs.

In a typical science center, the HOW dimension of learning occurs through inquiry, discovery, and discussion. (Johnson, 2009) The process of trial and failure, which leads to discovery – learning by doing – is the experiential part of the process. Collaboration is a natural part of the process. Consider a child learning to ride a bicycle:

JENNIE: (throws down bike, has tears in eyes) I'll never learn to ride this stupid bike! Why won't my bike stay up when I pedal?

JANET: (places hand on Jennie's shoulder) It took me a while to learn how to ride a bike too. But you'll get it. You know, I don't think you are going fast enough.

JENNIE: (thinking) You mean I need to pedal FASTER?

JANET: (nods head) Yeah. Come on. Let's go out to the sidewalk and try again. I'll run behind you and hold the seat of your bike so you won't fall, okay?

JENNIE: (unconvinced) Well ... okaaay.

Similarly, science centers encourage active engagement in the learning process. The discovery of new concepts, kinesthetic as well as linguistic, auditory, and visual learning is often incorporated in exhibit design. Because inquiry is encouraged, often there are many possible outcomes. An additional component of science center learning is the encouragement of discussion. Talking through problems and possible solutions is an essential part of the experience. (Johnson 2009).

In contrast, learning that occurs in a traditional classroom situation focuses on the transmission and retention of factual information and usually prescribes one correct outcome, particularly at the K-12 level. Content delivery is uni-directional and often there is immediate feedback. The learner passively receives information as the teacher transmits the data. (Johnson 2009).

The qualities that differentiate the science center from the classroom make it particularly amenable to interactive narrative, particularly since the goal of many interactive narratives are immersion, two-way

communication in which the user (or computer) can influence the outcome of the story, the incorporation of many pathways, immersion, and engagement.

The MLA has also developed a set of Generic Learning Outcomes (GLO) that further defines the second dimension of learning: WHAT types of learning occurs. (MLA 2009) GLO categories include:

- **Knowledge and Understanding:** Content knowledge, such as the fact that wood storks eat fish AND bugs, but fish have more nutritional value.
- **Skills:** Practical skills such as how to complete tasks related to the scientific process. In the wood stork project, participants learn how to ask questions, perform background research, construct hypotheses, perform experiments, analyze data, draw conclusions, and formulate new hypothesis based on the results. They do this when they work together as a group to provide feedback on why some babies died and some babies lived. Their responses become the hypothesis to be tested during the next iteration of the interactive narrative.



MLA's Generic Learning Outcomes

- **Attitude and Value Change:** The “AHA” moment that often occurs after a visit to the science center can spur visitors to change their attitudes and values months after the visit. Because we simply conceptualized the project, but did not test it with actual participants, this could not be addressed by the design.

- *Activity Behavior and Progression*: “AHA” moments often lead to activity and behavior changes. Perhaps a visitor sees that the environment is destroying wildlife in her area. She might then change her voting patterns or might choose to begin to recycle after a visit to the science center. This also could not be measured by the current wood stork project.
- *Enjoyment, Inspiration, and Creativity*: This final learning outcome asks if the visitor was inspired to creatively engage in inquiry. Or more simply, did they have fun? Fun, play, creativity, and flow while also providing educational opportunity is the “holy grail” of interactive educational programs. The incorporation of gaming elements in the wood stork project, such as timed challenges, and the incorporation of life and health meters adds to the enjoyment of the wood stork project.

Instructional Design, Game Design, and Cognitive Science Research

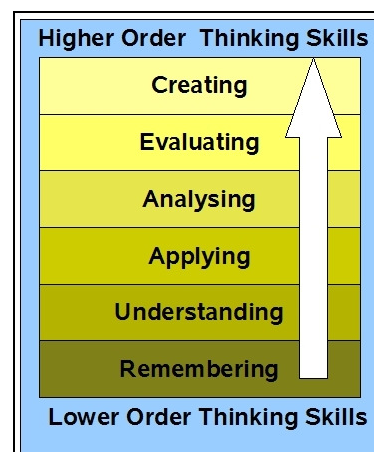
Instructional Design is the systematic process of translating general principles of learning and instruction into plans for instructional materials and learning. ID can be further defined as the entire process of analysis of learning needs and goals and the development of a delivery system to meet those needs. Modern ID encompasses elements of behaviorist, cognitive, and constructivist theories. Cognitive elements emphasize mental processes, such as memory and motivation.

Cognitive science focuses on the formation of internal knowledge structures and the relationships between concepts and causes. Effective learning results in the retention and transfer of skills across domains. New skills are formed based on prior learning and reflection is encouraged. In Bloom’s taxonomy, the creation, analysis, synthesis, and evaluation skills are primarily cognitive. This is significant because the higher order thinking skills correspond to the skills, attitudes and values, understanding, and creativity portions of the GLO model.

To facilitate deeper learning, knowledge should be presented incrementally in a step-wise fashion and should be chunked to group meaningful units of information. Meaning should not be habitually decontextualized, nor should basic skills be habitually

learned in isolation or out of context. (Gee 2003). In the wood stork project, knowledge is presented in the context of a compelling story. Baby storks are dying. The participants become surrogate parents who help the storks find food.

Skills should be presented inductively by engaging the participant progressively through the game. (Gee 2003). New knowledge should be presented on a “need-to-know” basis. Allowing the participant to experiment with novel situations and make discoveries, without always explicitly feeding them information, can facilitate deeper learning. (Gee 2003) In the wood stork project, there is a point where participants must fly to a pond that is farther away. To make that discovery, several ideas were brainstormed, including the addition of a gaggle of NPC (non-playing character) birds that suddenly fly to the far ponds and come back with fish in their beaks. When participants see this visual cue, and notice that their own ponds are empty, they get the idea to try lakes that are farther away ... without anyone explicitly telling them to do so.



Bloom's Taxonomy

Background knowledge should always be accessible to the user. Specifically, in this context, the virtual docent or the staff member could be one source of background knowledge. (Gee 2003). Furthermore, when information or assistance is given proactively to the user (instead of just being available) this should be offered “just-in-time”, when needed or when it can be applied. Again, the docent or staff member can facilitate this interaction.

As the participant progresses through the experience, reflection should be encouraged (Prensky 2000). Reflection should be presented so that participants can infuse existing with new knowledge and so that they can adjust their cognitive maps if necessary (Prensky 2000). Providing clear, achievable goals and feedback on the participant's progress is also important. In the wood stork project, reflection and positive feedback concerning progress and mastery are built into the process. Participants in the audience are able analyze problems and collaborate to formulate a hypothesis about why some babies died and some did not. Their hypothesis dictates what happens next.

Participants should also be presented with meaningful personal choices during the presentation (Ryan, Rigby 2006; Rigby 2007). This enables the participant to feel that they are the cause of the action and thus, satisfies their need for autonomy. Providing opportunities for action at any given moment during, such as providing multiple ways for them to progress through the presentation, helps the participant to retain a sense of control (Gee 2003). In the wood stork scenario, participants formulate the hypothesis and the hypothesis determines what happens next in the game.

Rewards are important. Research indicates that rewards should be offered intermittently and that they should be customized for each learner's level, effort, and growing mastery of the game (Gee 2003). The living, happy babies, full life meters, and full fish-i-cators / high health meters are rewarding. The class also discussed rewarding participants who make new discoveries. For example, the first person to fish in the far ponds might be rewarded with bonus fish. Additionally, the participant should feel comfortable with taking risks during the game. One means to do this is to be very careful about providing feedback that is negative – the user should feel safe to take risks during game play. (Ryan and Rigby 2006, Gee 2003). It is hoped that the failure of the staff member, and his or her reaction to the failure, would allow participants to feel comfortable failing as well. This is a design feature however, that would have to be tested to determine whether it is effective.

Finally, participants should think of themselves primarily as “players” and not “learners” to foster the

sense of immersion. (Prensky 2000). Altruism is an important part of the identity for many people. Providing opportunities for altruistic play are important. Making these moments clear and explicit – and providing no penalty for them allows participants to feel good about themselves and helps to them to be further immersed in the game world. (Ryan and Rigby 2006). Participants undertake a new identity as a wood stork parent and become players in the game. The entire scenario is altruistic in that participants are becoming surrogate parents so that the wood storks will survive.

Interactive Narrative Research

Standard story theory dictates that there is a protagonist, antagonist, plot, inciting incident, theme, complicating incidents and more. Initially, the script was developed using these theories. As the semester progressed however, it became apparent that a more structuralist approach was needed to develop interactive narrative.

The structuralist view divides the parts of story into discrete parts. At the highest level, narrative is divided into two parts: story and discourse. The story is WHAT happens -- wood storks are starving and they need the help the museum participants to get enough food to survive. Discourse covers a range of concepts, including HOW the story is presented. In the wood stork project, participants interact with digital imagery and are active participants in the creation of story.

Story can be further divided into characters, actions, events, and settings. Events are subdivided into Satellites and Kernels. Satellites and kernels are classifications for the events that take place in narrative. Satellites provide direction while at the same time also provide agency – a chance for people to have control over the flow of the story. Kernels are events that do not influence the flow of the story. (Chatman, 1978)

Not all events have the same degree of importance. For example, the visitor who plays the stork parent might decide to do any number of things during the two or three minutes of game play. These events might or might not influence game play and because of this, are placed in the kernels category. Important, pivotal events however, are satellites. Examples of satellite

events are when Pat (the virtual docent who plays the wood stork) asks the participants for help. The staff member helps the participants formulate the correct hypothesis during the final round so that the game can end. The manipulation of the environment (e.g. the sudden inclusion of lots of distant ponds or the dwindling supply of fish) are satellite events that are controlled by the software. However, the present design gives participants the freedom to make the wrong hypothesis and use that wrong hypothesis as the basis for the subsequent round (the making of hypothesis are satellite events because they control game play). This satisfies the participants need for autonomy.

V. SUGGESTIONS FOR FUTURE WORK

There are many suggestions for future research. The main suggestion, of course, would be to complete the conceptual design and test it using non-class participants. There are several other suggestions that can be incorporated into the script process.

Using the Wizard of Oz design process freed constraints, but pairing it with a structured project management process can reduce frustration. One simple way to do this would be to establish a rough timeline. If the goal is to explore the problem space and have a well-researched conceptualized design, decide when the script should be written, the environmental design should be finalized and so forth.

Consider using a standardized method for collaboration. Entertainment-education has a well-defined process that could be easily adapted for this or similar projects. *Writing and Producing Radio Dramas* and *Writing and Producing for Television and Film* (De Fossard, 2005) provide a step-by-step field-tested method for collaboration that incorporates the educational component.

Early in the process, determine the audience, dimensions of the space, and overarching purpose or message of the story. A basic topic and educational objectives should also be decided and should be mapped to public school objectives to help secure funding.

Having established the basic educational and topical parameters, consider having the script team write the initial script. Then, use an interdisciplinary team to review the script from different perspectives. The script should, at minimum be reviewed for: educational content, learning effectiveness, audio elements, video elements, network elements, audience impact, docent impact, and environmental elements. After the script is revised, it should be retested again using the same interdisciplinary team. Questions to ask during reviews of the script can include:

- Is dialogue simple and kept to a minimum?
- How can we measure outcomes to include the ones addressed in MLA's GLO guidelines?
- How can concepts be shown without words?
- How many ways can the educational content be taught? How can we get people to "discover" the lessons for themselves?
- Are all of the participants involved with learning as well as teaching?
- Are there opportunities for talking, feedback, and collaboration among participants?
- Is sound used appropriately? In what way can sound be used to not only add realism, but to psychologically lead people into the next scene? Are there ways to reinforce the educational content using sound (aside from dialogue?)
- Are swimmers, waders, and divers adequately incorporated? (Divers are participants who want to immerse themselves deeply in the narrative, take risks, and be in the center of the action. Waders prefer to watch and possibly perform a peripheral activity. Swimmers are a combination of both.) Are people with disabilities going to be able to dive, or will they be relegated to a wader role?

Structurally divide the script into beats and events. After one of two drafts, identify the satellites and kernels. For the kernels and satellites, list the different types of actions that a participant can take. Notecards might be a good way to facilitate this process since they can be rearranged easily.

Use the notecards to chart the story and look at different paths. Consider having more than one “right” ending.

Instead of using standard script format, consider creating a new format that includes character and scene treatment, a supporting media matrix (which would list the sounds, video, environmental props and more that are required for the scenes), and educational goals. Before each scene, include the following: target audience, duration, place, purpose/message, measurable learning objective, feedback, overall emotional tone, theme, main character, and plot. Map the educational contents to a local or nationally recognized standard if possible.

Because museum and science center learning focuses on higher order skills on Bloom’s taxonomy, use pre-work and post work to focus on the lower order skills and to also reinforce the acquisition on higher order skills.

Start a glossary of terms and a list of action conventions (e.g. to get help, press the button on the wii tongs) so that they are not violated. Make sure that the conventions are consistent within the realm of the project.

VI. REFERENCES

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APPENDIX A: Script Draft One (written by Steve Tome, edited by Karen Chu, Dave Moran, Chantel Brathwaite)

SCRIPT DRAFT # 1

INT. VISITORS ENTER A ROOM WITH DARK COLORED WALLS.
THEY ARE GREETED BY A PARK RANGER.

PARK RANGER 1

Well hello everyone. Looks like you're going to be my wood storks for today. Now if you've never been a wood stork before, go ahead and raise your hand.

The audience raises their hands.

PARK RANGER 1

Okay, looks like most of you know how to take instructions and that's great. For those of you who didn't. I guess we'll just assume you've been wood storks before. In any case, we'll just go through a few things with everyone before we get started. I guess I should introduce myself. I'm (insert ranger 1 name here) and it's my job to look over these parts here.

There's a little bit of information you should know before we get started. Hmm (looking around). It's kind of hard to get into character without some sort of setting. (thinks for a moment) Ah, I know! (Park ranger waves his hand and each of the four walls reflect marshy swampland, which is stork habitat. Sounds of birds and water fill the air.)

That's better. I figure we should let you all get into character. (Wood storks appear on all four walls in the habitat, and a giant stork appears behind the presenter and gets bigger and bigger throughout the presentation.) Now the wood stork is a wading bird in the stork family, Ciconiidae. Now adults can get up to anywhere from 33 to 45 inches tall and 58 to 71 inches at full wingspan. Show me your wings! (Encourages the audience to stretch out their wings and to move around the room.) That's it!

They're also a subtropical and tropical species which means they breed in many parts of South America,

APPENDIX A: Script Draft One (written by Steve Tome, edited by Karen Chu, Dave Moran, Chantel Brathwaite)

Central America, and the Caribbean, and also the only storks that breed in North America. (Show maps of these places on all of the walls, then they fade. The stork becomes normal sized. The marshland water starts to fill with fish.)

Wood storks typically feed in areas that can concentrate lots of fish because of the relatively low water levels, such as wetlands and paddy fields. Their diets usually consist of fish, frogs, large insects, and sometimes rodents and lizards. It all makes for quite a hearty meal. I hope most of you wood storks are hungry! Before we start, let's get something to eat. (Ranger gets a volunteer and shows them how to get food and "eat" it - when the person touches the wall, the food disappears. He then encourages the others to go to the different walls. As the food starts to disappear, the other ranger's voice is heard coming from another room.)

PARK RANGER 2

(from a distance, calls the name of park ranger #1).
Gather the storks, where is everybody?

PARK RANGER 1

Hello? Hello? Can anyone tell me where that voice is coming from? (Green arrows appear on the floor along with baby storks who are walking along the wall and into the next room. The storks and ranger follow it into the next room.)

PARK RANGER 2

Oh, there you are! Hey there (insert ranger 1 name here).

PARK RANGER 1

Oh hi (insert ranger 2 name here)! Hey, I'm glad you're here.

PARK RANGER 2

Oh? And why's that? And no I'm not covering your shift again so you can go sleep.

APPENDIX A: Script Draft One (written by Steve Tome, edited by Karen Chu, Dave Moran, Chantel Brathwaite)

PARK RANGER 1

Oh no no. It's not that. Well, not this time at least..... hey I want you to meet all our guests here today.

PARK RANGER 2

Wow, great crowd. Hi everyone!!
(to Park Ranger 1)
So how'd you manage to get them all here? Charming personality?

PARK RANGER 1

Well, no..... I mean..... Wait, that's not what I meant, I mean....

PARK RANGER 2

You want me to teach these folks how to act like wood storks...

PARK RANGER 1

Actually, yes!

PARK RANGER 2

Well of course!! I'll be glad to teach you guys. Anything to help out Ranger Smoothie Magoo here...

PARK RANGER 1

Please stop being mean to me.....
(Loud sounds of baby storks crying for food appear in the background.) What's that?

PARK RANGER 2

Baby storks! I wonder what's wrong? Why are they making so much noise? But I can't see them. (The noise is louder on one side of the room and physical materials for nests appear on the floor. The first guest who goes to the area and touches the wall causes a huge note to appear on the wall. The park ranger notices this and gets the attention of the other storks.) What is this? (Note says: "We are on Chokoloskee Island. We are hungry. Please help.")

PARK RANGER 1

APPENDIX A: Script Draft One (written by Steve Tome, edited by Karen Chu, Dave Moran, Chantel Brathwaite)

We've got to get there right away. But how will we get there? (Water appears on every wall with a bit of land around the participants. The island looks quite far away in the distance and birds are flying overhead. The park ranger encourages the group to flap their wings. As they do that, the scenes on the wall change so that there is a birds eye view. As the group flaps, they go higher, to land, they flap less. Soon they are on the island and see a whole island of baby storks. Fish and other food appears.) How do we feed them? (Visitors remember to go to the wall and can grab the fish and slide it next to the baby bird.)

APPENDIX B: Wood Stork Beat/Event Sheet

Wood Stork Beat/Event Sheet

1. Introduction (written in class - complete)

Purpose: Welcome and seat audience, introduce information about the visiting "wood storks"

Guests enter the room for the first time.

Somehow must be directed where to sit.

Describe the background (dark room etc.)

Opening "National Geographic" room setup.

2. Select volunteers (written in class - complete)

Purpose: Select volunteers, introduce docent and "pat"

Selecting the volunteers

Introduction of "Pat"

PAT is controlled by DOCENT and is a virtual character/bird on the wall

3. Fishing Pond (written in class - complete)

Purpose: Teach the skills of fishing, familiarize them with life and health meters. Science teaching - foods that wood storks eat.

Lining guests up at the fishing pond. Each gets tongs.

Docent teaches them to fish.

STAFF is the person in the room; STAFF teaches them how to fish, with comments by PAT

STAFF (or Pat) teaches about the life and health meters.

4. Back to the nest

Purpose: Teach the skills of flying, body movement, and the concept of the avatar on the ground.

Tongs around neck, moving the avatar back.

Avatar goes back to nest.

5. Feeding the babies (complete)

Purpose: Teach feeding, talk about life and health meters again.

STAFF teaches them how to feed the baby, complete with regurgitating noises.

"Pat" can do this too.

PAT comments, and explains the health meter (let's not do two meters, for simplicity's sake.)

The LEDs on the beak device represent stomach full/empty; the health meter (1 to 4 chick icons, with the weakest of them fading away)

Life and health meters explanation.

6. Introduction to scenario

"Pat" - talks of the urgency of needing to feed the babies.

Explains what they need to do.

Introduction, more than one fishing hole this time.

STAFF starts towards the fishing hole with them?

7. Game play begins - 2 minute clock.

STAFF helps the guests as necessary.

Pat calls encouragement out.

Babies noises get louder as they begin to die. If they die, they

APPENDIX B: Wood Stork Beat/Event Sheet

can disappear from the nest.

And from the wall-mounted "Life" meter icons.

8. Game play ends

Clock runs out.

PAT claps for everyone that played.

Questions include, what happened? Why do you think that happened?

What actually happened was that two of the birds were fishing from holes too far away from the babies, thus spending too much time flying, and so the babies died due to lack of food. This is what we hope that they hypothesize.

9. "Pat" and Docent start to facilitate hypothesis session.

10. Hypothesis session leads to setup of the next game

(We hope that guests suggest the idea that if you are not having much luck in one pond, it's time to try another one rather than wasting your time in the fished-out pond.)

APPENDIX C: Script Draft Two (with class changes incorporated)

SCRIPT DRAFT #2

FADE IN:

SCENE 1: TRAINING

S1

Before the group enters the room, the **STAFF** makes note of the different participants, visually checking to see if the participants that have special needs (if any) are present. (If the group has made arrangements prior to coming to the presentation, information about those participants should have been forwarded to the team in advance.)

Museum visitors enter as a group after being held outside. The **STAFF** welcomes them and shows them where to sit then goes to side of the room. The group is seated on moveable chairs so that everyone is able to see and participate and so that people who are in wheel chairs can be integrated with the audience. Walls have static scenery with pictures of wood storks in their natural habitat. After everyone is settled, the light is gradually dimmed until it goes dark.

The sounds of the wood stork's natural habitat fill the room as ambient noise, softer then gradually growing louder. Suddenly the images begin to move and we see filmed images of a lone wood stork doing the types of things that the visitors will do later. For about 30 seconds we see baby wood storks in their nests chirping, then adult wood storks catching fish, then flying and bringing the fish back to the babies. Only one baby is fed and it grows quiet, the other baby continues to cry. The stork looks briefly at the baby then heads out to get more food. As the stork flies out we see it join two other storks who are headed away, towards the lakes. As that scene gradually fades, the nest in the middle of the floor grows larger (as if the audience is approaching it) and we see that it is filled with baby storks. The babies are not happy, they are chirping loudly, insistently. The two side screens go dark and **PAT** appears.

PAT is a large wood stork, made to look older, wiser. **PAT** looks somewhat real, but is clearly illustrated as different from the other storks, a bit less real. **PAT** is next to a fishing hole that looks somewhat dry. **PAT** is pacing around the fishing hole and appears not to notice the audience at first. **PAT** looks up startled, then a bit sad. **PAT's** words are

APPENDIX C: Script Draft Two (with class changes incorporated)

close-captioned on the screen.

S2

PAT

Hi everyone. My name is Pat and I'm a woodstork. And I'm the proud parent of four little ones. We wood stork parents have a hard job, gathering enough food to keep their babies alive.

PAT stops pacing, stands, and looks at the nest and the nest is subtly illuminated. Chirping sounds become a bit louder, and in the nest, one of the babies slumps forward and recovers, but just barely. The nest goes back to normal lighting as **PAT** speaks again.

PAT

Will you help us? We need you to be parents to these birds. Here's a friend to show you how.

The main room lights begin to come up as the **STAFF** walks in front of the audience. The babies chirping becomes a bit softer, but can still be distinctly heard.

STAFF

Well hi everyone. Welcome to the Everglades. We wish that we could welcome you under more favorable circumstances. (STAFF and Pat exchange a look). I see that you've met Pat. (Pat lifts up a wing as if to say "hello"). (Note: This interaction helps the audience to feel that Pat is more connected to the event.)

STAFF turns back to the audience.

STAFF

How many of you have never been a wood stork?

A few people raise their hands.

S3

STAFF

(Branch 1: If no one raises their hands)
I guess most of you have never been wood storks!

(Branch 2: If most raise their hands, perhaps they've been through this before ...)
Great, we've got lots of experts!

Would you like to be our wood storks? (Picks four people.)

The sounds of water fill the room, becoming even

APPENDIX C: Script Draft Two (with class changes incorporated)

louder than the birds. The floor illuminates with four fishing spots and **STAFF** guides each to their fishing holes and gives each a set of "wi tongs" which will serve as beaks that hang around their necks. On the screens text appears: "Parents get fish for their babies" for the benefit of deaf guests. **STAFF** moves to the fishing hole.

STAFF

We need to fish ... I wonder if there are any fish in the fishing hole? Wood storks fish by feel, not by sight. (On the screen text appears: "Storks fish by feel, not by sight.") Watch me ...

STAFF extends tongs over the fishing hole and a shadow of a beak appears over it. As the **STAFF** does this, **Pat** does too to reinforce what is happening. The tongs make noise and the water splashes. **STAFF** mimes vibrations.

S4

STAFF

I've got a fish!

One LED on the beak lights up. **Pat** stops fishing and looks up, excited.

PAT

Alright!! Great!! Just make sure you look at your life meter! Each one means one of your babies will eat today!

The tong makes noise again, water splashes, and the **STAFF** continues to mime the vibration.

STAFF

And two, three ... four! My stomach is full!

S5

Turns to the visitors.

STAFF

Are there any fish in your fishing hole?

Participants move to fish. As they catch the fish, **Pat** ad libs encouragement guests. The **STAFF** helps people who have difficulty.

S6

STAFF

Let's fly back to the nest. (Puts arms out at the side and begins to flap). Look down in front you ... there you are! (Avatar appears in front of the guests. As they flap their arms, the avatar flaps

APPENDIX C: Script Draft Two (with class changes incorporated)

its arms.)

The participants starts flapping their arms and can experiment with stopping and starting flapping. Each flap moves the avatar 6 inches towards the nests. (Text appears on screen: "Flap your wings to fly.") Guest's bird silhouettes appear and start to fly towards their nests. As the participants get the hang of it, the bird chirping noises grow louder.

PAT

Uh oh! Looks like your babies are hungry. Hurry up parents!!

STAFF flaps faster and turns to encourage the others. Soon, they reach the nest. The **STAFF** reaches first, then leans over nest and touches a very lethargic baby with tongs. The **STAFF** makes wretching noises as the baby is fed it perks up and makes says "mmm mmm good".

S7

PAT

The babies can't chew. The parents chew and swallow the food them, then fly back to the nest and throw it up so the babies can eat it.

As **PAT** speaks the screen says: "Parents eat the fish, then throw it up to feed the babies." **PAT** waits for the audience reaction (probably "eeeeeeewwww").

STAFF

Well, no one said it was easy to raise kids.

STAFF tends to the babies until the audience settles down. Baby noises get louder.

PAT

Okay parents, time to feed your babies. They're hungry.

S8

STAFF and participants feed the remaining babies and the LED's go dark with each feeding. The babies settle down but not for long. Suddenly, an LED stop watch appears at the top of each screen. Only 2 minutes are left.

PAT

(All of the babies start crying again). Hurry, the babies need to eat before they go to bed.

Stop watch begins and the **STAFF** encourages the participants to fly towards the fishing hole, eat,

APPENDIX C: Script Draft Two (with class changes incorporated)

and then fly back. Each participant completes this. If they do this quickly enough, then all of the babies survive. If not, one dies.

At the end of the training session, two of the participants and the **STAFF** has one or two babies that have died. The dead baby grows still, then disappears from the nest. **STAFF** addresses each participant.

STAFF

How'd you do?

(When one person mentions that their baby died, **STAFF** says, "one of my babies died too." This will help the participants not be too traumatized by the "death." Faces the audience and the participants.)

STAFF

Why do you think our babies died?

(If no one answers, direct the question to specific members of the audience. They should give different reasons. The reasons should appear on the screens as they make them. The reason of course, will be that there were not enough fish. But the next question is why do you think there is not enough fish? And what can we do about it? The next part is to narrow it down to one of three different hypothesis, any of which can be played out in the next round. The three hypothesis appear on the screen behind them. People will then vote on which hypothesis wins using the voting buttons. (Possible scenarios: Look for more fish [more fishing holes], Look for other food sources [add more different types of foods], Flyer faster [add a bit more speed]).

END SCENE

APPENDIX D: Script Draft Final Scene

SCRIPT SCENARIO #3

S1: SELECT NEW PARTICIPANTS

The group is sitting together in the exhibit room. They have formulated a hypothesis and are now ready to test it. The walls have static scenery from the last "game." There is no sound.

STAFF

For this next game, we are going to need everyone to watch carefully (points to the people in the audience). We are going to try our guess, our hypothesis, and watch what happens and whether our idea works. Now, who would like to be the next parents?

STAFF picks four more participants and brings them to the front.

PAT

Oh my! They look like they are going to be fine parents! Remember, our goal is to keep these babies alive. The last time, we said that the reason some babies died is because (insert the hypothesis here) so let's try again. Take your places!

STAFF shows each participant their places and readies the wi-beaks.

PAT

Thank you for your help parents. Good luck!

S2: GAMEPLAY

Transition sounds now fill the room signaling that it is time for the new game to start. The screens change to the new scenery, which has many different lakes of varying distances from the nest. The close lakes are clearly close - the far lakes are clearly far - there are no lakes in the middle. The fishicator and life meters are reset and a timer appears on the screen. Numbers appear on the screen: 5, 4, 3, 2, 1, GO!

There is very little dialog now that the participants are familiar with how to play. **STAFF** helps those who are having trouble and both **STAFF** and **PAT** provide encouragement. When one minute is left on the clock, a buzzer sounds and the ticking of the clock is heard, faint at first, then gradually increasing in volume. 10 seconds before gameplay ends the sound of the ticking is very loud; a different

APPENDIX C: Script Draft Two (with class changes incorporated)

buzzer sounds when gameplay is over.

S3: HYPOTHESIS TESTING

STAFF

Great job guys! (Gives each person a high five and **PAT** lifts a wing). Let's give them a hand! (Audience claps). Now, let's check the babies.

PAT

(**PAT** gives a summary of how each person did.) Let's check our hypothesis and look at the data. What was our hypothesis?

An audience member restates the hypothesis.

PAT

Let's take a look at the fishicator and the babies. What do you see?

Audience members see that even with a full fascinator, the babies did not always survive. The screen also shows other information, such as which lakes the babies were fed from.

PAT

Hmmm ... Some of the babies died. Why is that? What is different between the babies who survived and the babies who didn't survive?

Audience members look at the data and start comparing notes. They talk among themselves as well. When the correct hypothesis is reached, **STAFF** and **PAT** look at one another.

PAT

Fishing close by and far away? I believe that this might work ... Let's try it!

NOTE: The last game is set up to make it easy for the participants to win now that the correct hypothesis has been reached. The lakes are "stocked" with fish both close and far. The last game allows participants to confirm the correct hypothesis and brings gameplay to a satisfying conclusion.