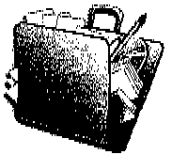
The Instructional Design Portfolio



"Life of a Star" museum exhibit

By Jill Hughes

The idea for the interactive program, "Life of a Star" arose in the spring of 2003 when the Sciencenter, a science museum in Ithaca, New York, feeling that the science museum needed more astronomy-type exhibits for their visitors and recognizing that they had an untapped resource at Cornell University's Department of Astronomy submitted a grant proposal for funding from the NASA Education & Public Outreach (E/PO) program.

On receipt of the funds from the NASA E/PO program, a group of individuals headed up by Charlie Trautmann, Sciencenter Executive Director came together to discuss the proposed exhibit project. The plan called for a 150 square foot exhibit titled "Life of a Star" that would include hands-on interactivity, photographic posters of the birth and death of a star and two computer kiosks that would display a Flash-based program for children to interact with. The exhibit was to demonstrate the life cycle of a star and how astronomers study stars through wavelengths (x-ray, visible light, infrared and radio). Jill Hughes, former Computer Clubhouse Coordinator at the Sciencenter and a student in Lehigh University's Instructional Design graduate program (and author of this article), was chosen to be project manager for the development of the computer program, as well as to provide the instructional design. Lynn Bacigalupo and David Goldfeder were brought onto the team as Flash developers. Marina Romanova, from Cornell University's Department of Astronomy, was the team's subject matter expert.

The Sciencenter volunteer staff surveyed 50 visitors about their current knowledge of the life cycle of a star, what they would like to learn about the topic and what they would like to see and do in the proposed museum exhibit. This needs analysis told us that museum visitors had very little knowledge about the way astronomers study stars through different wavelengths, and that they would like to see some interactive multimedia incorporated into a future exhibit. 94% of the surveyed visitors said they would be very interested in seeing an exhibit on the Life of a Star.

Based on the response of the Sciencenter visitors, we determined that the focal point of the exhibit would be a Flash-based program that allowed visitors to experience an animated representation of the life cycle of a star. Our major technical decision point at this time was how the interactive program was going to be developed. It had to be compatible with the Web and also stand alone on a computer without Web access. One of the biggest obstacles I faced was my own lack of experience with using Flash, but I knew that Flash had to be the development tool.

Program development started in December 2003 with gathering the content from Marina Romanova and NASA sponsored web sites, surveying the resources that were already out there on our subject, studying the previously conducted gap analysis of our target audience and the needs analysis, and also early storyboarding of the first part of the project. Once the content was gathered from Romanova, I rewrote it on a level that the intended audience — 3rd to 5th graders — would be able to understand. This involved taking pages and pages of text and megabytes of images, including Romanova's personal knowledge on the subject and information from NASA web sites, and using them to develop concepts that children could relate to. The instructional design focused largely on brainstorming ways to get across the scientific concepts in an engaging way. The exhibit had to be entertaining and not too technical, so I chose to write it almost as if it were a children's book with short segments of text and lots of connection between new concepts and concepts the visitors might already be familiar with.

After all the content was gathered, the committee decided on 3 sections for the program: Life of a Star, How Astronomers Study Stars, and Ask an Astronomer. These sections were determined by the areas that the Sciencenter visitors surveyed earlier were most interested in, including the questions that they asked about stars. We further decided to break up the three sections navigationally, so that the audience could go to any of the sections when they wanted to without having to wait through a continuous program. We placed a main navigation bar at the top of every screen so that users could go from one section to another at any point. We added sub-navigation bars for each section.

Module 1: Life of a Star

The committee decided that the most interactive part of the program should be the first module, since experience told us that most of our third- and fourth-grade visitors were not likely to sit through the entire program. To relate the life cycle of a star to things that children are familiar with already, I had decided that the content should be presented in a science fiction format. The audience would see animations depicting the life cycle of a star — birth, adulthood and death — through a spaceship window.

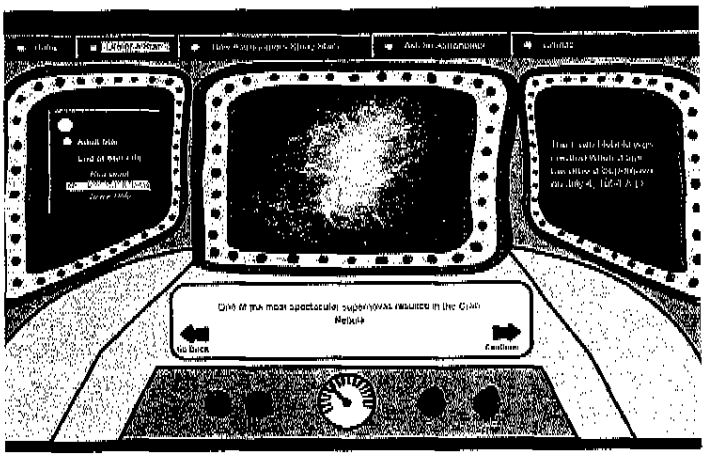
The level of interactivity was a key point in our design thinking. We determined that things should be moving in almost every screen to keep the visitors' attention. We also added extra buttons on the spaceship dashboard so that the audience could push a button to make the screen shake or push another one to restart that slide. We envisioned a simple video game-type interaction in this module. For example, on one screen everything (including aliens) is getting sucked into a black hole, and the program user has to push a red button on the spaceship dashboard quickly to avoid getting sucked in!

As I had determined already, the text had to be kept short and many of the concepts related to the life of a star were related back to the life cycle of humans or to places that visitors might know about. For example, in one screen the density of a Neutron Star was explained by comparing it to the length of a line of cars stretching from Boston to Washington D.C. The line of cars was depicted on the screen visually as a concrete metaphor that would make sense to the young audience.

We assumed prior to developing the program that most of the museum's visitors would not spend more than five minutes at the kiosk, and we knew that some were too young to be able to read. Therefore an audio narration was recorded redundant to any text that appears on the screen. We expected this narration to serve additionally as an aid for anyone who was visually handicapped. We used sound effects and different voices throughout the program. In *Module 1: Life of a Star*, a child's voice was chosen for the peer guide through the program since our primary audience would be children. When we were recording the boy's voice, a humming sound got picked up from the microphone; on deliberation and using some creative license, we kept the humming in the program because it sounded as though it were background noise from the spaceship!

Module 2: How Astronomers Study Stars

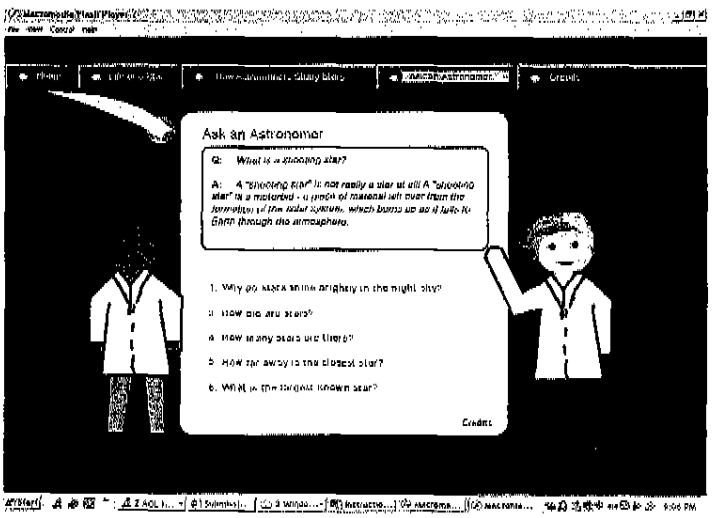
Since the visitors in our survey mentioned that they would like to know more about how telescopes are used to study space, the exhibit incorporated "How Astronomers Study Stars." This part of the exhibit was created to make it appear as if an astronomer was instructing an audience at a NASA facility. At the end of the module, we included a game (the brainchild of Romanova) that learners can play to see what the Crab Nebula would look like through different

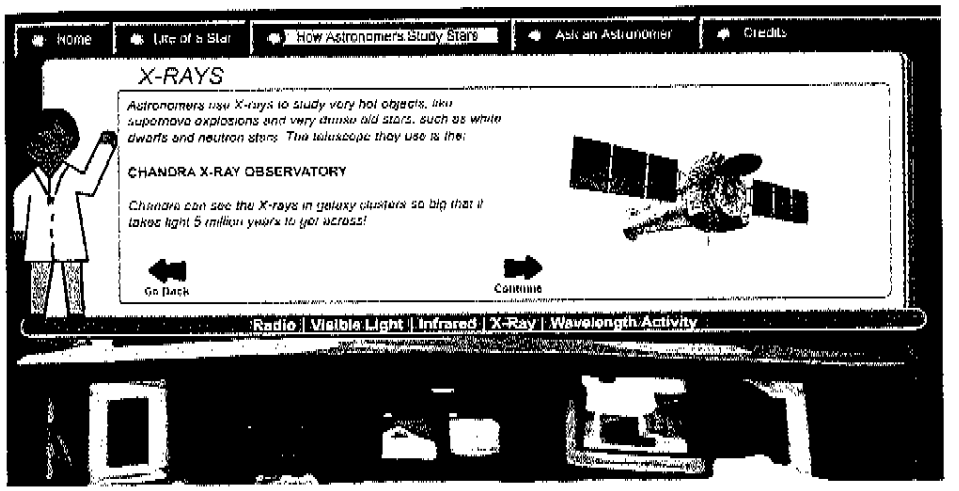


wavelengths. The module includes many engaging images of the Crab Nebula, and allows viewers to click the checkbox next to the name of a wavelength in order to see one of the images. But if viewers click multiple checkboxes, the images overlap and viewers can see even more aspects of the Crab Nebula. This was a difficult part to program because it had to be scientifically accuracy yet still be engaging to the learners, and the images were hard to edit in Photoshop to get the realistic feel of what astronomers would see if they overlapped the views for various wavelengths.

Module 3: Ask an Astronomer

The third part of the exhibit is a list of questions like "What is the largest star?" and "How many stars are there?" These are the questions that visitors said they would like answered during our survey. When a visitor clicks on a question, animated astronomer characters in white jackets provide the answers. To add some diversity we incorporated a male astronomer in some sections and a female character in the How Astronomers Study Stars section. We used two different voices (female and male) for recording the answers to questions. And for some added fun we designed this segment so that learners may spot a shooting star in the background.





Timeline

The exhibit took three months of instructional design and planning and six months of actual Flash development. There were a lot of versions to be created to make sure that the content was accurate and suitable for the museum. It was a huge undertaking, but manageable. I had to utilize a lot of resources to create this program, including neighbor kids for narration and a test audience, and other students for development. Also, since this is scientific material and it was developed through a grant, citations had to be added for all images and content that were used. A credits page was added at the end to list all of the citations and all the names of those who had contributed. By June 2004, the interactive program was approved by the Sciencenter staff and Cornell University subject matter experts.

Evaluation

Formative evaluation was conducted throughout the development of this project. Bacigalupo developed a few screens of each of the 3 modules for an evaluation conducted by myself and Trautmann at the Sciencenter with the intended audience, elementary school aged visitors to the Sciencenter. The eight participants in the evaluation welcomed the program with great enthusiasm. We asked them to rate the following aspects of the exhibit on a scale of 1 to 10 (with 10 being the highest): ease of use, navigation, screen design, information presentation, media integration, aesthetics and overall functionality. The average scores for the evaluation categories are shown in Table 1.

Ease of Use	8.4	**Media Integration**	9
Navigation	8.5	**Aesthetics**	9
Screen Design	9.2	**Overall Functionality**	9.1
Information Presentation	9.6		

Table 1. Average scores by evaluation category.

There were minor suggestions made to the development team, such as the need for larger text and images. We implemented those changes in the next phase of development. The evaluation of the final prototype was conducted by Trautmann at the museum with museum staff, subject matter experts and a few selected visitors. After minor content revisions to ensure we had accurately reflected the life cycle of a star and how astronomers study stars, the program was handed over to the Sciencenter for any further evaluation.

The "Life of a Star" exhibit program was recently recognized by AECT's Design and Development division a 2004 recipient of the Nova Southeastern Outstanding Practice in Instructional Design by a Graduate Student award.

Where is it now?

Further evaluation done by the Sciencenter found that the program was not engaging enough to use as a whole, so only the most engaging parts like Module 1 with the spaceship will be used on the museum floor. The challenge is that so many children are mesmerized by video games and more interactive programs that simple slide shows, no matter how graphical they are, do not keep the attention of that generation.

Since the conception of the program, more grant money has been acquired, so the Sciencenter has decided to expand the original exhibit plan to include more about "How Astronomers Study Stars." The exhibit will now be approximately 300 square feet and will include images of Mars in different wavelengths, and more hands-on interactivity such as an infrared camera. The exhibit will be open in late 2005 at the Sciencenter in Ithaca, New York and can be viewed by anyone who visits the museum. The "Life of a Star" interactive program will be available to other museums and schools by request. Since so many images (including Quicktime movies) and animations were used, the program is too large to be placed on the Web as was originally intended. Therefore it will be distributed via CDROM.

Jill Hughes, a recent graduate from Lehigh University's Masters program in Instructional Design & Development, is now employed in Piscataway, NJ as an e-learning training consultant for Johnson & Johnson Health Care Systems, Inc. In her spare time, she acts as project manager for her web design business, Nuevo Red Design (www.nuevoweb.com). Jill also has a B.S. in Organizational Communication, Learning & Design (OCL&D) from Ithaca College's Park School of Communications. Her portfolio web site can be found at: www.jillhughes.com