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Educational Report for 5303 Learning with Computers in K – 12 Classrooms Project

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Abstract

The project “Planets of Our Solar System” was developed to present the planetary bodies of our solar system to 5th and 6th grade children. The presentation medium is primarily via the World Wide Web (after here referred to as the Web) with some multimedia content. The different methods of presentation were chosen to be interesting to children and to keep their attention. The Educational Technology standards used in the creation of this Web site are design, development and utilization. An educational reflection upon the project explaining how this project increased my knowledge and skill is included.

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Project Description

Typically children are impressed by extremes – the largest, the fastest, the hottest, the coldest, etc. Our solar system is an extreme place. If exposed to interesting science facts early enough in school, then more girls and boys might see the sciences as possible career paths and be more likely to pursue them. To promote this idea, a lesson about the planets of our solar system was created. The audience for this lesson is 5th and 6th grade science students. The purpose of the lesson is to help the students understand some of the major differences in the planets and the order in which they orbit the Sun. Also, ideally, the students will develop a life-long curiosity in astronomy and other sciences.

In order to make it as interesting as possible, a variety of presentation methods and learning styles were used. The project included preexisting and designer created resources. The existing resources included vast image and video galleries made freely available (for non-profit educational purposes) through NASA, a series of astronomy podcasts (from http://www.astronomycast.com) that focus on the planets, and 'fun facts' about each planet that show what makes each one unique. The facts about each planet were sourced from several places documented in the Material List at the end of the Final Project Lesson Plan.

Of the resources created for the project, the primary was a Web site to offer a central location and presentation area for the rest. Also created were a Wiki for the students' collaborative work and an online quiz comprising one part of the evaluation.

Program Identification

This project was chosen for inclusion in the portfolio on the basis that it is a good demonstration of development, design, and utilization. The development of this project encompasses several elements. The first notable element is the background of the Web site. It is a repurposing of Google Sky content. Google Sky (http://www.google.com/sky/) is a free service from Google that allows the user to search, pan, and zoom the night sky using images from "some of the largest ground- and space-based astronomical surveys. " (Google Sky, 2009) The overlay map of the historical constellations, from the collection of David Rumsey, was originally drawn and printed in 1792 by Giovanni Cassini.

Another notable developmental element is the presentation scroll that is the focus and center canvas of the lesson. The solar system image on the scroll was taken from the NASA For Educators Web site (http://www.nasa.gov/audience/foreducators/) and reworked in Photoshop so as to fit the scroll and to remove unwanted elements. The original can be viewed at http://solarsystem.nasa.gov/planets/. The large and the small scroll images were created in Photoshop for this project.

The presentation scroll can be 'rolled up' out of the way, (via a JavaScript) so that the user can interact with the background map. To keep the lesson in the center, all of the content is linked via the scroll area. Each planet on the scroll is a link that pops up a presentation window with an image, the podcast player, the fun facts, and links to more information.

Other key developmental elements are the engaging presentation methods of the pop up windows, the embedded audio player, and all of the extra materials available through links to movie and image galleries.

The standard of design is shown through the flexibleness of the lesson. The instructor can follow the linear progression through the planets from the innermost out to the most distant rocky body Pluto, even though it is no longer considered a planet. The option for nonlinear progress is also easily available. The instructor can start with any planet and follow his or her own pattern.

The duration of the lesson was designed to be accommodating. The material for each planet will take about an hour. The podcasts are approximately 30 minutes each and the rest of the material for each planet can take anywhere from 15 to 30 minutes to cover. The instructor has the option to break up the lessons in any manner they see as appropriate.

As written, this lesson was designed to take place over the course of five days occupying approximately two hours per day. Each day two planets would be covered. There are audio, visual, and print components to each part of the lesson.

The activities for this lesson are both active and passive. Before the lesson begins, the educator should divide the class into nine groups of students (one for each planet). Each group would be responsible for taking notes on its planet and entering the information into the Wiki at the end of the lesson. This will depend on the availability of computers in the classroom. The educator will need to decide how this happens based on his or her classroom situation.

After listening to the podcast, the educator should lead the students in a short discussion about the planet, review points from the podcast, view the added material linked from the Web site, and review what they've read in the handouts. There were transcripts of the podcasts available on the linked page in the materials section to aid the educator in preparing to guide the short discussion.

Additional time should be planned for each group to compile its own planet's reference section in the accompanying Wiki, a process that might take several weeks of collaborative work time. After which, each group should prepare a short, 10 to 15 minute presentation of their work for the rest of the class and a short verbal quiz.

This project also shows the standard of utilization. In order to adapt the existing content to the audience, several changes were made. The background was simplified by hiding many distracting elements of the standard Google Sky Web page, such as the top frame that includes the search and print fields and also the bottom frame of quick links to other features. Through the JavaScript code the defaults for the page were changed to load the historical map overlay, set the zoom, and center the location on the constellation Leo.

Other strategies of media utilization and implementation to tailor the content to the audience include the conversion of metric units into standard, the simplification the scientific language, and alteration of much of the original JavaScript code used by Google.

Educational Reflection

The difficulties in developing this project were two-fold and resulted in new learning experiences; there was the creation of the Web site and the development of the lesson.

The creation of the Web site required the creation of new content and the alteration of existing, professionally developed content such as images, Cascading Style Sheets, HTML code and JavaScript code. Much of the creation involved hand-coding HTML to make the presentation framework, creating original images, and researching and writing the content for each planet and the quiz. From this, my skills at HTML, Photoshop, research, and writing were improved.

For the alteration of existing material, there was much more to do. There were many JavaScripts that required alteration in order to fit the lesson's objectives: the code for the Google Sky API (eleven individual scripts had to be checked or altered), the code to show and hide the scroll, the code to pop-out the planet presentation window — a JQuery script called ThickBox (Lindley, 2007), and code to embed the podcast player. From these tasks, I learned a lot more about JavaScript and how to embed a Flash audio player that can be supported across several Web browsers. It was also the first time I had used any JQuery tools; I found them easy to set up after viewing a few tutorials and de-constructing existing Web sites.

The final lesson learned from building the Web site relates to establishing a cut-off for support of old technology; this time it was the problem of Portable Network Graphics files (PNGs) in Internet Explorer 6 (IE 6). Many of the images used on the home page were saved as PNGs; it is a high quality image with crisp

transparencies. However, IE 6 does not display the transparency in PNG images; it displays the color gray where the transparency should be (PNG Files Do Not, 2007). This problem could have been resolved by reproducing each PNG as a Graphics Interchange Format (GIF) file and using an alternate Cascading Style Sheet (CSS) to trigger the switch to the lower quality GIF images for IE 6. The decision was made to not solve this problem since only 13.6 percent of Internet users still use IE 6 according to the W3 Schools Web site (2009). The IE 6 problem does not affect the usability of the Web site, only the attractiveness of the home page.

The other challenge was developing the lesson. I have some experience instructing adults, but none with the K – 12 demographic. After stating the initial goal of attracting the students to science, I had to find and use different presentation methods in order to interest everyone – not only visual learners but auditory as well. Also, there is a mix of science facts, history, and literature references. These highlights might get the attention of students not necessarily interested in pursuing science directly, but who can appreciate the role it has played in history and literature.

Since there was so much material available, the time for each lesson was suggested but left flexible, so that each instructor could have the option to show more or less depending on interest, time available, etc. Rigid lesson plans can become unusable if not accommodating to many situations. Once again in order to address as many types of learners as possible, it seemed best to use a combination of behaviorist and constructivist teaching methods. Many students, especially the

auditory learners, will retain a lot of information from listening to the podcast – in this case a dialog between two knowledgeable subject matter experts. Even though the podcasts are interesting, it is still passive listening. Constructivist learning tools, like the Wiki, are valuable for the student that learns best in project-based situations. Besides the podcasts and the Wiki, there are student led presentations over their group Wiki contributions which also help the student develop organizational and public speaking skills.

In order to have enriching lessons it is not only necessary to present factual information, but also helpful to use a variety of presentation methods to cast a wide educational net. Additionally, it is always important to remember that every tool used should serve the educational purpose and not just be there for show.

Resources

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