Web Based Instruction on Solar Eclipse and Lunar Eclipse for Deaf and Hard of Hearing People

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Abstract

The purpose of this study was to develop a Web-Based Instruction on Solar Eclipse and Lunar Eclipse to meet the perceptive of Deaf and Hard of Hearing (D/HH) people. The outcome was to analyze D/HH people's ability to identify the relative location of the earth to the moon and the sun during either a solar or lunar eclipse. The Web-Based Instruction on Solar Eclipse and Lunar Eclipse was tried out twice by means of D/HH individual try-out and D/HH small-group try-out to find the weak points for revisions. After the completion of the revisions, the Web-Based instruction was field tested with the sample of D/HH people at Ratchasuda College, Mahidol University and the D/HH at Thailand Association of The Deaf. Furthermore, the D/HH people were asked to study from the Web-Based Instruction, to practice and to do the tests. A 5 level rating-scale questionnaire was also used to evaluate the D/HH attitude.

Introduction

Most D/HH people find it difficult to understand science concepts as taught in classroom. D/HH learners face difficulties in formal teaching of concepts when they need to see concrete models or handle actual objects to truly understand. Web-based Instruction (WBI), which is an emerging field in education, is nevertheless, a part of the rapid growth that is the Internet. Reasons for the growth of WBI include: promotes growth of distance education economically as compared to computer based training, live broadcasts, video tapes, and so on, (Relan and Gillani, 1997b and Santi, 1997), enables learners who prefer or are required to learn outside traditional classrooms to attend classes at their homes or offices, (Bannan and Milheim, 1997), and provides delivery medium, content provider, and subject matter in one package, unlike other mediums, such as computer based training, that require a separate delivery mechanism (McManus, 1996).

Methodology

The researchers analyzed the D/HH learning science problems, studied the content of solar eclipse and lunar eclipse, and identified learning objectives and scope of content for five sections: objectives, vocabulary, components, lesson topic and historical anecdote. Then the researchers designed and developed a web site map, a storyboard and developed the web programming.

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Web- Based Instruction Development

The research aims to design and build a natural science instruction that allows the deaf learners' access to the knowledge about science. The research and development process starts with perceptive analysis of the deaf, formulation of objective and design of an interactive structure of a lesson. The researchers then designed and developed media animation with Macromedia Flash program including Adobe Photoshop decorative image, text and buttons, design and build tests on the content, design of evaluation form for the lesson model and filing into database with PHP program, construction of the lesson on the web with Macromedia Dreamweaver and video chip on sign language to accompany lecture. Lastly, the program was field tested by engaging in a sample of the deaf who have internet skills, followed by improving access to the lesson model with the data on the access problems and comments of the users. The lesson was afterwards set for efficiency investigation.

This activity involves two Web-based Instruction research components. D/HH people will use the Internet links provided to research solar and lunar eclipses in an attempt to better understand the relationship between the sun, moon and Earth. Students will also be presented with fascinating eclipse pictures and a look at the astronomers who chase eclipses around the world. The last part of the lesson involves having students write a descriptive paragraph and a detailed diagram explaining how solar and lunar eclipses differ.

Result of the research is a model of natural science web-based instruction on solar and lunar eclipses that fits the learning of persons with hearing loss as concluded from tests and assessment reports of comments of the deaf toward the web-based lesson, on the average, the learners were satisfied with the natural science lesson model.

Curriculum Objectives: Observe and explain how the relative positions of Earth, the moon, and the sun are responsible for the moon phases and eclipses.
General Objectives: Through this activity, students will become more familiar with solar and lunar eclipses and will have an opportunity to see some fascinating pictures and video clips of eclipses. Because the activity includes a Web component, students will also become more familiar with Internet researching.

The steps of the lesson design include analysis of instruction problems of the deaf learners on the science and technology where the subject matters are rather of abstract nature that makes the learners unable to comprehend, thus depress their learning or investigating interest, coupled with the instructor's lack of suitable instruction media for the deaf learners that greatly impede access to the science. Following the researchers conducted analysis of the lesson content and make a design that suits the perceptive nature of the hearing impaired learners. So, the structural design of the instruction comprises of identification of objective, terminology, simple sentence construct, still image and animation designs and video clip design of web-based sign language. Afterwards, a design was drawn on structure of the presentation of the web-based lesson as shown below in figure 1.
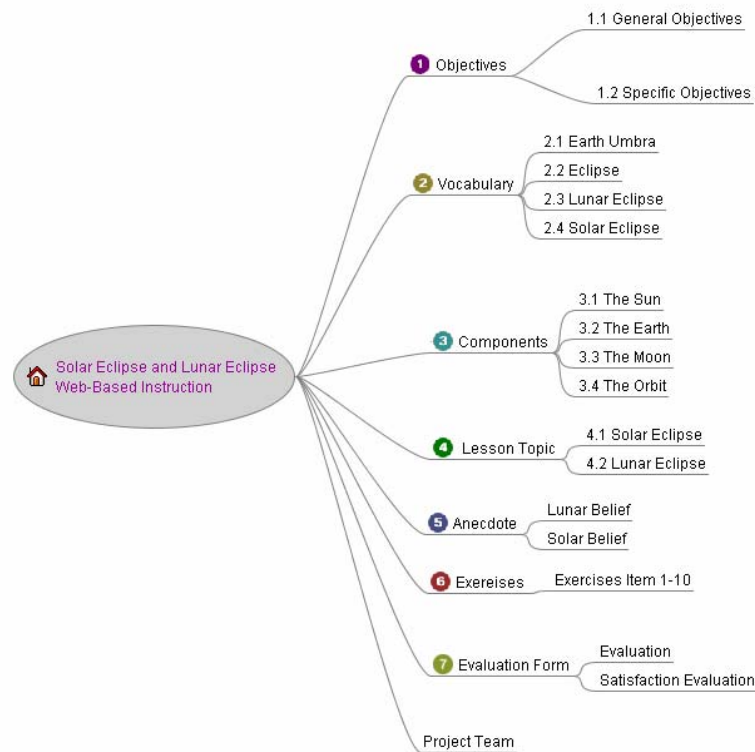
Figure 1. Web-Based Instructions on Solar Eclipse and Lunar Eclipse Site Map.

The next step was to develop the web page with computer software in order to build a lesson according to the site map in figure 1. The programs in use for the lesson to be built having computer multimedia are Macromedia Dreamweaver; a program for setting website framework and Macromedia Flash for presentation control, animation and modifying the format of video file of the sign language to quickly display the output on the web page. The step on drawing up the test and learning assessment forms was conducted with the PHP program. In addition, an assessment database was organized with My SQL program. From then on, the lesson model was tested and the

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data collected by D/HH experts for improvement, followed by field tests by the hearing impaired at the Ratchasuda College and the Association for the Deaf of Thailand for assessment of the model.

Research results

The research and development of natural science web-based instruction on solar and lunar eclipses for the deaf comes with pattern of presentation and simulation of the natural phenomena. The components, in the form of multimedia, include alphabets, images, video clips and animation. The lesson model comprises of several web-based topics, i.e. objective, vocabulary, description of the component, anecdote tips, test and assessment forms. Some web-based instruction screenshots are shown in figure 2 to figure 5.

The development of the model of natural science lesson produce output as the learning process of the deaf. Assessing the comments of the hearing impaired toward the natural science learning model on the web found that on the average, the deaf were satisfied with the quality of solar eclipse and lunar eclipse web-based instruction.
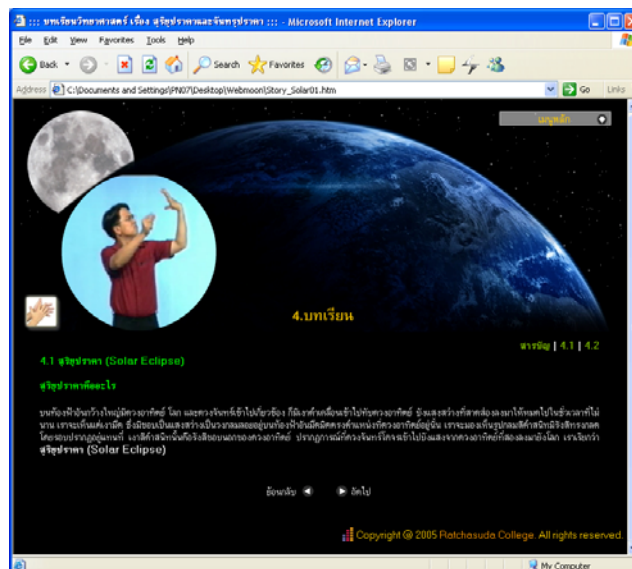

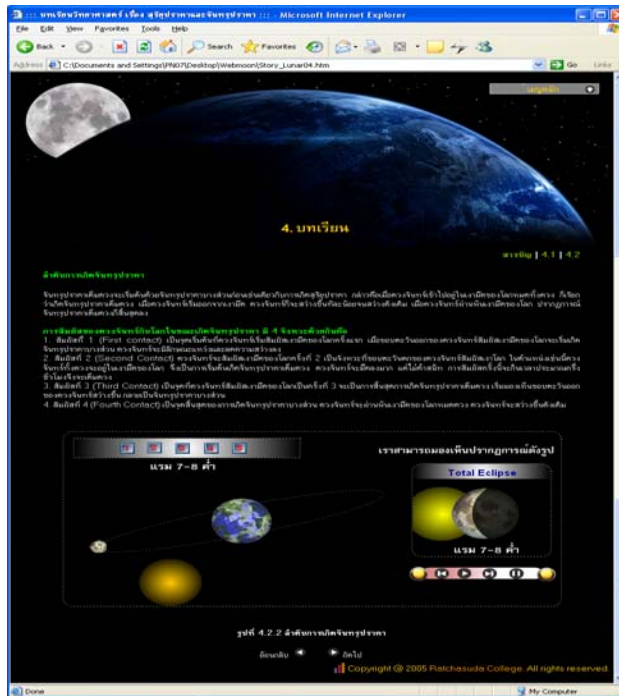**Figure 2. Screenshot of the Solar Eclipse and Lunar Eclipse Web-based Lesson**
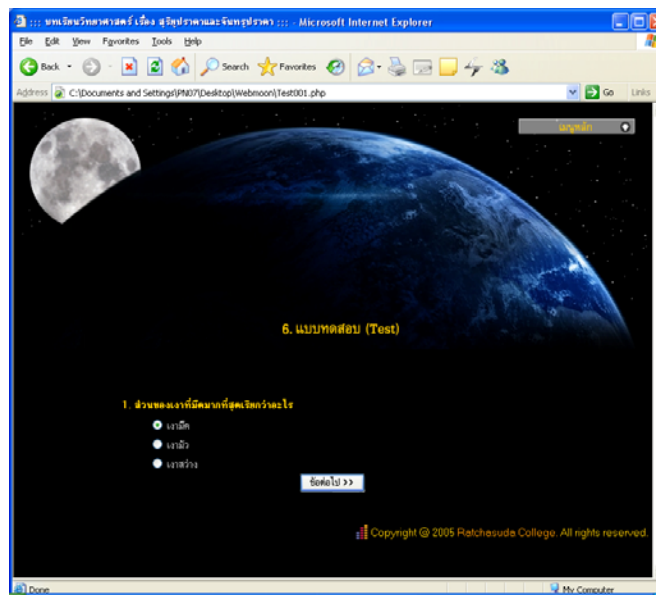
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Figure 3. Screenshot of Animation

Figure 4. Screenshot of Lesson Test

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Figure 5. Screenshot of WBI Evaluation

Conclusion

Overall, the solar eclipse and lunar eclipse was created with the purpose to enable D/HH users to learn about natural science, to test the user's knowledge, perform example tasks, and evaluate satisfaction form. The evaluation shows that the course is indeed usable and presents no major usability issues.

The developed web-based lesson model was designed with multimedia technology as the main component. The simulated event of solar and lunar eclipses enables the learners to manage their steps of learning and to interact with the computers by themselves. Consequently it was concluded that the web-based instruction model on natural science "Solar and Lunar Eclipses" for D/HH people provide outcome according to the research objectives. The lesson enables both the interested learners and the instructors to use it as the efficient instruction media.

Recommendations for Future Research

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This study was conducted with a small group of D/HH people who were worked at Ratchasuda College, Mahidol University and the D/HH at Thailand Association of The Deaf. Future research should focus on increasing the sample size of the study in order to increase the generalize ability of the findings. Since this study focused on describing the conceptual understanding of solar eclipse and lunar eclipse without any intent to generalize the findings to an entire population, additional studies are needed to accomplish this mission.

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