

## **Development and Use of Multimedia Material in Planetary Science**

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In order to assist secondary school children to understand the evolution of the earth and the moon, multimedia software has been developed. This software is based upon the concept of breaking down the complex structure of the many integrated sciences into components that can be more easily understood by children. It then utilizes hypothetical models to help present the ideas of these natural phenomena in quantities comprehensible by children. The many components are then integrated utilizing electronic multimedia. The integrated material will assist the user in understanding how the earth and moon have evolved as well as how the scientific understanding of their evolution has been developed. In addition, this program will influence the children to apply scientific reasoning to assist them in understanding the natural phenomena that they encounter in their everyday lives. The assistance and collaboration of the scientists in the individual integrated disciplines, as well as database managers and secondary school teachers are required enhance and complete the principal software shell.

### **General Concept of the Material**

Developing education in the sciences as a single integrated subject is one of the most important goals of science educators as well as those who are developing multimedia educational techniques[1]. Due to the characteristics of interactive multimedia, integrated scientific educational software can be expected to offer a better opportunity for students in exploring and comprehending natural phenomena than currently existing material such as textbooks or video tapes. This multimedia educational software was developed to assist the student in understanding the waxing and waning of the moon, the evolution of the earth in light of lunar evolution, and lunar eclipses. It develops the students inductive reasoning in order to achieve this understanding. During the learning process, students will find that the “truth” of science has been changing. They will learn to appreciate the existing models of lunar evolution and to understand the reasoning that developed the methods utilized by scientists to study the geologic history of the earth and moon. The most important goal of this multimedia educational software is to imbue an enthusiasm into the students to determine the “truth” of science through personal investigation.

### **Content of the Material**

This program consists of four different interlinked modules: “Movement of the Moon”; “A Mission to the Moon”; “Observing the Moon’s Surface”; and a “Question and Answer” module.

With the “Movement of the Moon” module, students can observe animated sequences demonstrating how the moon waxes and wanes. Apparent viewing points can be located either on the earth or in space. Not only can the students observe the moon moving around the earth, but they can also control the moon’s movement to allow them to examine the relationships between

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the moon, sun, and earth at their own pace simply by clicking the mouse. Students are given the opportunity to explore any section more thoroughly or to jump to other topics. For example, one may closely examine the character of a sunbeam or jump to a section on the size of the solar system.

“A Mission to the Moon” begins with a photo of an Apollo lunar landing. Students are informed of the significance that the lunar rocks hold as a key to the knowledge of the missing history of the early earth. This module also contains a story about the lunar craters, which can be accessed interactively from the “Watching the Moon’s Surface” module.

“Watching the Moon’s Surface” includes lunar images acquired by lunar probes as well as earth based telescopes. In this module, students are prompted to guess that moonlight is reflect sunlight. Also they are asked what causes the dark patterns we observe from the earth and call “The Man in the Moon.” A stereoscopic photographic pair used in this module will allow students to create a 3-D image. Also included is a topic on crater formation that will introduce students to the impact theory of crater formation on the moons and planets of our solar system.

“Questions and Answers” is comparable to a glossary and students enjoy using it. This module is available for all of the previous sections and includes some additional information.

### **Practical Use in Secondary Schools**

A preliminary study was conducted at both a public and a private school in November and December 1994. Students at these institutions utilized this software in pairs to stimulate learning. The data from this study are currently undergoing analysis. Further practical applications are planned for more secondary school students.

### **References:**

[1]Smith, E.E. and Westhoff, G.M. (1992) *Educational Technology*, 32,1, 15-23.