Scientifically Speaking . . .
Connecting the Past

A science unit that had fourth graders try their hand as researchers, biographers, script writers and models in a "wax museum"

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This article is the first in a three-part series dealing with how science speaks to us in the past, present and future.

Although the authors connected the three parts when presenting the unit to students, each part can stand alone.

The authors suggest that to do the project well in its entirety, teachers will need from four to six weeks of 30- to 45-minute daily science lessons.

Part one required about three weeks; part two lasted approximately two weeks; and the final section took only one week because the preliminary set-up was in place.

Next month: "Scientifically Speaking...Connecting the Present."

We introduced this unit by preparing a bulletin board with scientists' names, career titles and scientific achievements. An effort was made to include men and women, well-known and not-so-well-known, with diverse backgrounds in different periods of history. Matthew Henson (1865-1955), first known explorer to walk on the North Pole, and Maria Mitchell (1818-1899), first female astronomer in America to discover a comet, were two of the many scientists featured.

What we were trying to do with this display of information from the historical past to the recent past is encourage the children to generalize that scientists and their contributions exist in the children's world, no matter what the time frame.

Five steps. The initial class activity focused on the introduction to students of the scientific method. Using a hands-on approach, the school's elementary science coordinator taught the steps of problem-solving: 1) identify and make a clear statement of the problem; 2) gather information about the problem; 3) form a hypothesis or a proposed solution to the problem; 4) test the hypothesis by making observations; 5) draw conclusions

Throughout the activity, the students were encouraged to think like scientists, questioning and gathering possible solutions while they worked in groups. Eventually, some students discovered appropriate solutions and were then designated as "peer assistants." The activity lasted about 45 minutes, but could easily have been a two-day lesson.

Off to the media center. Students began to read about individual scientists in teacher-selected library books. Brainstorming and class discussions motivated students to seek additional print and non-print materials. It was time for a class trip to the media center.

Some students already knew which scientist they wished to investigate. Others delayed their decision until they met with our media specialist, who identified print and non-print materials for the children to read and/or check out. The specialist also assisted students to access the Internet.

Research and discussion. Once students selected their scientists to research, approximately five class periods were spent in reading, note-taking and summarizing information. To facilitate this process, students were provided with individual note-taking booklets.

As students read and summarized their

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A very tired *Samuel Morse and Neil Armstrong have obviously had it at the conclusion of the "Focus on Scientists Wax Museum."*

Marie Curie *(ieft) and Annie Jump Cannon wait patiently to come to life as Clara Barton talks about her life as a nurse.*

Parents and other visitors *had only nice things to say about the students' debut as wax models.*

findings, they were encouraged to group the information under the following broad categories: vital statistics, childhood and home-life experiences, character traits, places visited during lifetime, adult successes and conflicts and ways this scientist impacted society.

Scientific literacy discussion groups were formed with four or five students in each group. One class period was devoted to meeting in clusters and sharing information recorded in the note-taking booklets. This activity enabled students to question each other about their individual research and to offer suggestions to the student researcher.

While the research concept was embedded in this process, these discussion groups allowed students to reflect on their note-taking skills, their summaries and important points they wished to convey to their listeners. Also, the activity helped prepare the students for the writing of the scientists' biographies.

With the preliminary planning out of the way, the actual writing of the biographies went quite smoothly. Students wrote during a variety of times – for example, writer's workshop, computer lab time, study time, noon break and recess. Some opted to continue their writing at home on the computer, while others chose to write with pencil and paper during school hours only.

The process of completing a biography took on a life of its own with students setting individual goals, and taking responsibility for meeting those goals in a timely fashion. Most of our students completed the biography in three to five school days.

As students completed their biographies, small group or individual minilessons were conducted on shifting the pieces from third person to first person. The students knew that the next step was to write a script which they would eventually role play. Research and summarization skills came into play as students condensed the biographies into short scripts. The writer's workshop process was employed throughout the various drafts.

The biography writing emphasized written language skills while the focus of the script writing and presentations was on oral language skills. The presentations varied in length from two to 20 minutes. Students rehearsed their scripts in front of peers and family members and, whenever possible, memorized their scripts for the final performance.

Throughout the first phase of the unit, a video camera was used for informal and formal assessment opportunities. For example, the discussion groups were taped, and class time was devoted to debriefing and evaluating

Continued on page 50

Recommended Reading

KID-FRIENDLY BOOKS: Two books the children found particularly informative were:

Starry Messenger: Galileo Galilllei written and illustrated by Peter Sis (Farrar, Straus & Giroux, 1996). This beautifully illustrated and highly readable book drew students to research on this famous astronomer.

The Usborne Book of Inventors by Struan Reid and Patricia Fara (EDC Publishing, 1994). This book exposed students to such inventors as Guglielmo Marconi with his wireless telegraph and Robert Goddard, famed for his work with rockets.

TEACHER-FRIENDLY BOOKS: Two resources the authors relied on heavily during the time-consuming process of gathering information were:

Focus on Scientists by Mary Ellen Sterling (Teacher Created Materials, 1994).

Scientists Around the World by Jerry DeBruin (Good Apple, 1987).

Science in the past *continued from page 49*

A parent listens *to physician Elizabeth Blackwell as astronomer Benjamin Banneker waits his turn.*

these groups. Students were also taped as they presented their scripts (while in costume) to their peers. Class time was provided for student and teacher evaluation.

Wax museum. Although original objectives and outcomes had been met, student interest and motivation remained high. Consequently, an after-school "Focus on Scientists Wax Museum" was planned so that students could share their knowledge with parents, teachers and interested community members. The museum was open for 45 minutes, with a celebration afterwards, which included debriefing, cleaning up and enjoying refreshments.

INTERNET CONNECTIONS

TOPIC: SCIENTISTS

1. **BIOLOGICAL TIMING ONLINE SCIENCE EXPERIMENT: www.cbt.virginia.edu/olh/** Real science experiment on sleep with two specific experimental designs – one for middle school and one for elementary. Learn the scientific process and compare real-time data with classes around the world. Detailed teacher's guide with extensive student activities.
2. **MAD SCIENTIST WORK: www.madsci.org/** Interactive science laboratory with a collective "Ask-a-Scientist" to e-mail for answers or browse online. A lesson database of experiments uses common materials. The <Mad Library> science links are well-organized and extensive.
3. **WWWVL HISTORY OF SCIENCE – BIOGRAPHICAL RESOURCES: www.asap.unimelb.edu.au/hstm/hstm_bio.htm** Web resources for biographical information on scientists. links include <Nobel Prize>, <Inventor of the Week Archive>, <African Americans in the Sciences> and more.

Once again, the students returned to their scripts – this time to write a shortened version (about two paragraphs) that would summarize the scientists' accomplishments. The students, dressed in costume and with appropriate props within easy reach, stood or sat behind a "roped area," created from tissue streamers and music stands.

Since this was supposed to be a wax museum, each famous scientist stood or sat without moving. However, a simple touch on the hand of a scientist was enough to bring him or her back to life. Not for long, of course. These minipresentations lasted anywhere from 10 to 30 seconds – but it was long enough for the scientist to deliver his or her two-paragraph message. After completing the oral presentation, the scientist returned to his or her motionless state.

Favorable comments. The reaction of adults who visited the wax museum was highly positive. Parents and other visitors commented favorably on the professional manner in which the students conducted themselves throughout the presentations and how seriously they took responsibility for portraying the scientists accurately.

It was evident from the families' perspective (and ours, too) that from the outset students had a vested interest in this unit, owning their learning from the introduction to the completion of the wax museum open house. Parents reflected on how well the students had synthesized the value of the scientific method while employing their newly acquired research skills and ultimately applying this knowledge to their oral and written presentations.

As we reflected upon the first phase of our unit, we once again recognized the value of student ownership in learning. Connecting the objectives to daily classroom events and outcomes enables students to maximize their learning more effectively.

Phase one meaningfully connected our students with the past accomplishments of scientists. Now we were ready to embark on the second phase of this unit: "Scientifically Speaking...Connecting the Present."