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ACKNOWLEDGEMENTS

“We assess the intelligence of others on the basis of the stories that they tell and on the basis of their receptivity to our own stories.” ~ Roger Schank

As a proud member of Pepperdine University’s Super7 Cadre, I owe a special note of thanks to my co-learners who have encouraged me throughout my action research. The impact and success of my learning experience results directly from the guidance of Dr. Margaret Riel.

Special thanks also to Carol A. Parsinen, Senior Vice-President at The Franklin Institute. Her inspiration and support have been invaluable. Other colleagues at The Franklin Institute—especially Barbara Holberg, Jay Treat, Margaret Ennis, and Wayne Ransom—have listened to my stories and provided support throughout the year.

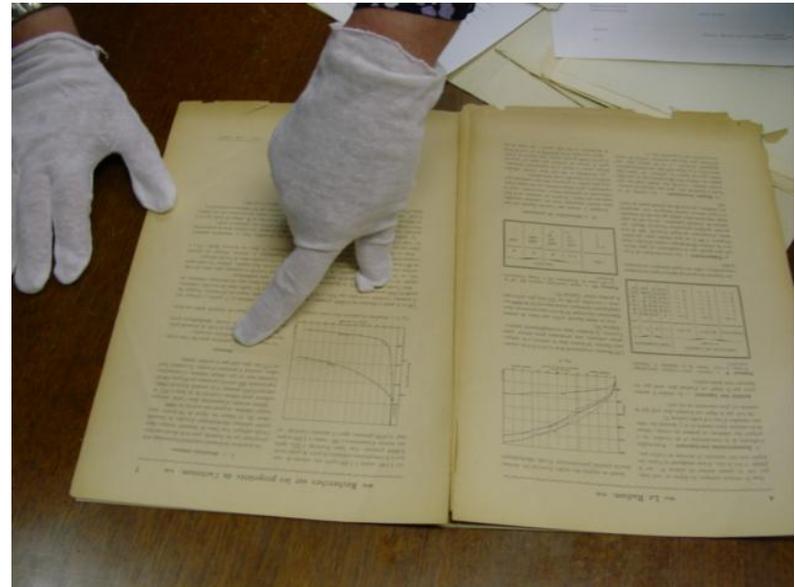
Finally, I extend my thanks and admiration to all of the teachers who have dared to wear the white gloves and take an educational leap of faith with me this year.

“People remember best what they feel the most.” ~ Roger Schank

THE WHITE GLOVE EXPERIENCE

UNDERSTANDING THE NATURE OF SCIENCE
THROUGH PRIMARY SOURCES:

**TEACHER INTERPRETATION
AND CONVERSATION**



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RESEARCH CONTEXT – RESPONDING TO A PROBLEM

How are primary source materials from the history of science useful for the development of teacher understanding of the nature of science?

In an attempt to answer this question, I investigated how direct encounters with primary historical science resources can inspire teachers to think about their own role as actors in the social network of science. This investigation responds to a national call for students to learn about the nature of science, despite the fact that few teachers are ready themselves to answer that call. Teachers can use primary source materials to develop their personal understanding of the social nature of the scientific process. Only then will they stand ready to answer the call and help turn the tide of student disinterest in science.

To help me in my research, I invited teachers to participate in direct, hands-on encounters with historical documents contained in a Case File related to the work of Marie Curie. One document in particular—Curie’s 1903 published paper entitled *Le Radium*—became the centerpiece of my inquiry. How could this document inspire teachers to develop their understanding of the nature of science?



Throughout the course of three cycles of planning, acting, and reflecting, I discovered that teachers responded positively and enthusiastically to the use of *Le Radium* as a resource for understanding the nature of science, especially at the Middle School level. I also discovered that

interaction with primary source materials becomes most meaningful when accompanied by opportunities for reflection and dialogue. Ultimately, primary source materials from the history of science are most useful for the development of teacher understanding of the nature of science when teachers interpret primary sources for themselves and then share their findings through conversation. In other words, primary sources become most useful when used as tools for teachers to act as scientists do.

“Thinking and explaining catalyze learning. People who go through life repeating the same successful behavior, never trying anything new or different...learn precious little.” ~ Roger Schank

EVIDENCE AND ANALYSIS

Commonality of Reflective Descriptors

Looking across all three cycles at the cumulative data, the most commonly used reflective descriptors are variations on imagination, excitement, and connections. These words express both the novelty of the white glove experience, (i.e. “excitement”) and the readiness for practical application (i.e. “imagine the connections”). The frequency of the words awesome and/or humbling also suggests the nature of the hands-on encounter with Marie Curie’s papers. Real and authentic are more indicative of professional thought processes.

Classroom Applications of the Curie File

	Elem	MS
Science		
<i>62% of science ideas came from MS teachers.</i>	5	8
Social Studies		
<i>60% of social studies ideas came from Elem teachers.</i>	9	6
MATH		
<i>100% of math ideas came from MS teachers.</i>	0	4
Language Arts		
<i>69% of language arts ideas came from Elem teachers.</i>	9	4

Cumulatively, the data supports an interpretation that suggests greater readiness for use of historical primary sources by middle school teachers. While the elementary school teachers expressed comparable enthusiasm and excitement, their interpretations leaned toward metaphorical use of the Curie file as a context for cross-curricular learning, rather than as a tool for meeting the call for students to learn about the nature of science. Any impact at the elementary level, however, is significant. A progression from elementary considerations of the nature of scientific practice to a more literal interpretation in the middle grades will create readiness for scientific pursuit at the secondary and post-secondary levels.

“Students need to understand that science reflects its history and is an ongoing, changing enterprise. The standards for the history and nature of science recommend the use of history to clarify different aspects of scientific inquiry, the human aspects of science.” ~ National Science Education Standards