



By Debbie McGregor and Wendy Precious

Dramatic SCIENCE

*Using acting techniques to develop
science process skills and passion for science*

The setting: the science classroom. The characters: you and your students. The scene: Your students acting out scientific discoveries, modeling a frog's life cycle, mimicking the transition from liquid to solid. This is *dramatic science*, a teaching approach that uses acting techniques to explore and develop young children's ideas about science. We (a teacher educator and teacher advisor) began the project for students in grades 1–3 at 10 schools here in the United Kingdom in 2009.

We started dramatic science because there is concern that the status of science in primary schools (grade 1–6) is declining as a result of an increased focus on reading and math (Blank 2008). There is also a concern that science is being taught in a way that ensures examination successes at age 10 (Alexander and Flutter 2009). This “teaching to the test,” which has also been a concern in the United States, has skewed views of *what* science must be learned and subsequently *how* it should be taught (Pollard et al. 2000; Reay and Wiliam 1999). This has resulted in many children experiencing rather limited, somewhat unexciting, transmission of science knowledge.

Science for elementary children needs to be more engaging, relevant, exciting, and challenging (Blank 2008). Encouraging the development of curiosity and confidence in acting and talking about science at a young age, it is hoped, will lay sound foundations that will increase students' interest in science (Murphy and Beggs 2003).

Using drama provides more than just an art form for learning science, it offers a participatory form of learning. Drama is a nontraditional way to appeal to and involve all children in a classroom. It offers an artistic way to represent ideas and understandings—appealing to those learners not naturally drawn to science and mathematics (Clipson-Boyles 2006).

Themes and Strategies

In this project, all activities applied eight strategies (Figure 1) within three different themes. The first theme was exploration, in which students were encouraged to act and think as explorers in a foreign land and consider what they might find, what it means, and how to explain the features of the animals and plants found there. The

Figure 1.

Dramatic science strategies.

Hot seating: The teacher is placed in an “expert” role and students pose constructive questions.

Spontaneous role-play: Small groups of children are placed in different situations and asked to take on varied roles, such as someone selling materials for different sports.

On the table: Students develop their observational and questioning skills through the examination of various objects.

Miming movement: Students mimic what it would be like to be a *blank* ... or have *blank* happening to them.

Freeze frame: While acting out concepts or ideas, students are asked to stop and explain their actions and interpretations.

Mind movies: Students are given visual and auditory information that evoke a location or situation in which they have to consider consequences of happenings and events.

Modeling: Students act out what an object is or how something works (e.g., modeling how a tadpole changes into a polliwog and eventually an adult frog, or how chocolate melts).

Acting out mini-historical plays: Students act out aspects of scientists’ lives (e.g., Alexander Graham Bell as a child helping his father teach hearing-impaired people and eventually devise a long-distance communication device).

second theme was sports (capitalizing on the excitement about the London Olympics). Students were encouraged to think as competitors and consider what special equipment they might need and how this is related to the materials used to make them. They also considered how different sports are played and the effect changing materials might have on playing them (e.g., soccer, swimming, tennis). The third theme was “stranded on a desert island.” Students were encouraged to consider (and act out) how they might survive by building a shelter and using what they might find washed up on the beach (e.g., seaweed, cloth, spade).

The three themes provided the context within which the strategies were applied. The strategies helped students develop process skills in several areas.

Formulating Questions

The *hot seating* technique is based on questioning. The teacher, acting as the expert, is dressed for the part. He or she is introduced and may be an explorer preparing for an expedition, an athlete preparing for the Olympics, or an islander with special survival skills. The scene is set to give the students reasons to obtain information from an expert—how to survive a long journey in a faraway country, how to dress for ice hockey in the winter Olympics, or how to survive with materials found on a desert island. The children then ask their own

questions of the expert. The kinds of questions asked of a desert islander were initially closed and included “Do you get lonely?” or “Are you scared?” After reflection, to elicit more focused questions, remind the children that they will need to act out how the desert inhabitant survived. They asked “What do you eat?” “How do you get food?” “How do you keep warm?” and “Where do you sleep?” The idea is that the children question the expert within the theme with a purpose, so that they know what to do, whether miming or modeling. *Spontaneous role-play* can also elicit focused questions. For the sports



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Students engaged in dramatic science.



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Students *modeling* how chocolate melts.

theme, children had to question each other while selling different materials to each other in the marketplace to find the best material for their sport (e.g., for a swimsuit, a stretchy, soft, and strong material was necessary).

Observing and Inferring

In a variation of *on the table*, students felt an object in a “feelie box,” a container with two holes for their hands, and suggested what the mystery object might be. When responding to questions about the objects, students have to describe the characteristics of the objects and then speculate about how and why they might be used. In the

sporting theme, there were samples of sponge, foil, and plastic, and students were challenged to think about how the properties of materials might make them suitable for sporting equipment.

Communicating and Modeling

Communication is central to all of the dramatic science strategies, but *miming movement* and *freeze frame* have been found especially useful for indicating what students are thinking. In the explorers theme, students acted out the life cycle of animals that they might encounter on their travels (e.g., penguins in the Antarctic). In the sporting theme, students acted out how a ball would behave if it was made of different materials. The students mimed playing soccer and were told “you are now in a very cold place; the ball is made of ice, now play with that ball.” Some assumed that the ground was then slippery (ice) too, so they pretended to slip as they tried to kick the ball. And of course the ball would melt into liquid as they played with it. Students were then told they would be playing in a hot country and the ball was made of chocolate, so the ball got smaller and you could see the children becoming more timid in how they kicked the ball. Then they kicked closer to the ground as it melted. For *freeze frame* they were stopped, asked what they were doing, and explained they were kicking more gently as the ball was getting smaller.



Students practice *miming movement* within the sports theme.

Predicting

Mind movies proved a useful technique to set up scenarios that could be used as starting points to speculate about possibilities. Theme sounds or music was played while students closed their eyes. They were then asked questions about the sounds and what they indicated or “What might happen next?” In the desert island theme, students listened carefully for animals (and considered whether they needed to move away!). In the explorers theme, they heard the howling winds of the Antarctic and considered how they might overcome the problems that might be encountered in this environment—especially as a penguin. They would huddle to keep warm and even went outdoors and “felt” what it was like as a penguin. For the stranded on the desert island theme, we would ask, what is it like? What can you hear? What should you do? No ship in sight? How can we survive? What should we use?

Classifying

Through *on the table*, *miming movement*, and *freeze frame*, within the theme of sports, students were asked to think about properties of different materials. They were given collections of stretchy cloth or insulating materials for particular sports and asked why they might be useful for the athletes. In the desert island theme, they were asked to consider the different reflective and sound-making qualities of materials washed up on the beach. Which items might attract the attention of a passing ship or plane?

Assessing and Reflecting

In this dramatic science project, teachers photographed students in action (stills and video) and noted their answers, ideas, and suggestions. This provided evidence of the development of students’ ideas and their understanding about science. The comments from the teachers in their reflective journals indicated the strategies particularly enhanced the science aptitudes of observation, higher-order questioning, understanding and communicating ideas, predicting, identifying simple patterns, applying concepts, explaining things, thinking creatively (and critically), and considering evidence. Teachers implementing the strategies in their classrooms were surprised by the enthusiasm of the children, many of whom began to ask to do drama when science (and other curricular areas) was taught. An unanticipated outcome was the range of the children’s understandings (from totally absent to partial or incomplete) when they were asked to mime, show, or explain their views of different ideas in science through drama. Teachers reported that asking children to act out how a substance changes when heated (e.g., a piece of chocolate when it melts) or mime an animal’s life cycle can show their level of understanding. Communicating and displaying their thoughts in many

ways to each other, and the teacher, appears to extend their thinking and advance their learning and understanding—dramatic results indeed! ■

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Connecting to the Standards

This article relates to the following *National Science Education Standards* (NRC 1996):

Content Standards Standard A: Science as Inquiry Grades K–8

- Abilities necessary to do scientific inquiry
- Understanding about scientific inquiry

National Research Council (NRC). 1996. *National science education standards*. Washington, DC: National Academies Press.