Papier-Mâché Animals: An Integrating Theme for Elementary Classrooms

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Abstract

One of the biggest present challenges for teachers, especially in primary classrooms, is the need to address the content standards in all subject areas with the same amount of instructional time. While curriculum integration continues to be a powerful strategy to meet this challenge, teachers often find it difficult to bridge the gap between theoretical models of integration and classroom implementation. In this article, we describe how to implement an integrated science lesson founded upon four guiding principles: (a) Use of the 5-E instructional model, (b) adherence to the National Science Education Content Standards, (c) utilization of developmentally appropriate practices for young children, and (d) incorporation of the project approach to motivate learning and integrate different subjects. Specifically, this article describes how to employ papier-mâché animals as a unifying theme in primary classrooms to integrate science, language arts, and visual arts to allow for overlapping adherence to content standards.

Traditionally, many teachers have popularized the inclusion of papier-mâché art projects in their classrooms (Farris, 2003; Hammond, 1983; Shaw & Pruitt, 1990; Sievert, 1979). However, the craft aspects of papier-mâché frequently overshadow the academic purpose for the project. As a craft, it is a wonderful activity, but to make it into a content-oriented lesson, connections to the subject areas need to be developed and emphasized. To address this problem, this article provides a set of activities that can be organized into a unit using papier-mâché animal representations as a thematic context in which to engage children in standards-based, developmentally appropriate inquiry projects that seamlessly integrate science, language arts, and visual arts. Enrichment activities are also provided to integrate social studies and mathematics.

Why Integrate?

A common thread that permeates national reform efforts stresses the need to integrate, or make connections among, the different areas of the curriculum (International Reading Association and National Council of Teachers of English, 1996; National Art Education Association, 1994; National Council of Social Studies, 1992; National Council of Teachers of Mathematics, 2000; National Research Council [NRC], 1996; National Science Teachers Association, 1998). Specifically, Program Standard B of the National Science Education Standards states: “The program of study in science should connect to other subjects” (NRC, 1996, p. 214).

Researchers of curriculum integration have identified many benefits, including that it (a) allows children to make connections among the disciplines (Shoemaker, 1989), (b) adds a sense of relevancy and significance to what is being learned (Beane, 1995; Hargreaves & Moore, 2000), (c) prepares children to transfer knowledge later in life (Caine & Caine, 1991), and (d) leads to academic gains in the content areas (McBee, 2000). Integration is also supported by brain research, which has revealed that individuals process information through patterns and connections rather than through fragments of information (Beane, 1996; Burton, 2001; Caufield, Kidd, & Kocher, 2000; Cohen, 1995; Diamond & Hopson, 1998).

Theoretical Framework

Curricula can be integrated via a number of different approaches, ranging from a fragmented model in which the teacher within a single discipline emphasizes concepts that may carry over into other disciplines to a networked model in which the learner directs the integration process by linking resources (human, experiential, textual, etc.) from different disciplines within and outside the school (Fogarty, 1991). The thematic learning cycle lesson and accompanying enrichment activities described below follows the connected model of curriculum integration. In this model of integration, a theme is used (e.g., papier-mâché) to link concepts and topics between disciplines, such as fictional descriptions of animals, sculptural representations of animals using papier-mâché, nonfictional descriptions of animals, historical uses of papier-mâché, and mathematical descriptions of papier-mâché creations.

The development of this integrated lesson was founded upon four guiding principles. The science lesson should:

- Follow the 5-E learning cycle to enhance scientific reasoning and foster conceptual understanding of scientific concepts (Bybee, 1997);
- Address specific National Science Education Content Standards (NRC, 1996);
- Employ developmentally appropriate practices for young children (Bredekamp & Copple, 1997); and
- Incorporate the project approach to motivate learning and integrate different domains of knowing (Helm & Katz, 2001).

The 5-E learning cycle model is an inquiry strategy whose origins can be traced to John Dewey and the Progressive Movement (Bybee, 1997). There is ample research to indicate the learning cycle model produces superior gains in children's content knowledge and scientific reasoning compared to teacher-centered instruction (Guzzetti, Taylor, Glass, & Gamas, 1993; Lawson, 1995; Lawson, Abraham, & Renner, 1989). The model is comprised of five different phases that all start with the letter *E*: Engagement, exploration, explanation, elaboration, and evaluation (see Table 1). The first phase, engagement, stimulates curiosity, taps into children's prior knowledge, and motivates the learner. In the exploration phase, the teacher invites children to investigate a problem by manipulating materials or brainstorming solutions. The explanation phase allows the teacher to uncover the children's thinking about the problem and to help move children's misconceptions toward scientifically accurate explanations. In the elaboration phase, children participate in a related learning experience to deepen their understanding of the concept previously explored. The fifth phase, evaluation, may include a summative appraisal of learning at the end of the lesson. However, formative assessments take place during the other phases of the 5-E lesson to learn what children know and/or are able to do as a result of their experiences.

Description of the Learning Sequence

During this lesson, children explore papier-mâché to create two- or three-dimensional representations of animals based on characters from picture books, learn about characteristics of animals during the explanation phase, and extend their understanding of animal characteristics through a cooperative research project during the elaboration phase. The lesson addresses National Science Education Content Standards A and C (NRC, 1996). Content Standard A, Science as Inquiry (K-4), states that activities should develop children's abilities to conduct scientific inquiry. Standard C, Life Science (K-4), states that activities should develop children's understanding of the characteristics of organisms.

Table 1
The 5-E Model at a Glance (Adapted from Bybee, Powell, & Trowbridge, 2008)

Phase	Event
Engagement	• Teacher initiates the learning experience by creating interest and sparking curiosity. • Teacher elicits responses that uncover students' prior knowledge and/or misconceptions. • Connections to past and future activities are made clear.
Exploration	• Concrete learning experiences that encourage students to work together to build conceptual understanding. • Students are active explorers of concepts, experiences, and/or situations. • Teacher acts as a coach or facilitator during student interaction.
Explanation	• Teacher encourages the students to use their own wording to explain their understanding of concepts discovered during the exploration phase. • Teacher formally provides definitions, explanations, and clarification of misconceptions. • Teacher capitalizes on, and draws from, students' previous learning experiences afforded in the engagement and exploration phases as a basis for explaining concepts.
Elaboration	• Teacher expects the students to use formal labels, definitions, and explanations provided previously to apply or extend the concepts and skills in new situations. • Teacher challenges and/or extends students' understanding and skills through new learning experiences.
Evaluation	• Assessment of students' knowledge and/or skills by a variety of formal and informal evaluation strategies. • Teacher looks for evidence that the students have changed their thinking or behaviors. • Students encouraged to assess their own learning.

Developmentally appropriate practices are consistently used to accommodate individual differences in children's ability and interest (Bredekamp & Copple, 1997; Gestwicki, 2006). For example, during the explore phase children may choose from a variety of papier-mâché animal representations and they may choose to make a representation of their favorite storybook animal, a pet, or an animal they may remember from a zoo or on television. In kindergarten and first-grade classrooms, children can create flat representations or small sculptures; however, community volunteers may be needed to help out. These projects are relatively easy for second- and third-graders to produce and they can be managed by a single teacher. More complex representations, such as papier-mâché masks and hats, may be attempted with the older children, but these may also require volunteers to assist children. During the engagement and elaboration phases, developmental needs are considered as children acquire information about animals through books read by the teacher, individuals, or groups of children.

During the elaboration phase of the lesson, children work cooperatively on a project to find out how their favorite animal really looks and behaves. The project approach to learning has been described by Helm and Katz (2001) as the in-depth research of a topic, usually by small cooperative groups, posed by the children, teacher, or both. The purpose is to provide an authentic learning experience to make learning more meaningful for children. These researchers highlight a number of benefits to using the project approach, including strengthening children's motivation to master a variety of literacy and inquiry skills, establishing connections among different domains of knowledge, and enhancing social development, making it an excellent strategy for curriculum integration. Some of the lesson's enrichment activities incorporate the project approach as well.

Engagement phase. The engagement phase introduces the science-language arts-visual arts connection. It starts with a combination of guided, shared, and independent reading of books that feature animal characters (Figure 1). Whether done individually, in small groups, or as a class, reading provides the common experience necessary for children to begin thinking about animal characteristics and creating their animal representations. The teacher encourages children to talk about the animal characters; what they look like, what they did, who they interacted with, and how they behaved. Children may act out the roles of the characters and retell the stories. Through these experiences, children develop ideas for an animal to create out of papier-mâché.

Brett, J. (1998). *The hat*. New York: Scholastic.
Brett, J. (2005). *Honey…honey…lion! A story from Africa*. New York: G. P. Putnam.
Brown, D. (2005). *The good lion*. New York: Houghton Mifflin.
Carle, E. (1990). *The very quiet cricket*. New York: Philomel Books.
Carle, E. (2001). *Hello, red fox*. New York: Simon & Schuster.
Dunbar, J., & Varley, S. (1998). *The spring rabbit*. New York: Dell.
Edwards, P. D., & Cole, H. (2001). *Clara caterpillar*. New York: Harper Trophy.
Martin, B., Jr., & Carle, E. (1992). *Brown bear, brown bear what do you see?* New York: Holt.
Livingston, I. (2003). *Finklehopper frog*. Berkeley, CA: Tricycle Press.
Numeroff, L. J., & Bond, F. (1985). *If you give a mouse a cookie*. New York: HarperCollins.
McKee, D. (1989). *Elmer*. New York: Lothrop, Lee & Shepard Books.
Paul, A. W., & Long, E. (2005). *Mañana, iguana*. New York: Scholastic.
Rohman, E. (2003). *My friend rabbit*. New York: Scholastic.
Wilson, K., & Chapman, J. (2006). *Bear's new friend*. New York: Simon & Schuster.
Young, E. (1996). *Lon Po Po: A red riding hood story from China*. New York: Putnam Juvenile.

Figure 1. Recommended picture books with animal characters.

Exploration phase. In this phase, children create papier-mâché representations of their favorite animal character inspired by readings in the engage phase or personal experiences. The purpose of this activity is to enable children to translate their mental constructs into concrete representations, an essential component of the artistic process. The representations serve as springboards to encourage critical thinking about animal characteristics that they began to think about in the engagement phase and will develop further in the explanation and elaboration phases. The representations could take different forms, including miniature sculptures, two-dimensional pictures, masks, or hats. Possible materials and directions for constructing different types of papier-mâché animals are provided in Appendix A. The picture books should be displayed and available to children as they work. Children may work independently or in small groups to create their animal representations modeled after, or inspired by, a character from one of the picture books (see Figure 2). The amount of time needed to complete the exploration depends on the type of papier-mâché projects that are created. The application of the papier-mâché itself requires between 30 minutes (two-dimensional pieces) and 60 minutes (masks and hats). The projects need at least 48 hours to dry before decorating, which may require an additional 30 to 40 minutes.

Explanation phase. The purpose of the explanation phase is to stimulate critical thinking about the characteristics of animals. Begin by asking each group to describe which animal character is represented by their papier-mâché creation, the materials they used to decorate it, and why they chose this particular character. Encourage children to expand upon their thinking, initiated during the engagement phase, about how the stories portrayed their animals' physical and behavioral characteristics and environments, such as body color and size, food choices, speaking and reading, shelter, locomotion, clothes, defense strategies, emotions, personal hygiene, growth and

development, and so forth. Using a graphic organizer, make a class list of fictional characteristics from the animals depicted in the fictional books (Figure 3). Further use of this organizer will be elaborated later.

Figure 2. Papier-mâché animal projects from beginning to end.

Name: _____ Animal: _____		
Fiction	Nonfiction	Similar?

Figure 3. Graphic organizer to compare animal characteristics from fictional and nonfictional sources.

Elaboration phase. In this phase, the project approach (Helm & Katz, 2001) is used to help children discover how their animals really look and behave. The project approach poses authentic problems to encourage children to take the lead in their own learning. For example, the teacher might pose questions such as: "Do you think a frog would really take a bubble bath before going to bed?" or "Do you think caterpillars really say such things?" Children should be encouraged to explain why they think so. Next, pose the problem: "Today, you are all junior zoo keepers. Your job is to make sure the information you tell visitors about the animals is correct. How do you think we could find out if real animals behave like the ones in our story?" Emphasize the point that television documentaries and nonfiction books tend to portray animals as they really are and, therefore, are more reliable sources of information.

For nonreaders, the teacher can read nonfiction books out loud and help children compile a list of characteristics similar to the one created from the fictional story. Webcams and documentaries can be used to help children discover how real animals look and behave. The Animal Webcam Locator (2005) provides links to live video feeds of a variety of animals.

The teacher should provide a variety of age-appropriate options for the children to report on their findings. For example, younger children can reuse the graphic organizer they completed earlier, to record fictional animal characteristics from fictional books, to now record animal characteristics from nonfiction sources (Figure 3). The children then decide if the descriptions of the animals in the fictional story are similar to the ones provided in the nonfiction books, an important formative assessment for the literacy component of the lesson. More advanced children can organize their findings using a Venn diagram. Older children can produce a computer presentation of their findings, incorporating images and text to support their conclusions.

Evaluation phase. By making careful observations and asking focused questions, the teacher assesses the children's ability to perform skills associated with scientific inquiry, including observing, inferring, and communicating, as well as their understanding of animal characteristics at various checkpoints through this integrated learning cycle lesson (NSES Content Standards A and C). For instance, during the engagement and explain phases, the children's ability to use the text to identify animal characteristics can be assessed and fostered. At the beginning of the elaborate phase, children reveal initial conceptions about their understanding of personification as the teacher asks children to consider whether animals really look and behave like the characters in the stories. By listening to children's responses and explanations, an initial picture of student understanding is revealed. Another checkpoint of the children's understanding and/or ideas occurs at the end of the elaboration phase when they report on the differences they identified between real and fictional animals using graphic organizers or computer presentations.

Finally, an engaging summative assessment is used. In addition to reading about popular characters, many children also are accustomed to watching popular cartoons and/or movies in which nonrealistic and realistic characters are portrayed. Examples of some popular movies include Disney's *Finding Nemo* and Pixar's *A Bug's Life.* The teacher has children work in small groups and focus on particular characters to keep the task manageable. For instance, in Disney's *Finding Nemo* movie, each group can focus on a particular character (e.g., Group A focuses on Nemo, Group B focuses on Marlin, Group C focuses on Dori, and so on). Children can view these clips and follow along with T-charts noting realistic and nonrealistic characteristics. A follow-up classroom discussion led by the teacher using the T-chart responses is used to clarify real and unreal characteristics and to make comparisons between different animals to develop generalizations (e.g., animals have basic needs, communicate, and respond to their environment).

A rubric for assessing the children's T-charts can be used to document the children's understanding in a summative fashion.

Discussion

As stated in the introduction, the goal of this project was to use papier-mâché as a unifying theme to develop a set of activities based on the 5-E learning cycle model that seamlessly integrates science, language arts, and visual arts with engaging, developmentally appropriate learning experiences firmly grounded in the content standards. Additional activities are provided that can be used to develop an entire unit themed around papier-mâché. Children's fictional literature is a wonderful way to get children ready to learn. In the engagement phase of the lesson, the teacher and children read books that feature animal characters. The teacher encourages children to talk about the characters; what they look like, what they did, who they interacted with, how they behaved. Through these conversations, children develop ideas for an animal they want to create, investigate, and write about.

If time permits, the engagement phase can be enhanced by having the children participate in a readers' theater to role play the characters as the books are reread, or create and participate in their own classroom skits or plays. Children can also explore the storytelling device of portraying animals with human qualities to teach lessons about manners and morality through fables and fairy tales.

Visual arts are integrated into the lesson during the exploration phase when children create their animal representations with papier-mâché. Children express their ideas, experiences, and stories through their creations, as well as apply elements of design such as shape, color, and texture. They are also allowed to make choices about the type of object they create and the materials they use. As children discuss their choices, the teacher should emphasize the connections between the creation of art, the importance of good observation skills, and the influences of experiences and interests on the final product.

Physical and behavioral characteristics of animals are introduced during the explanation phase as children discuss their papier-mâché creations and their characteristics as presented in children's books. Science content knowledge is deepened during the elaboration phase as children assume the role of junior zookeeper and research nonfiction resources to learn about how their animals really behave. Children are provided with a variety of resources to collect information and prepare a presentation about their animals. The language arts are also emphasized during the explanation and elaboration phases as children talk and write about their animals' physical and behavioral characteristics and the differences between their papier-mâché animal creations, the animals' portrayals in storybooks, and how they really look and behave.

Learning centers should be used to enrich and further integrate the content areas as part of the explanation and elaboration phases. The use of centers is a developmentally appropriate practice that enables young children to work at their own pace, interact with other children, gain hands-on experiences, and make choices (Hyson, 2008). At the science center, children may choose to explore the chemical and physical properties that make it possible to construct objects out of papier-mâché (NSES Content Standard B). They can use magnifiers to observe dried fragments of papier-mâché. The teacher works with the entire class to create a list of the children's observations, making sure that the holes in the paper and the network of strands are noted. The teacher facilitates a discussion about how the holes and strands may be clues as to how the papier-mâché sticks together. Specifically, water enables white glue or wheat flour to penetrate the pores

of the paper. White glue and flour contain polymers, long strands of repeating molecules that bind together. When the water evaporates the polymers remain, mechanically bonding the strips of paper.

At the language arts center, children can choose to create their own stories about their papier-mâché animal creations. Additional fiction and nonfiction books about animals should be provided to encourage independent reading and conversation. Children can also systematically investigate how fiction and nonfiction trade books portray animals (Gomez-Zwiep & Straits, 2006). Older children can use the project approach to write their own children's books that use animals to teach young children important lessons, such as colors, manners, counting, cooperating, and telling the truth. Children can also choose to investigate and write factual reports about other animals.

The visual arts learning center provides children with materials to create two- and three-dimensional representations of scenes from books, realistic environments in which the animals are likely to be found in nature, or fantasy landscapes inspired by the stories and classroom conversations. Children can choose to use papier-mâché and other media to construct their scenes. The project approach is used here to create a scenario to engage children in the activity. For example, children can choose to work cooperatively to create a museum exhibit depicting a realistic habitat for their animals and lead "tours" for children from other classrooms. Children may also choose to illustrate the stories they wrote at the language arts center.

Mathematics is also integrated into the curriculum with center activities. For example, younger children may choose to make bar graphs to represent the number of individuals/groups selecting a particular animal character. Older children may choose to determine the volume of masks and hats using rice, popcorn kernels, or small beans. Children may also choose to measure the circumferences of their hats and masks. Data for the entire class is organized in a table and represented graphically. Children then calculate the range and mode for the entire class.

At the social studies center, books and photographs are used to illustrate the origins and historical uses of papier-mâché, including art, furniture, and boxes. Additionally, children may choose to explore the historical and cultural relationships of piñatas to Mexican culture through books such as *Hooray, a Piñata!* (Kleven, 1996) and *Magda's Piñata Magic* (Chavarria-Chairez, Ventura, & Vega, 2001). Through teacher-facilitated discussions, children talk about the relationship that their animal creations have with humans. For example, is it a scary monster, a pet, an animal we might see at a zoo, or a wild animal living in our backyards? If it is a monster, what makes it scary? If it is a pet, why do we like to keep it in our houses?

Implementation and Lessons Learned

Lastly, the implementation of the activities by teachers has been well received. Several elementary teachers have provided suggestions and ideas to help facilitate this activity. For example, children at the younger end of the elementary school level (Grades K-2) and/or children with special learning needs will need additional help, time, and support if they are creating full-coverage masks. A first-grade teacher also suggested that it is much easier for children at this age to focus on developing flat representations and/or mini sculptures (discussed in the exploration phase). Another suggestion provided by a second-grade teacher was to expand the exploration phase (animal hat creation) across a week and ask for help from students at the upper elementary and/or junior high/high school levels. In addition, all of the teachers who responded to the authors have suggested that it has always been very helpful to invite parents, grandparents, or other

student teacher volunteers into the classroom during this activity. Teachers also pointed out that giving the children a choice in their animal hat design helped keep them focused. Another teacher encouraged the children to bring in craft items, such as beads, feathers, or sequins, from home to contribute to their hats. Other teachers suggested sending a letter home explaining the project, inviting parents to sign up for a time to help, and/or asking for materials to assist with creative parts of the hats.

Conclusion

This article described how papier-mâché animals may be employed as a unifying theme to integrate science, language arts, and visual arts using developmentally appropriate learning experiences, including the project approach, without compromising each discipline's content standards. Suggestions for integrating mathematics and social studies were also provided. Curriculum integration is a powerful strategy to help children make better sense of the material they are learning and transfer their knowledge across content areas and to new situations. Developmentally appropriate learning experiences were used throughout the lesson to encourage children to make choices, interact with each other, and participate in hands-on, minds-on activities. The 5-E learning cycle lesson culminated with an authentic, project-based activity to motivate children to work hard and strive for quality. Suggestions and examples for incorporating the project approach in some of the enrichment activities were also provided. As the pressure increases for teachers to address the content standards in all subject areas with the same amount of instructional time, thematically integrated curricula are an effective strategy to meet the challenge.

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Appendix A: Materials and Directions for Constructing Papier-Mâché Animal Representations

Materials

- Newspaper (torn into long strips)
- Wheat flour
- White glue
- Water
- Measuring cups
- Containers or basins for mixing paste
- Large balloons (10-15 inch diameter)
- Tempera paint (various colors)
- Paint brushes
- Scissors
- Tape
- Construction paper
- Card stock
- Tissue paper (various colors)
- Styrofoam balls (optional)
- Paper towel rolls (optional)
- Scrap fabrics (optional)
- Cardboard pieces (optional)
- Pom-poms (optional)
- Fictional trade books featuring animals

Directions

1. Make the papier-mâché mixture by mixing equal amounts of flour and water or glue and water. Glue will yield a stiffer product when dry. The mixture should be about the consistency of thin pancake batter. About 4 cups of the mixture are needed to complete a hat or mask.

2. To create flat representations, children dip the strips of newspaper into the mixture and

apply it to a sheet of card stock or construction paper. The result is a relief image of their animal's face or entire body. Miniature sculptures can be created by shaping the moistened strips of paper into animal shapes.

3. Groups wishing to create hats or full-coverage masks need a large balloon filled completely with air and tied securely. Children use their fingers to affix paper strips to the balloon until the balloon is completely covered with two to three layers of newspaper. It is not necessary to wait for each layer to dry before applying a new layer.

4. The papier-mâché representations should be allowed to completely dry for approximately 48 hours in an undisturbed place indoors. Groups making hats or masks can now use a pair of scissors to pop the balloon and carefully cut a hole into the base. For a mask, the hole should be large enough for a child's entire head to fit inside. For a hat, the hole should be slightly smaller than the diameter of a head. The papier-mâché can also be cut longitudinally to create two masks that cover just the face. The teacher should assist children with cutting out the holes for the eyes and mouth.

5. Children can then begin to develop their animals in fun and creative ways, which addresses the visual arts standards. Colored tissue paper can be applied to the dried newspaper by dipping them into a papier-mâché mixture or affixing them with white glue or glue sticks. This step allows children to add color and dimensionality to the animal creations. Washable paints can also be applied to the dried paper to add color. Adornments such as horns, eyes, noses, ears, hair, and teeth can also be applied using paper towel rolls, cardboard, styrofoam balls, strips of fabric, and marbles.