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Integrated science unit : ponds and water

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Integrated science unit : ponds and water

Abstract

This instructional development project integrated the language arts and the science areas. The science content was ponds and water from the second grade curriculum. A rich learning environment was provided through a literature base, representing the different genres and related expressive activity. The unit was presented through teacher-directed activity and learning centers that offered many options from which children could select experiences.

The goals of the program were to give children more control over their learning and to extend children's thinking-language abilities by capitalizing on the common processes of the language arts and science areas and offering many opportunities to engage in the language processes within the functions of language. The unit was presented to children in grade 2. As the children became involved in the content and processes of the unit provided by a print-rich environment with many options for learning activity, they generated much enthusiasm and assumed responsibility for directing their energies toward the learning tasks.

Integrated Science Unit: Ponds and Water

A Graduate Project

Submitted to the

Department of Curriculum and Instruction

in Partial Fulfillment

of the Requirements for the Degree

Master of Arts in Education

UNIVERSITY OF NORTHERN IOWA

by

Evelyn K. Oliver

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has been approved as meeting the research article requirement for the Degree of Master of Arts in Education.

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Abstract

This instructional development project integrated the language arts and the science areas. The science content was ponds and water from the second grade curriculum. A rich learning environment was provided through a literature base, representing the different genres and related expressive activity. The unit was presented through teacher-directed activity and learning centers that offered many options from which children could select experiences.

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Literature-based language arts instructional programs extended across the curriculum promote knowledge because the different genres offer many dimensions of knowing. Such programs provide more opportunities to engage in the genuine functions of language found extensively in the content areas and to extend thinking-language abilities through the common tasks associated with the different curriculum areas (Routman, 1994; Langer, 1982).

A literature-based classroom is filled with high quality literature that is developmentally appropriate. The rationale for creating such a print-rich environment is that when children are surrounded with literature that is meaningful to them, they will not only read with interest but will extend their thinking-language abilities (Smith, 1994; Huck, Hepler, Hickman, & Kiefer, 1997). Children find reading interesting when they are able to read to fulfill their needs to know or to be entertained, or in other words, when children are allowed to own their reading experiences. Children need opportunities to select literature from the different genres to solve problems or complete projects that extend across the areas of the curriculum (Strickland, 1994).

A print-rich environment with many options for learning can promote risk-taking yet should be secure and predictable (Maslow, 1970). Sustaining learning centers can assist in maintaining a stable

environment. These centers are present throughout the school year, reflecting the curricular study along with centers specific to themes and units (Harms & Lettow, 1998).

Language development is further strengthened as students interact with others concerning what they have learned from engaging in the reading and writing processes. The interaction may be an informal sharing with a partner or small group, a student-teacher conference, or a more formal discussion and listening session with the whole class. Responses can be prompted by entries in the students' reading journals. When sharing their ideas with others, children's interpretations can be extended (Kooy & Wells, 1996).

To assess youngsters' involvement and progress in a literature-based instructional program, qualitative techniques need to be used to describe their growth and instructional needs. Student journals and teacher logs can be used to monitor children's involvement in the language processes. Teacher observations of children's engagement in language activities and sharing sessions can yield evidence of student language growth. Children can share insights that they have gained in literature experiences and related expressive activities with teachers in conferences. These qualitative assessment techniques can support

portfolio collection that provides an ongoing record of an individual student's growth (Tierney, Carter, & Desai, 1991).

Literature-Based Language Arts Extended to the Science Area

Children are curious about the world. Elementary science instruction can nurture this curiosity and open up the world for their discovery. Experiences with quality literature, representative of the different genres, can strengthen science study by giving new dimensions to the study (Langer, 1982).

Integrating a rich literature base into the science curriculum can offer many meaningful language experiences for children (Routman, 1994). Science is abstract for children. If they are to develop understandings, they must be able to see science concepts as part of their own personal world (Butzow & Butzow, 1989).

Each of the different genres can make a unique contribution to a science unit. The sum total of these contributions can provide an in-depth study. Informational books can provide relevant facts through their text and illustrations. Many books of this genre focus on specific aspects of a topic. Fiction often places humans in the center of the experiences, thus helping children identify with elements of the world. Carefully researched science information in fiction allows children to gain concepts more easily because the content load is less intense. Poetry offers children many

opportunities to perceive the world with a new, sharp perspective. After participating in poetry experiences, children become more aware of the world and its emotional qualities and develop a greater appreciation for its elements (Huck et al., 1997).

Implementation of Literature-Based Unit: Water and Ponds

The process of integrating literature-based language arts into the science program has been explored. This integration of curriculum areas extended the print environment, thus providing in-depth study of the unit concepts and allowing students to become involved in the functions of language.

This integrated language arts/science unit on ponds was developed for grade two. The science concepts were expanded through teacher-directed activities and centers, both sustaining and specific to the unit. The children were free to explore and discover within the center format.

Teacher-Directed Activities

These teacher-directed activities were presented to introduce the concepts of the unit.

Web of Pond Life

The teacher led a discussion of the ecological system of ponds. A web was made on large chart paper showing animal and plant life found in

and around ponds. The web, hung on the wall, was added to during the unit.

Pond Mural

The students drew the image of a pond on a large roll of paper. Then the students drew and cut out images of plant and animal life that are a part of the habitat of ponds and attached these pieces to the mural.

Student-Directed Activities

Many literature-based activities were presented in learning centers to extend the content of the pond and water study and to engage in the processes of the language arts and science areas. The centers provided options for students to engage in the processes of language while experiencing the functions of language. Both sustaining centers and those specific to the unit were offered.

Sustaining Centers

Sustaining centers were maintained throughout the school year with the contents changing to reflect the unit being studied. These centers provided a predictable and secure learning environment.

- Listening/Reading Center

This center offered books with accompanying teacher-made cassette tapes from the different genres pertaining to water and ponds. It

was a major source of content for the unit. The works are listed in the appendix.

The center was often used, especially to research drawings for the pond mural and to write mini-reports. Better readers liked to read the books on their own. Less able readers enjoyed listening to the tapes and looking at the illustrations/photographs.

- Poetry Center

Teacher-made posters of poems were displayed in the classroom. Also, the teacher compiled for the center a bound volume of poetry that focused on the theme of water and ponds.

Directions for composing cinquain poems with images of the pond were presented through a poster. The poems for the compilation and the charts were primarily from the volumes listed in the appendix.

Directions for cinquain poetry.

Line 1—one word, noun

Line 2—two words, describing words

Line 3—three words, actions

Line 4—four words, phrase to describe

Line 5—one word, summary word or synonym of the image on line

one

Cut out a picture from a magazine or draw a picture to accompany the image of your cinquain. Display your poem on the bulletin board and eventually contribute it to the class book.

Many students enjoyed reading the charts and the compilation of poetry. They thought cinquains would be difficult to write until they followed the directions. They were surprised at the simplicity of the form and felt proud of their writing results.

- **Author/Illustrator Center**

The featured author of this unit was Joanne Ryder. She has won many awards for her books about nature. Her books blend scientific fact with poetry. A number of her books describe the growth and life cycles of small creatures. She also likes to take readers on imaginary travels that transform them into animals. A brief biography of the author, as well as examples of her works, was exhibited in this center. These works are listed in the appendix.

The students enjoyed the nature books. They were interested in finding other books by Ryder in our school library.

- **Bookmaking Center**

This center contained materials and directions for constructing books. The children wrote mini-reports about pond plants and animals in the books that they constructed.

This center was constantly occupied by several children. Some students worked individually on their mini-reports while others worked in pairs. Those that enjoyed drawing also illustrated their books.

Centers Specific to the Unit

These centers were developed specifically for this unit of study on pond and water.

- Riddle Center

Science goal: The children will become familiar with animals living in and near a pond.

Language arts goal: The students will describe animals in the form of a riddle.

Literature Experience: With a partner read the poem "Odd," by Lilian Moore, from Something New Begins (New York: Atheneum, 1982). Have the partner guess what animal (toad) the poem describes.

Expressive Activity: Write a riddle about a pond animal on one side of the paper. On the other side, write the answer and illustrate it. Share the riddle and picture with the class. Contribute your riddle to the class book.

Children's Response: Each child wanted to write a riddle for classmates to guess its image. The class book has been popular during free reading time.

- Growing Center

Science goal: The students' understanding of the growth cycle of animals will be extended.

Language arts goal: The children will follow a sequence of ideas associated with the life cycle of animals.

Literature Experience: Read/listen to The Mysterious Tadpole, by Steve Kellogg (New York: Dial, 1977), and The Very Hungry Caterpillar, by Eric Carle (New York: Collins, 1979).

Expressive Activities: Use four to eight small sheets of paper to draw the stages of the life of a tadpole/frog or caterpillar/butterfly. Staple the pages together to make a flip chart. These flip charts can be added to the classroom library.

Children's Response: Those who were comfortable drawing had fun with these flip charts. The growth cycles of many animals were explored by the students. They studied many more animals than expected.

- Puppet Center

Science goal: The children will learn the characteristic markings and coloring of turtles.

Language arts goal: Students will focus on the details of an image.

Literature Experience: Read/listen to Turtle Tale, by Frank Asch (New York: Dial, 1978), and the Aesop fable, The Tortoise and the Hare.

Expressive Activity: Make a turtle puppet, coloring it to match the markings of a real turtle. With a partner, use the puppet to retell one of these stories.

Children's Response: The children drew turtle puppets and retold their favorite turtle story.

- Frog Race Center

Science goal: The children will learn how fast and far a frog can hop.

Language arts goal: The children will increase their ability to write directions.

Literature Experience: Read/listen to The Great Frog Race, by Kristine O. George (New York: Clarion, 1997).

Expressive Activity: Write the directions for training a frog for a race. Think of a name for your frog. Have a frog-jumping contest, using plastic frogs. Display the results on a graph.

Children's Response: The children wrote many different directions for training a frog. They had much fun conducting the frog jumping contest. The students graphed their results and declared their contest a tie between "Jumper" and "Hoppy."

Summary

A literature-based science unit can provide a rich learning environment. Integrating the language arts with the science area allows children to engage in the processes of both areas while experiencing interesting content. Integrating these two areas helps to facilitate efficient instruction. The natural overlap of contents reinforces children's learning.

The students were actively involved in the pond and water unit that integrated the language arts with science content. The children became more independent as they took charge of their learning experiences. They were excited to move from center to center learning new information about the wonders of a pond.

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Christopher-Gordon.

Appendix

References of Sustaining Centers

Listening/Reading Center

- Fiction

Asch, Frank. (1978). Turtle tale. New York: Dial.

Carle, Eric (1979). The very hungry caterpillar. New York: Collins.

Christian, Mary B. (1974). Devin and Goliath. Normand Chartier, illus. Reading, MA: Addison-Wesley.

Ets, Marie Hall (1955). Play with me. New York: Viking.

Fernandes, Eugenie (1986). Ordinary Amos and the amazing fish.

Henry Fernandes, illus. New York: Golden Book.

Fisher, Aileen (1964). Listen, rabbit. Symeon Shimin, illus. New York: Crowell.

Fleming, Denise (1993). In the small, small pond. New York: Holt.

Hoban, Lillian (1977). Stick-in-the-mud turtle. New York: Greenwillow.

Kellogg, Steven (1977). The mysterious tadpole. New York: Dial.

Lionni, Leo (1970). Fish is fish. New York: Pantheon.

Lobel, Arnold (1979). Days with frog and toad. New York: Harper & Row.

Mayer, Mercer (1967). A boy, a dog, and a frog. New York: Dial.

Rockwell, Anne and Harlow (1970). Olly's polliwogs. New York: Doubleday.

Tafari, Nancy (1984). Have you seen my duckling? New York: Greenwillow.

- Nonfiction

Ames, William H. (1981). Life in ponds and streams. Washington, DC: National Geographic Society.

Back, Christine, and Barrie Watts (1984). Tadpole and frog. New Jersey: Silver Burdett.

Brownell, M. Barbara (1988). Busy beavers. Washington, DC: National Geographic Society.

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Dorros, Arthur (1996). Animal tracks. Boston: Houghton Mifflin.

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Fowler, Allan (1987). Life in a pond. New York: Childrens Press.

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Isenbart, Hans-Heinrich (1979). A duckling is born. Othmar Baumli, illus. New York: Putnam's Sons.

Jennings, Terry J. (1985). Pond life. Chicago: Childrens Press.

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Parker, N. (1990). Frogs, toads, lizards, and salamanders. New York: Greenwillow.

Rockwell, Anne (1994). Ducklings and pollywogs. Lizzy Rockwell, illus. New York: Macmillan.

Royston, Angela (1991). Frog. Kim Taylor, illus. New York: Lodestar.

Stone, Lynn (1990). Raccoons. Vero Beach, FL: Rourke.

Stone, Lynn M. (1995). Salamanders. Vero Beach, FL: Rourke.

Stone, Lynn M. (1996). Wetlands. Vero Beach, FL: Rourke.

Poetry Center

Allen, Thomas B. (1996). Once in the country. New York: Putnam.

Froman, Robert (1974). Seeing things, a book of poems. New York: Crowell.

George, Kristine O'Connell (1997). The great frog race. Kate Kiesler, illus. New York: Clarion.

Graham, Joan Bransfield (1994). Splish splash. New York: Ticknow & Fields.

Kent, Jack (1982). The caterpillar and the polliwog. New York: Simon & Schuster.

Lewis, J. Patrick (1990). A hippopotamusn't and other animal poems. New York: Puffin.

Moore, Lilian (1982). Something new begins. New York: Atheneum.

Ryder, Joanne (1985). Inside turtle's shell. New York: Macmillan.

Author/Illustrator Center—Joanne Ryder

Fireflies. Don Bolognese, illus. New York: Harper & Row, 1977.

The goodbye walk. Deborah Haefele, illus. New York: Lodestar, 1993.

Hello, tree! Michael Hays, illus. New York: Lodestar, 1991.

Mockingbird morning. Dennis Nolan, illus. New York: Four Winds, 1989.

My father's hands. Mark Graham, illus. New York: Morrow, 1994.

One small fish. Carol Schwartz, illus. New York: Morrow, 1993.

The snail's spell. Lynne Cherry, illus. New York: F. Warne, 1982.

The spider's dance. Robert J. Blake, illus. New York: Harper & Row, 1981.

Step into the night. Dennis Nolan, illus. New York: Four Winds,
1988.

Under your feet. Dennis Nolan, illus. New York: Four Winds, 1990.

When the woods hum. Catherine Stock, illus. New York: Morrow,
1991.

Where butterflies grow. Lynne Cherry, illus. New York: Lodestar,
1989.