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An integrated science unit : ants

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Abstract

This instructional development project integrated language arts and the science areas. A print-rich environment extended content and offered models of language, thus energizing children to become actively involved in the study. Many literature genres and related expressive activities provided children with many options for learning experiences. The focus for this science unit for grade two was on ants. A print-rich environment was provided along with computer software and access to information on the internet.

An Integrated Science Unit: Ants

A Graduate Project

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by

Julia Dillehay

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Abstract

This instructional development project integrated language arts and the science areas. A print-rich environment extended content and offered models of language, thus energizing children to become actively involved in the study. Many literature genres and related expressive activities provided children with many options for learning experiences.

The focus for this science unit for grade two was on ants. A print-rich environment was provided along with computer software and access to information on the internet.

A literature-based classroom by providing content and models of language offers an environment that encourages children to use language to learn. Through a rich source of quality children's literature, children learn language, learn about language, and learn through language (Galda, Cullinan & Strickland, 1997). When children are surrounded by meaningful print, learning takes place. Children develop reading and writing abilities as they participate in the language processes and interact with people who use written language (Smith, 1994).

Language tasks and content concepts and their related vocabulary need to be taught in the context of the reading functions (Fuhler, 1990). Read aloud activities presented by the teacher support children in developing concepts of print, improving listening abilities, building concepts and related vocabulary, and improving comprehension. Such activity has a positive impact on children's attitude toward reading (Routman, 1991).

Children engage in the writing and reading processes throughout the school day in a literature-based school program. Literature is the base of the curriculum. The different aspects of the language arts are connected, and the language tasks can be associated with the functions of language across the curriculum (Huck, Hepler, Hickman & Kiefer, 1997; Galda, et.al., 1997).

Value of Literature-Based Language Arts

Literature-based instruction can support children's development of personal-social and thinking-language abilities. Children enjoy reading literature that is developmentally appropriate. As a result, they develop a positive attitude towards reading which in turn builds a lifelong appreciation of language. Literature-based instruction allows children to develop a respect for their own ideas, have an opportunity to find success in taking risks, and develop cooperative group abilities that allows them to gain respect for others as well as their ideas (Galda, et.al., 1997).

An extensive base of quality literature can energize children to become actively involved with written language. Such experiences expose them to many types of story structures, ways to organize information, and writing styles (Routman, 1991). Being involved in literature experiences can improve children's writing ability. Experiences with fine models of writing and activities in which a well-designed text is offered as a scaffolding for creating their own writing pieces allow children to understand writing possibilities and ways to manipulate language. As children read, write, respond and share, they expand their metacognitive knowledge and social-language abilities (Graves, 1983).

Literature-Based Language Arts Extended to the Science Area

Science involves many abstract concepts. When different genres of literature are integrated across the curriculum to the science area, children can begin to see the relationships of science concepts with their own world. Children find it easier to follow a plot in a story than to comprehend facts from textbooks (Butzow & Butzow, 1989). The different genres of literature expand the dimensions for learning (Langer, 1995). As a result, more science concepts and related vocabulary can be offered, and they can be more clearly understood and thus remembered (Butzow & Butzow, 1989).

When teachers integrate the curricular areas, making use of their common tasks, they can more easily develop a school program that is meaningful to the students, thus energizing them to assume goals that will extend their thinking-language abilities (Bosma & Guth, 1995). Trade books representing a range of reading levels as well as interests of students can provide a rich source of information and excellent models of written language.

To support children's learning, journals can be used to record their learning experiences with literature. Developing a webbing of the unit's concepts and related vocabulary can introduce children to discussing and outlining a plan of study. This process can be ongoing as children search for ideas from many sources. The webbing can also provide options for

individual or small group study. As the unit comes to a close, a web can depict an overview of the study (Butzow & Butzow, 1989).

Many literature-based classrooms use centers to extend the literature base across the curriculum and provide options for expressive activity.

Sustaining centers remain in the classroom all year but change in content from unit to unit. Also, centers specific to a theme or unit can provide a wealth of content and activity. These centers can extend the literature base by providing experiences with different genres and expressive experiences (Harms & Lettow, 1998).

Implementation of Literature-Based Science Unit: Ants

An integrated literature-base approach was applied to a science unit in an established second grade science curriculum on plant and animal populations. The language arts and the science areas were integrated in the unit. Teacher-directed activities as well as sustaining centers and centers specific to the unit were used to expand science concepts through the different genres of literature.

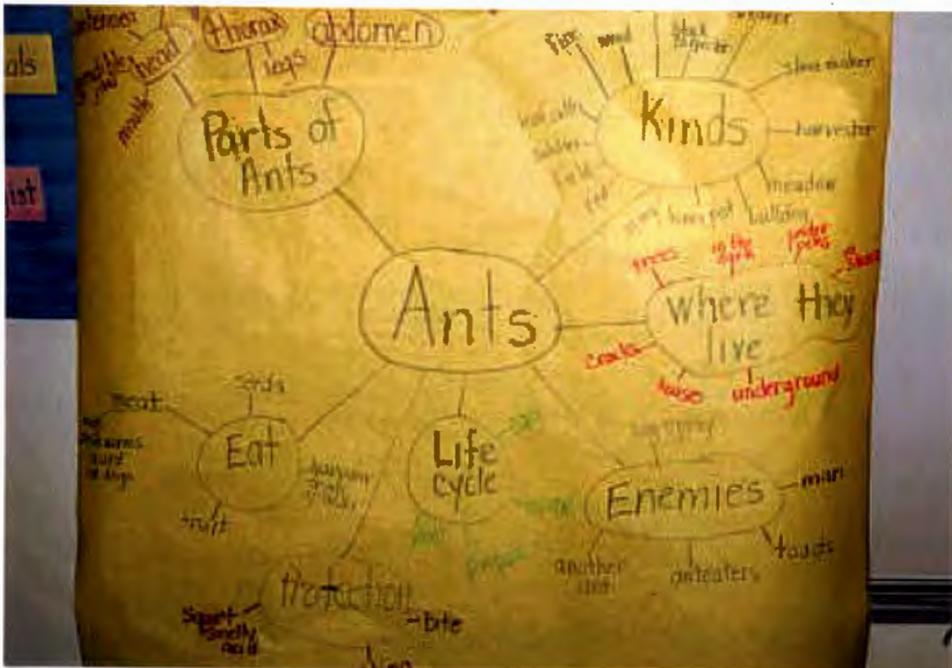
The focus for this unit was on how an ant population interacted and changed. Children observed the social behavior of ants in the colony as they built their tunnels and consumed the food and water that was provided for them.

Teacher-Directed Activities

The teacher introduced the unit on ants with a webbing activity. First, the teacher led the students in listing what they wanted to learn about ants. These ideas included what they eat, kinds of ants, where ants live, their enemies, body parts, jobs and protection. The teacher then read Barbara Brenner's Thinking About Ants (Grenvale, NY: Mondo, 1997) and Steve Parker's It's an Ant's Life (Pleasantville, NY: Readers Digest Children's Books, 1999). The students used the information from the books to expand the web. The webbing activity was ongoing throughout the unit and was updated as new information or ideas were discovered (see Figure 1).

Figure 1

Webbing for the Unit



Another teacher-directed activity was choral speaking with Lorna and Graham Philpot's Amazing Anthony Ant (New York: Random House, 1994). The children enjoyed using the flip book and choosing a new maze for Anthony to move through as they chanted or sang to the tune of "When Johnny Comes Marching Home." This book became a favorite at the listening/reading center.

Student-Directed Activities

Learning centers were used to extend the literature base across the curriculum into the science unit, specifically related to ants. The centers provided many experiences with the different genres as well as options for expressive activities. Sustaining centers were used along with centers specific to the unit.

Sustaining Centers

Sustaining centers were used in the classroom throughout the year to provide a predictable and secure environment for engaging children in the functions of language. The following sustaining centers were used throughout the study of ants: listening/reading, poetry, author, and bookmaking.

- Listening/Reading Center

A rich source of quality children's fiction and nonfiction literature were available in the listening/reading center, some with

accompanying teacher-made cassette tapes. Students used this center to find factual information about ants and to enjoy stories involving ants. The words are listed in Appendix A.

Student Response: The students enjoyed the different genres of literature representing different reading levels. They listened to or read again some books several times that they particularly enjoyed and often shared or read them with a partner (see Figure 2).

Figure 2

Children Reading from the Listening/Reading Center



- Poetry Center

Poetry was introduced by reading it aloud to the class before it was added to the center. Some of the poems were enlarged for posters and hung in the poetry area. The poems are listed in Appendix A.

Student Response: The students had fun reading the poems about ants. Some became favorites, especially “The Army Ants.” by Douglas Florian. Students selected their favorite poems from this center, duplicated them, and placed them in their individual poetry books. Many children wrote poetry during writers workshop.



- Author Center

Joanne Ryder was the featured author in this center because she has written many award winning children's books about nature, using a blend of scientific fact and fantasy in a lyrical style. Through her works, she expands children's imagination by challenging them to view the world from a specific animal's point of view.

The students were introduced to Joanne Ryder through a short biographical sketch that was exhibited in the center along with her picture. Her latest book, Each Living Thing (Ashley Wolff, II., San Diego, CA: Harcourt, 2000), was read aloud to the students and discussed. Other works by Joanne Ryder were included in the author center. A list of her works are given in Appendix A.

Student Response: The students enjoyed listening to/reading Joanne Ryder's books because they were about nature. How animals lived and actions of animals were written in a lyrical form. They especially like the message in her latest book Each Living Thing: Enjoy watching animals and let them be.

- Bookmaking Center

Students were provided with materials to make books about ants. Some of the books made were stepbooks showing the four stages of an ant's life cycle, thumbprint ant books, and anthill shape journals.

Student Response: The bookmaking center was a popular center as students were eager to make a book of their own. Fiction books, number books, and nonfiction stories were produced and shared with the class.

Centers Specific to the Unit

- Observation Center (The curricular standards were taken from Kendall and Marzan, 1997.)

Science Standard K-2: Understands the nature of scientific inquiry: Knows that learning can come from careful observations and simple experiments.

Language Arts Standard K-2: Demonstrates competence in the general skills and strategies of the writing process: Dictates or writes detailed descriptions of familiar persons, places, objects, or experiences.

Literature Experience: Listen to/read Savage, Steven. (1995). Observing Nature....Ant. Clive Pritchard. (Il.). New York: Thomas Learning.

Expressive Activity: Record in your ant hill journal observations you have made of the ant farm.

Expressive Activity: Record in your ant hill journal other observations you have made of an ant under the magiscope.

Expressive Activity: Use a blank picture of an ant farm and draw the tunnels similar to what you observed in the ant farm in the classroom.

Student Response: The students were eager to observe the ant farm and engaged in this activity throughout the day not just at center time. They liked using the magniscopes to view parts of an ant along with other ready-made slides (see Figure 3).

Figure 3

Children Observing the Ant Farm



- Technology Center

Science Standard K-2: Knows the characteristics and uses of computer software programs.

Language Arts Standards K-2: Demonstrates competence in the general skills and strategies for reading a variety of informational

texts: Applies reading tasks and strategies to many types of informational books.

Literature Experience: Listen to/read Hepworth, Cathi. (1992). Antics. New York: G.P. Putnam's Sons.

Expressive Activity: After listening to/reading Antics, use the curriculum web page to locate the Antics site on the internet. Click on the red ants and see if you can guess the word containing "ant."

Literature Experience: One small square: Backyard. (1995). Los Angeles, CA: Virgin Sound and Vision. (CD-ROM)

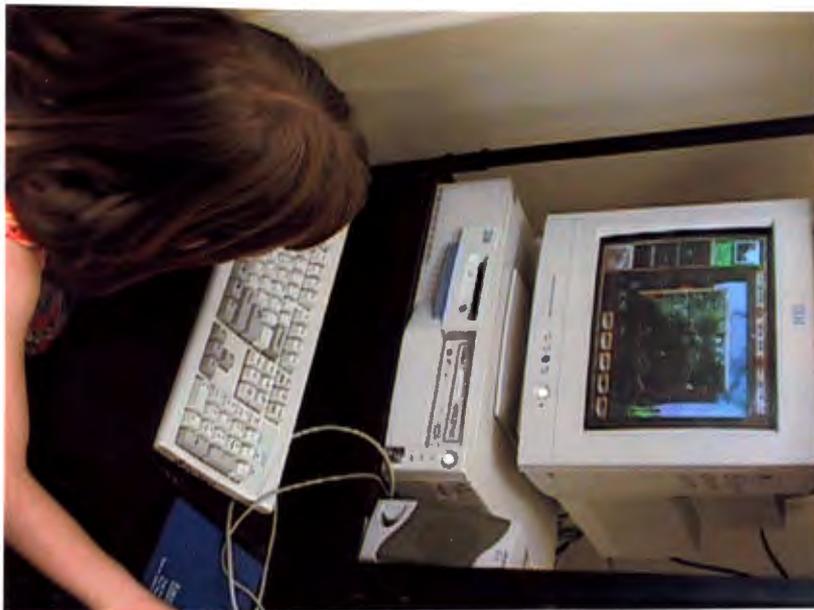
Expressive Activity: Use the CD-ROM One small square: Backyard to learn about ants and other animals that live in the same ecosystem. Use the journal page in the program to record what you learned and then print it out with a picture of what you wrote about.

Expressive Activity: Use the ant sites from the internet to locate additional information about ants.

Student Response: Students used two classroom computers with two software programs along with a curriculum web page, designed by the teacher, to access ant sites on the internet (see Figure 4). The computers gave the students an opportunity to use a different media in order to seek information. As they listened, read, and viewed, they became actively involved in their learning. Appendix A contains a list of CD's and sites used on the curriculum web page.

Figure 4

Student Viewing a Software Program



- Math Center

Mathematics Standard K-2: Uses a variety of strategies in the problem-solving process: Uses whole number models (e.g., pattern blocks, tiles, or other manipulative materials to represent problems).

Language Arts Standard K-2: Demonstrates competence in the general skills and strategies of the writing process.

Literature Experience: Listen to/read these books.

Losi, Carol A. (1997). 512 ants on sullivan street, Patrick Merrell, Il. New York: Scholastic.

Pinczes, Elinor J. (1993). One hundred hungry ants. Boston: Houghton Mifflin.

Pinczes, Elinor J. (1994). Remainder of one. Boston: Houghton Mifflin.

Expressive Activity: Use the ant manipulatives to make formations like those shown in the stories or design your own formations.

Expressive Activity: Use the ant manipulatives to make up story problems about ants.

Student Response: The students liked lining up the ant manipulatives into different formations and patterns.



- Retelling Center

Language Arts Standard K-2: Demonstrates competence in the general skills and strategies for reading a variety of informational texts: Summarizes information found in texts (e.g., retells in own words).

Literature Experience: Listen to/read these Aesop fables.

The ant and the grasshopper, East, P. (1997). Thematic unit: Ants.

Huntington Beach, CA: Teacher Created Materials.

The ant and the dove, East P. (1997). Thematic unit: Ants. Huntington Beach, CA: Teacher Created Materials.

Expressive Activity: Use the flannelboard pieces to retell the fables.

Student Response: The students enjoyed retelling the fables.

- Story Writing Center

Language Arts Standard K-2: Demonstrates competence in the general tasks and strategies of the writing process: Dictates or writes stories or essays, based on one's own experience, with a sequence of events that make sense (see Figure 5).

Literature Experience: Listen to/read Hoose, David & Hannah. (1999).

Hey little ant. Debbie Tilley, Il. New York: Scholastic.

Expressive Activity: Finish the story, "What do you think the child should do?"

Literature Experience: Listen to/read Calder, S.J., (1989). If you were an ant. Englewood Cliffs, NJ: Silver Press.

Expressive Activity: Imagine that you are an ant. Write a story about an adventure you had as an ant.

Student Response: The students had a good time deciding if they would step on the ant. They also had fun making comparisons like those in If you were an ant.

Figure 5

Student Working in the Writing Center



- Art Center

Literature Experience: Listen to/read Dorros, Arthur (1987). Ant cities. New York: Crowell.

Expressive Activity: Make your own ant city. Use construction paper and glue to make ant tunnels. When the glue is dry, place a plain piece of paper over the construction paper and color it and the ant tunnels will appear.

Literature Experience: Listen to/read Cutting, Brian & Jillian (1992).

Ants. Bothell, WA: Wright Group.

Expressive Activity: Make an ant using the materials available. Label the parts of the ant.

Student Response: An assortment of materials were available including clay, foam rubber, pipe cleaners, egg cartons, and styrofoam balls. Different ant tunnel formations were created along with some interesting looking ants.

Conclusion

Extending the literature base across the curriculum to the science area generated enthusiasm for learning among these second graders. Special needs students were given an opportunity to interact and become involved with other students in the learning process. The different genres allowed them to engage in the functions of language at the same time attaining concepts of science.

The centers gave the children opportunities to take charge of their learning. Every morning the children arrived eager to observe what had happened overnight to the ants in the ant farm.

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Smith, F. (1994). Understanding reading. (5th ed.). Hillsdale, NJ:
Lawrence Erlbaum.

Appendix A

Bibliographies of Sustaining Centers

Listening/Reading CenterFiction

Allinson, B. (1990). Effie. B. Reid, (Il.), New York: Scholastic.

Baker, B. (1981). Rat is dead and ant is sad. M. Funai, (Il.), New York: Harper & Row.

Beech, L.W. (1996). The Magic School Bus Gets Ants in Its Pants. J. Speirs, (Il.). New York: Scholastic.

Boegehold, B. (1980). Bear underground. J. Arnosky, (Il.). New York: Doubleday.

Cameron, P. (1961). I can't said the ant "A second book of nonsense". New York: Coward.

Flemming, D. (1981). In the fall, tall grass. New York: Holt.

Mizumura, K. (1970). Way of an ant. New York: Crowell.

Moses, A. (1992). If I were an ant. T. Dunnington, (Il.), Chicago: Childrens Press.

Myrick, M. (1968). Ants are fun. A. Lobel, (Il.). New York: Harper & Row.

Peet, B. (1972). The ant and the elephant. Boston: Houghton Mifflin.

Rattigan, J.K. (1994). Truman's aunt farm. Boston: Houghton Mifflin.

Van Allsburg, C. (1988). Two bad ants. Boston: Houghton Mifflin.

Waber, B. (1975). An anteater named arthur. Boston: Houghton Mifflin.

Wolkstein, D. (1994). Step by step. New York: Morrow.

Nonfiction

Bix, C.O. (1982). Ants. Satoshi Kuribayashi, (Il.). Minneapolis, MN: Learner.

Butterworth, C. (1988). Ants. Morristown, NJ: Silver Burdett.

Chinery, M. (1991). Ant: Life story. N. Armstrong, (Il.). Mahwah, NJ: Troll.

Fichter, G.S. (1993). Bees, wasps, and ants. K. Kest, (Il.). New York: Golden.

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Johnson, J. (1995). Bugs a closer look at the world's tiny creatures. New York: Reader's Digest.

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Sheridan, J. (1992). Ants, ants, ants. Bothell, WA: Wright.

Sheridan, J. (1992). How ants live. Bothell, WA: Wright.

Terry, T. & Linton, M. (1988). Life cycle of an ant. J. Harland, (Il.).
New York: Bookwright.

VanWoekom, D. (1979). Hidden Messages. L. Cherry, (Il.). New York:
Crown.

Watts, B. (1990). Ants: Keeping minibeasts. New York: Franklin Watts.
Poems

Berger, G. (1993). Teaching guide: The world of ants. C. Martinot, (Il.).
New York: Newbridge.

“Ants, Although Admirable, Are Awfully Aggravating”

“Every Insect”

“Under the Ground”

Florian, D. (1994). Beast Feast. San Diego: Harcourt Brace.

“The Ants”

“The Anteater”

Florian, D. (1998). Insectlopedia. San Diego: Harcourt Brace.

“The Army Ants”

Hopkins, L.B. (1999). Spectacular science a book of poems. V. Halstead,
(Il.). New York: Simon & Schuster.

“How?”

Livingston, M.C. (1979). O sliver of liver. I. Van Rynbach, (Il.). New York: Atheneum.

“Driveway”

“For Sara”

Ryder, J. (1985). Inside turtle’s shell and other poems of the field. S. Bonners, (Il.). New York: Macmillan.

“Ant sighs and climbs”

Worth, V. (1994). All the small poems and fourteen more. N. Babbitt, (Il.). New York: Farrar.

“anteater”

Author Center – Joanne Ryder

Chipmunk song. (1987). L. Cherry, (Il.). New York: Dutton.

Fireflies, (1977). D. Bolognese, (Il.). New York: Harper & Row.

Fog in the meadow. (1979). G. Owens, (Il.). New York: Harper & Row.

The Goodbye Walk. (1993). D. Haeffele, (Il.). New York: Lodestar.

Mockingbird morning. (1989). D. Nolan, (Il.). New York: Four Winds.

My father's hands. (1994). M. Graham, (Il.). New York: Morrow.

Snail in the woods. (1979). J. Polseno, (Il.). New York: Harper & Row.

The snail's spell, (1982). L. Cherry, (Il.). New York: Warne.

The spiders dance. (1981). R.J. Blake, (Il.). New York: Harper & Row.

Step into the night. (1988). D. Nolan, (Il.). New York: Four Winds.

Under your feet. (1990). D. Nolan, (Il.). New York: Four Winds.

When the woods hum. (1991). C. Stock, (Il.). New York: Morrow.

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Technology Center

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<http://ezra.mts.jhu.edu/~naomi/insects/ants.html>.

Truscio, R. (1999). Ants.
<http://home.att.net/~B-P.TRUSCIO/STRANGER.htm>.