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Dr. Sandra Cain

Dr. Leonie Rose

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Assessing Children's Picture Books: Assisting Teachers in Integrating Science and Literature

Dr. Sandra Cain is a professor of science education in the Teacher Education Department at Central Michigan University. Dr. Leonie Rose is a professor of reading in the Teacher Education Department at CMU and is president of MRA.

For over 15 years educators have recommended that teachers use high quality literature to teach content area concepts in a variety of subject areas through integrated units (Smardo 1982; McGowan & Guzzetti 1991; Lapp & Flood, 1993; Wepner & Feeley, 1993). Several reasons are given in the literature for these recommendations. For example, children's literature tends to have a more familiar story structure and more interest appeal than content texts. The beautiful illustrations in picture books enhance the print, catch the attention of the reader and provide additional motivation for using children's literature to teach content area concepts. Many times these books provide a needed resource for teachers and students. As a result, many teachers are using children's literature to teach science concepts. However, this instructional practice has received mixed reviews.

While there are many excellent resources available for selecting high quality children's literature (Huck, 1993; Cullinan and Galda, 1994; Norton, 1995; Hennings, 1996) little research has been conducted to assist teachers in determining which books are appropriate for teaching science concepts (Cain & Evans, 1990; Mayer, 1995). On the

one hand, a good story does not compensate for misconceptions in science content, and on the other, good coverage of science facts and concepts does not justify a poorly written book.

Instruments that assist teachers in selecting literature that is both high quality and appropriate for teaching science concepts are in short supply. In response to this need, this article: (1) addresses benefits and cautions in using children's picture books to teach science concepts, (2) introduces the *Assessment Inventory: Selecting Children's Picture Books to Teach Science Concepts*, (3) provides suggestions and recommendations gained from using the assessment inventory for four specific books that teachers might use to teach science concepts, and (4) includes a three-category list of picture books that classroom teachers have evaluated using the *Assessment Inventory*.

Benefits of using children's literature to teach science concepts

Using children's literature to enhance science instruction benefits children because it fosters personal connections and builds on prior knowledge related to the targeted science concept (Lapp & Flood, 1993; Reutzel

& Cooter, 1996; Eanes, 1997). These personal connections increase interest, improve reading skills and allow for individuality (Rice & Rainsford, 1996; Casteel & Isom, 1994; Tunnel & Jacobs, 1989).

Children are familiar with the narrative story structure represented in good children's literature. This familiarity makes it easier for them to understand and retain science concepts

Sometimes the fictional parts of the story can actually confuse children and interfere with a child's understanding of important science concepts.

being presented in a high quality piece of literature than when these same concepts are presented in an expository text that may contain a variety of text styles (Maria & Junge, 1993; Wepner & Feeley,

1993; Jacobson, 1998). Expository text patterns used in science are not by nature predictable, often contain ideas that are unfamiliar, and use technical vocabulary that contributes to reading difficulty for students (Lapp & Flood, 1993; Eanes, 1997).

Children's picture books are less intimidating for students with reading difficulties (Carlile, 1992; Stiffler, 1992). They allow for more in-depth coverage of science concepts (Crook & Lehman, 1990) and encourage higher levels of discussion. Picture books also provide many opportunities for designing hands-on activities related to the targeted science concept (Pond & Hoch, 1992).

Smardo (1982) recommends using children's literature to clarify science concepts. High quality children's literature can introduce science lessons by raising questions about what is realistic and what is fictitious. Stories offer rich and varied opportunities for discovery in science. They can be used to raise questions that can guide instruction and make it more meaningful for students.

Interesting and enjoyable literature involving science concepts can be used to help dispel anxiety and phobia related to this subject while encouraging students to appreciate

the practical applications of science in everyday living (Butzow & Butzow, 1989; Eanes, 1997). Some teachers find that quality children's literature is useful in a number of ways, including inspiring writing projects, motivating students, drawing conclusions, testing hypothesis, and providing reading skills that are essential for the collection, analysis, and manipulation of data (Lapp & Flood, 1993; Eanes, 1997).

Why the Assessment Inventory?

A quality piece of children's literature does not contain stereotyping in any of the key story elements (Huck, 1993; Norton, 1995; Hennings, 1996). Clearly using good literature to teach and reinforce science concepts can enhance science instruction by presenting scientific information in a format that is easy for children to identify with personally. However, sometimes the fictional parts of the story can actually confuse children and interfere with a child's understanding of important science concepts (Wiley & Royce, 1999). Children can develop misconceptions based on information presented in children's literature.

Deborah Mayer (1995) studied the science concepts that primary students learned after listening to a piece of children's literature titled "Dear Mr. Blueberry." She found that the children acquired misconceptions and developed negative attitudes about other issues related to the story line. Mayer concluded that "certain books may unintentionally foster misconceptions and influence attitudes ... in a negative way" (p.17). Mayer's study as well as others have revealed no significant increase in the amount of new scientific information learned by students when children's literature was used as an instructional strategy. (Mayer, 1995; Lamartino, 1995; Butzow, 1991).

In view of these findings and feedback from teachers, it becomes clear that guidelines are needed to assist in the selection of high quality children's literature that adds to students' understanding of the science concept being taught and does not create

misconceptions or negative attitudes. As McGowan and Guzzetti (1991) note, the well-planned use of children's literature requires teachers to engage in decision-making while using their ingenuity, resourcefulness, and knowledge of content.

Mayer (1995) developed a checklist to measure a piece of literature's appropriateness for teaching science concepts. This checklist was used as a resource in developing the *Assessment Inventory: Selecting Children's Picture Books to Teach Science Concepts*. Mayer's original checklist does not include items related to selecting good literature nor does it involve the teacher in determining the science content area or identifying the specific science concept that would be learned. The *Assessment Inventory* can assist teachers in examining both the quality of the literature and the science concepts present in the text.

Description of the instrument

The *Assessment Inventory for Selecting Children's Picture Books to Teach Science Concepts* has eight categories with two to three questions related to each category (see Appendix A on page 41). The questions are designed to elicit information about a specific book that can be used in making a decision about whether to use that book to teach targeted science concepts. The categories are (1) theme, (2) story line, (3) characters, (4) setting, (5) illustrations, (6) aesthetic qualities, (7) stereotyping, and (8) misrepresentations or misconceptions. Information about the questions for each category is discussed briefly below.

1. The first category, **Theme**, helps to establish the book's purpose from a literary as well as a science point of view. Good children's literature will have a message, lesson, or moral about life that permeates the story (Lukens, 1995). Generally speaking, the successful writer communicates the themes through the events and characters rather than through an overt statement as in a fable. It is important for teachers to identify the literary purpose and use it to teach story grammar to

young readers. The science concept that would be learned must also be identified along with the content area(s) to which it belongs.

The *National Science Educational Standards* (1996) identifies the following content standards for K-4. In the area of physical science, "all students should develop an understanding of properties of objects and materials, position and motion of objects and light, heat, electricity and magnetism" (p.123). In the area of life science the understandings focus on "the characteristics of organisms, life cycles of organisms and organisms and environments" (p.127). Earth and space science concepts center on "properties of earth materials, objects in the sky and changes in earth and sky" (p.130). There are many children's books that focus on one or more concepts from one of these three traditional science content areas—physical, life and earth/space.

The *Science Standards* also includes a category for science and technology. Students in grades K-4 are expected to engage in activities that help them understand "that some objects occur in nature; others have been designed and made by people to solve human problems and enhance the quality of life" (p.138). Teachers should purposefully select books that fall into the science and technology area. These books can be used to help children connect to the designed world and foster an understanding of how technological objects and systems work. Stories in which the characters tackle tasks with a technological purpose and solve them can serve as an introduction to firsthand experience with classroom projects in which children design ways to use technology to solve "real world" problems.

It is important that teachers be aware of the intended purpose of the book from both a literature and a scientific viewpoint. Teachers also need to determine whether this intended purpose matches the instructional purpose for which it will be used.

2. The second category, **Story Line**, asks the teacher to identify the plot structure and

type of story. In picture storybooks, the plot is usually relatively simple. There tends to be one main sequence of events, with few or no subplots to take attention from the main character, and one central problem that needs to be solved. Usually, each action flows from earlier ones to enable the reader to predict what will occur and what the outcome will be (Hennings, 1996).

Dorothy Grant Hennings (1996) has identified four types of plot patterns in picture books that are most often used in primary grades. In the step-by-step plot pattern events flow logically from one to the next, which leads the reader to a predictable ending. In a turn-about pattern the events still flow logically from one to the next, but the ending is an unexpected surprise. In a story with a circular plot structure the events also flow

Literature that is suited for teaching science concepts should be realistic in order to promote the believability of the story line and characters.

logically from one to the next, but the story ends with the main character returning to the same place or actions as in the beginning of the story. The final plot pattern is repetitive where events are repeated with each repetition varying slightly, but the events are still very predictable. These four plot patterns are reflected in good children's picture books unless the book is a piece of nonfiction that would not have a narrative plot structure.

Most children's picture books can be placed into one of the following categories: Fantasy, realistic fiction, and nonfiction. In a fantasy the setting, events, and/or characters are usually make-believe. Portions of the story could not really take place. In realistic fiction the characters, setting, and events could actually occur in the real world. A piece that is nonfiction does not have the elements of a narrative text such as characters, setting, theme, events, problems, and solutions. These trade books are factual with details and various text patterns such as description, listing, sequence, comparison/contrast, cause/effect,

or problem/solution (Reutzel & Cooter, 1996; Jacobson, 1998).

From a scientific point of view it is important to carefully examine the information presented to be sure that it is factual. A fictional story can be based on factual information and represent what is real. Children must be able to easily distinguish the factual parts from the fictional parts, and the teacher must be able to determine if these fictional parts will lead to misunderstandings or misconceptions related to the science concept that is being targeted (Mayer 1995).

3. The third category addresses the **Characters** in the story. It is important from a science view that animals are depicted naturally. Animals that talk, wear clothes and take on other human characteristics are generally not the best way to help children learn and understand the true nature of animals (Cain & Evans 1990). This can be especially confusing for younger children. In a high quality piece of children's literature authors develop characters through description and actions. Characters must be believable, behave consistently, and have a range of feelings so that readers can easily identify with them (Norton, 1995; Hennings, 1996).

4. In narrative text the **Setting** is the portion of the story that sets the stage by establishing a timeframe and a place where the action takes place. The setting can have little influence on the story or be an integral part of the story that moves the plot forward and heightens feelings (Lukens, 1995; Hennings, 1996). Literature that is suited for teaching science concepts should be realistic in order to promote the believability of the story line and characters. The passage of time should be clear to children. Check to see that the book makes it clear how much time passes during the story—a few minutes, a day, week, year, and so forth.

5. **Illustrations** in literature that is suitable for teaching science concepts should accurately portray scientific representations. Animals, plants, and other objects such as the moon, stars, clouds, raindrops, and rocks should closely resemble the "real thing" and

not be drawn as cartoon-like or given features that are inaccurate or misleading. In picture books meaning is communicated through words and pictures. At times the pictures dominate. Successful storybooks illustrate the verbal story line with pictures that harmonize with the words. Authors can harmonize illustrations and words through use of color, detail, and variations in size (Hennings, 1996). Children learn a great deal from the pictures and illustrations that accompany a story. Make sure that they are not getting mixed messages from inaccurate illustrations.

6. The first question under the sixth category, **Aesthetic Qualities**, calls attention to the effects of the book related to promoting a positive attitude toward inquiry-based science. The *Science Standards* (1996) emphasizes the importance of an inquiry-based science approach for grades K-4. Books that have an active, investigative, process-oriented focus encourage children to take an active hands-on, minds-on role in constructing science knowledge and that in turn fosters the development of a positive attitude toward inquiry-based science. The second question focuses on enjoyment rather than on learning new information. Cox and Zarillo (1993) note that it is just as important that readers enjoy a story as it is to identify important concepts, facts, or vocabulary embedded in the book. Both of these questions are extremely important and teachers should be able to answer **yes** to them both. If either is answered with a no, then that particular book would not be recommended for teaching science concepts.

7. **Stereotyping** deals with issues of negative stereotyping in any of the story elements. Stereotypes can involve gender, culture, religion, ethnicity, or any other way of looking at a group that does not respect individuals or that creates a negative view of those individuals (Norton, 1995; Hennings, 1996). Teachers need to be aware of negative stereotypes that are part of a character's makeup or that are

reinforced through behaviors, attitudes, illustrations, or settings. A book that resorts to using stereotypes is not a good literature or science source.

8. The last category, **Misrepresentations and Misconceptions** is designed to involve teachers in identifying specific parts of the story that might lead children to form science misconceptions. On this portion of the *Assessment Inventory*, the teacher examines the story for misleading information and illustrations that are contrary to scientific findings. Will this story enhance students' understanding of the science concept that was identified in category 1? If there are some questionable or misleading portions of the story, how will the teacher deal with these? Can these inaccurate parts be used to help students learn and remember the science concept that is being taught? Are there so many problems with misrepresentations that this particular book is **not** the best one to use in teaching a science concept? Carefully consider whether the book can be used to increase science understandings and foster deeper meanings related to science content and processes or if it is more likely to cause serious misconceptions that will interfere with important science understandings.

The *Assessment Inventory* has been used with pre-service teachers and classroom teachers. The response has been very favorable. This instrument provides needed criteria for evaluating potential high quality literature to use in teaching and reinforcing important science concepts. See Appendix B on page 42 for a list of picture books that classroom teachers have evaluated using the *Assessment Inventory*. Please note that the teachers adapted the three recommendation indicators found in the assessment inventory (excellent science resource, needs modifications, inappropriate resource) to better meet their needs. These adapted categories are: no or few modifications needed, some modifications needed, and many modifications needed.

Sample Assessment Results

Summary reviews of the following four books: *Owl Moon* by Jane Yolen, *Carlos and the Cornfield* by Jan Romero Stevens, *The Snowy Day* by E. J. Keats, and *Bringing the Rain to Kapiti Plain* retold by Verna Aardema, have been selected from those reviewed by veteran teachers and pre-service teachers using the *Assessment Inventory*. These summary reviews illustrate how the instrument can be useful in evaluating potential literature for teaching science concepts.

Owl Moon by Jane Yolen (1987), is a beautifully illustrated, realistic fiction story of a father and young child who go "owling" together one cold winter night. The author's message is one of patience, hope, and reverence for nature.

Using the criteria contained in the Assessment Inventory, Owl Moon is considered to be an excellent science resource.

The book could be used to promote interest in several life science concepts as well as specific earth and space concepts. The larger area of "night science," which could combine life and earth/space concepts, could be the target, or the focus could be specifically owls. The plot structure used is step-by-step. The facts are accurately presented using a realistic fiction story line. Both animals and humans are depicted naturally, are believable and have no negative stereotypes. The setting is appropriate and time is accurately portrayed although the exact location and timeframe do not influence this story. The match between the story line and the detailed, colorful watercolor sketches helped assure this book the Caldecott Medal for best illustrated picture book of 1987. Children are presented with an accurate picture of what an owl looks like. Active observation of wildlife in a natural setting is encouraged by the characters in this story. Children have responded to this book with rapt attention and enjoyment. *Owl Moon* does not have any misrepresentations that would lead to science misconceptions. Using the

criteria contained in the *Assessment Inventory*, *Owl Moon* is considered to be an excellent science resource.

Many cross-curricular activities could be integrated into a unit that includes this story. Children could observe a stuffed owl, actually view a live owl, examine owl pellets to learn what owls eat, and discuss other nocturnal animals. Students could also conduct simple "research" to find out which animals might be seen at night, participate in actual observations with their parents, and make short reports or presentations. They could observe the night sky and record what is seen and changes that occur. Art would be a natural area to include as part of an integrated unit. Math might be infused by having students compare sizes and measure wingspans of different owls. These are just a few of the activities that teachers and their classes might plan as a result of using *Owl Moon* as part of an integrated unit that actively involves children in developing a deeper understanding of the identified science concepts.

Carlos and the Cornfield by Jan Romero Stevens (1995) is an amusing bilingual story—written in both English and Spanish—with a surprise ending about a boy who plants corn. In order to finish the planting of the corn in less time, Carlos puts many more seeds in each hole instead of just three as he was instructed to do by his father. But when the corn began to come up in haphazard bunches, he knew he had to do something to make things right. His solution results in the surprise ending. The author's message centers on responsibility. Readers learn that when you do your job well the first time, you don't have to do it again. The story line uses a turn about or surprise ending plot pattern, is realistic fiction, presents facts accurately, and does not confuse the factual and fictional parts of the story. The characters are believable, depicted naturally, and negative stereotyping is not present. The setting has appropriate time relationships and is realistic. As with many picture books, the exact location and timeframe are not important features of this story. The illustrator used colorful oil paint-

ings on watercolor paper to complement the verbal style of the text. This story has interest appeal for children in grades K-4 because they can easily identify with Carlos' problem and has the added attraction of having the print in Spanish as well as English. The paintings portray accurate scientific representations, and the story promotes a positive attitude toward inquiry-based science. Teachers could easily use the story to stimulate thinking and action related to seeds and the plants they produce. There are no misrepresentations that the teacher will have to deal with. This book is another excellent science resource for the classroom teacher.

As with many good science resources, this book could be used to teach several different life science concepts. The most obvious would be about growing plants in general and corn plants in particular. The *Science Standards* suggests that children in grades K-4 should begin to "build understandings of concepts through direct experiences with living things, their life cycles and their habitats: (p.127). This book could be used to foster curiosity about how things grow from seeds and lead into looking at a variety of actual corn seeds. Children could spend time observing the different seeds, sorting and describing them, then matching them with the "parent plant." The different seeds could be planted, noting what conditions are necessary for plants to grow and thrive. When the plants produce new seeds, these new seeds could be compared with the original ones planted so children could begin to understand that organisms have traits like those of the "parent." By actively involving children in planting a variety of corn seeds, and watching them grow into mature plants, they can observe firsthand what Carlos experienced when he mistakenly replaced a few rows of poorly planted yellow corn seeds with blue corn seeds.

The Snowy Day by Ezra Jack Keats (1962) is a good example of an older book that is still a good literature and science resource book for classrooms today. The child in this story spends an adventurous day exploring

the new fallen snow. He tries to save a snowball for the next day by putting it in his pocket and taking it into his warm house. Of course, when he checks for it before going to bed, he finds that the pocket is empty. The next day, when new snow is falling, Peter and his friend go out again to share new snow adventures. In this circular story, the author's message is one of appreciation and exploration of the simple everyday aspects of our natural world. The science concepts in this story fit under the identified area of properties of earth materials, from the earth science content

area (*Science Standards*, 1996). Specific science concepts focus on the marvelous properties of new-fallen snow. The story line uses a realistic fiction format that accurately presents facts associated with the properties of snow. The characters in the story are depicted naturally, are believable, and are not portrayed with negative stereotyping. The setting is realistic with no specific location, and the time relationships are appropriate. Even though the illustrations are not accurate scientific representations, the large splashes of color do outline the various objects, pieces of clothing, and people in the story so that children do know what they are and with prompting from the teacher can discuss how an illustrator can use color, textures, and outline to represent various objects in our world. *The Snowy Day* was awarded the prestigious Caldecott Medal for best illustrated picture book in 1962. One of the criteria for this award is that the story and illustrations are well matched. This story captures the attention of young children and is a great one to use to promote inquiry-based science activities. The child in the story is involved in active exploration. Children who live in the northern part of the United States and have had many of these same adventures with snow can use their prior experiences to closely

This story (The Snowy Day) captures the attention of young children and is a great one to use to promote inquiry-based science activities.

identify with Peter. Others who have had little or no experience can deepen their understanding about the properties of snow by experiencing them vicariously along with Peter. They might compare a walk in the snow with a walk in the sand or leaves or with something similar that they have experienced first hand. The only misconceptions that might occur would be associated with the illustrations. Teachers can easily deal with these by pointing out how the illustrator has used bold colors, textures, and outlines to represent various objects. A good discussion on the differences between actual pictures taken with a camera and an artist's depiction using color, texture, and outline to enhance a story can add to a child's understanding of literature and art. This book can be used as an excellent science resource.

Bringing the Rain to Kapiti Plain by Verna Aardema (1981), is based on a Nandi African folktale. Folktales are usually stories that people have made up and passed down through generations about things that may or may not have happened and that are not taken seriously (Norton, 1995). This story provides an interesting but unscientific explanation for how Ki-pat caused the rain to fall on the dry Kapiti Plain. The author first introduces the reader to Ki-pat who tends the animals on Kapiti Plain. Ki-pat notices dark rain clouds overhead. The animals are all thirsty, and it has not rained for a long time. Everything is very dry. Still it does not rain. When an eagle drops a feather, Ki-pat has an idea. He makes an arrow from the feather, shoots it at the big black rain cloud, causing a hole in the cloud and releasing the rain.

The author's message shares how one culture explains the natural phenomenon of rain through a fanciful tale and stresses how one should use reasoning ability to solve a problem. The science concepts that relate to the story include atmosphere/weather, the water cycle and the relationship between weather patterns and the water cycle. Earth/space science is the sci-

ence content area that best fits this picture book. This story is a fantasy that is told using a repetitive plot structure. Not all of the facts are accurate, and the teacher would need to guide the children in distinguishing between fact and fiction. The main character and animals in the story are believable, portrayed naturally, and contain no negative stereotypes. The setting has an influence on this story because it is important that the reader knows that the story takes place a long time ago in the Kapiti Plain. The setting uses animals that are realistic to that region, and the time relationships are appropriate. Many of the illustrations are scientifically accurate except for the stylized depiction of the eagle and the arrow piercing the black cloud to release the rain. The full color illustrations that are painted in gouache match the print well and assist in telling the story by matching the setting as well. While the story does not promote inquiry-based science activities by itself, teachers can guide students to question how rain does occur. Children at various age levels would enjoy the fantasy of the story, the repetition of the story elements, and the beautiful illustrations.

At first glance, this book might be considered inappropriate for teaching science concepts since the story falls into the genre of fantasy and clearly contains some misrepresentations that could lead to science misconceptions. Certainly, it must be used with caution, but it could be used successfully with children to confront misconceptions about the water cycle and how rain really occurs. According to the *Science Standards* (1996), children are not expected to completely understand the water cycle until they reach grades 5-8. It is at this level that they really are able to "investigate the water and rock cycles as introductory examples of geophysical and geochemical cycles" (p.159). But in grades K-3 children should be involved in hands-on experiences that lay the foundation for later in depth understanding of the water

cycle. Weather is a common science unit in the primary grades. Most young children have all noticed changes in the weather, been out in the rain, and watched the puddles disappear. Most have formed some idea of how rain happens or at least have wondered where it comes from and where it goes. This book provides an opportunity for the teacher to challenge students' thinking with questions such as, "Do you think that clouds really hold rain like a sheet and that someone could shoot an arrow that would make a slit in the clouds so that the rain could spill out? How does rain really occur? Let's find out." Active observation of real clouds over time, watching for changes in the clouds, identifying rain clouds and other weather conditions associated with rain are good activities for children to be involved in as they begin to construct some preliminary knowledge about rain and how it occurs. Constructing a terrarium and observing how the water cycle works in this closed system is an excellent way to help children understand the various concepts associated with the water cycle. There are many teacher demonstrations and student activities that show the process of evaporation, condensation, and precipitation that can be used to help students grasp the concept of how rain occurs. It is crucial that children are *not just told* about misconceptions and provided with the "right answer." They must be actively involved in confronting the misconception by being involved in numerous activities in which the "right answer" is directly experienced.

Conclusions

Good children's literature can be used effectively with students to help them construct and reflect on scientific knowledge, skills, and attitudes. It can serve as an excellent means of building an inquiry-based atmosphere for collecting data about a science concept. Carefully selected pieces can increase student interest, build on prior knowledge, and foster personal

connections with a targeted science concept. The *Assessment Inventory* presented in this article is designed to help teachers assess and select literature to assist in teaching and reinforcing science concepts that will enhance student understanding. The instrument also has the potential to assist teachers in eliminating misconceptions that can occur when using children's literature in teaching science concepts.

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Assessment Inventory
Appendix A
Selecting Children's Picture Books to Teach Science Concepts
 Dr. Sandra Cain and Dr. Leonie Rose

Title of Book: _____ Author: _____

1. THEME

- a. What is the author's message, lesson, or moral about life for the reader?
- b. What is the science concept that children would learn?
- c. In which science content area does the science concept belong?
 ___ physical ___ life ___ earth/space science ___ science and technology

2. STORY LINE

- a. Which plot structure does the story use?
 circular ___ repetitive ___ step-by-step ___ turn about ___ other ___
- b. Is the story mostly ___ fantasy ___ realistic fiction or ___ nonfiction?
- c. Are accurate facts present in the book? yes no
- d. Does the story allow children to easily distinguish fact from fiction? yes no

3. CHARACTERS

- a. Are animals in the story depicted naturally? yes no
- b. Are characters believable? yes no

4. SETTING

- a. Does the story take place in a realistic setting? yes no
- b. Are time relationships appropriate? yes no

5. ILLUSTRATIONS

- a. Do the illustrations portray accurate scientific representations? yes no
- b. Do the illustrations match the story or print? yes no

6. AESTHETIC QUALITIES

- a. Does the story promote a positive attitude toward inquiry-based science? yes no
- b. Will the children at my grade level find this book interesting and enjoyable? yes no

7. STEREOTYPING

- a. Are any stereotypes present? gender ___ cultural ___ other ___ none ___
- b. If so, how will you deal with them?

8. MISREPRESENTATIONS and MISCONCEPTIONS

- a. Are there misrepresentations that could lead to science misconceptions?
 ___ none ___ some ___ many
- b. If so, how will you deal with them?

CIRCLE YOUR RECOMMENDATION

Excellent science resource Needs modifications Inappropriate science resource

Adapted from Deborah A. Mayer's *Checklist for Choosing Children's Literature to Teach Science*, Science and Children March 1995, p.18.

LITERATURE RESOURCES TO TEACH SCIENCE CONCEPTS

Appendix B

No or Few Modifications Needed	Some Modifications Needed	Many Modifications Needed
1. <i>The Tiny Seed</i> by Eric Carle	1. <i>The Very Busy Spider</i> by Eric Carle	1. <i>The Very Hungry Caterpillar</i> by Eric Carle
2. <i>The Carrot Seed</i> by Ruth Krauss	2. <i>A Color of His Own</i> by Leo Lionni	2. <i>A Dinosaur Named After Me</i> by Bernard Most
3. <i>A House for Hermit Crab</i> by Eric Carle	3. <i>Swimmy</i> by Leo Lionni	3. <i>Cloudy with a Chance of Meatballs</i> by Judi Barrett
4. <i>Round Trip</i> by Ann Jonas	4. <i>Masai and I</i> by Virginia L. Kroll	4. <i>Seven Blind Mice</i> by Ed Young
5. <i>BearShadow</i> by Frank Asch	5. <i>Brown Bear, Brown Bear, What Do You See?</i> by Bill Martin	5. <i>Oliver and the Oil Spill</i> by Aruna Chandrasekhar
6. <i>Rain Talk</i> by Mary Serfozo	6. <i>Polar Bear, Polar Bear, What Do You Hear?</i> by Bill Martin	6. <i>The Wartville Wizard</i> by Don Madden
7. <i>When I'm Sleepy</i> by Jane R. Howard	7. <i>Through the Year With Harriet: A Time Concept Book</i> by Betsy Maestro	7. <i>The Wump World</i> by Bill Peet
8. <i>Blueberries for Sal</i> by Robert McCloskey	8. <i>Tops and Bottoms adapted and illustrated</i> by Janet Stevens	8. <i>Bring the Rain to Kapiti Plain</i> by Verna Aardema
9. <i>Q Is for Duck</i> by Mary Elting and Michael Folsom	9. <i>Earthlets, As Explained by Professor Xargle</i> by Jeanne Willis	9. <i>The Black Snowman</i> by Phil Mendez
10. <i>The Alphabet Tale</i> by Jan Gatten	10. <i>Frederick</i> by Leo Lionni	

No or Few Modifications Needed	Some Modifications Needed	Many Modifications Needed
11. <i>When Vera Was Sick</i> by Vera Rosenberry	11. <i>Are You My Mother?</i> by P. D. Eastman	
12. <i>Big Moon Tortilla</i> by Joy Cowley	12. <i>Stellaluna</i> by Janell Cannon	
13. <i>Just a Dream</i> by Chris Van Allsburg	13. <i>The Grouchy Ladybug</i> by Eric Carle	
14. <i>The Magic School Bus on the Ocean Floor</i> by Joanna Cole	14. <i>The Extraordinary Egg</i> by Leo Lionni	
15. <i>The Lorax</i> by Dr. Suess	15. <i>The Mountain That Loved a Bird</i> by Alice McLerran	
16. <i>Where the River Begins</i> by Thomas Locker	16. <i>Those Mean Nasty Dirty Downright Disgusting but-- Invisible Germs</i> by Judith Rice	
17. <i>The Legend of the Indian Paintbrush</i> by Tomie de Paola	17. <i>It's Mine</i> by Leo Lionni	
18. <i>Hailstones and Halibut Bones</i> by Mary O'Neill	18. <i>Spectacles</i> by Ellen Raskin	
19. <i>Zoom</i> by Istvan Banyai	19. <i>A Drop Around the World</i> by Barbara Shaw McKinney	
20. <i>Water Dance</i> by Thomas Locker	20. <i>Arctic Son</i> by Jean Craighead George	
21. <i>The Bee Tree</i> by Patricia Polacco	21. <i>Chipmunk Song</i> by Lynne Cherry	
22. <i>Carlos and the Cornfield</i> by Jan Romero Stevens	22. <i>Everybody Needs a Rock</i> by Byrd Baylor	

(Continued on next page)

No or Few Modifications Needed	Some Modifications Needed	Many Modifications Needed
23. <i>Come a Tide</i> by George Ella Lyon	23. <i>The Great Kapok Tree</i> by Lynne Cherry	
24. <i>Desert Voices</i> by Byrd Baylor	24. <i>The Magic School Bus at the Water Works</i> by Joanna Cole	
25. <i>Flight</i> by Robert Burleigh	25. <i>The Magic School Bus Gets Eaten</i> by Joanna Cole	
26. <i>The Goodnight Circle</i> by Carolyn Lesser	26. <i>The Magic School Bus Inside A Hurricane</i> by Joanna Cole	
27. <i>Homeplace</i> by Anne Shelby	27. <i>The Magic School Bus: Lost in the Solar System</i> by Joanna Cole	
28. <i>Nuts to You</i> by Lois Ehlert	28. <i>The Snowy Day</i> by E.J. Keats	
29. <i>Owl Moon</i> by Jane Yolen		
30. <i>The Real McCoy</i> by Wendy Towle		
31. <i>Red Leaf, Yellow Leaf</i> by Lois Ehlert		
32. <i>Red Wolf Country</i> by Jonathan London		