The rubric introduced in this study is a valuable tool that can help teachers make informed decisions about science trade books for use in their classrooms.

Teaching science in today’s elementary classrooms is a demanding undertaking. Teachers are increasingly asked to “cultivate young scientists” as the current trend to emphasize the fields of science, technology, engineering, and math (STEM, 2008) has gained momentum across the United States. In the midst of this quest, teachers face myriad instructional challenges as they seek to make sense of a scientific world that—as documented by numerous reputable sources (e.g., Kaku, 1998, National Science Board, 2006)—is changing before their eyes.

As with the majority of subjects taught in U.S. schools, textbooks remain the mainstay of elementary science programs (Haury & Rillero, 1994; Weiss, 1987). Despite their common usage, science textbooks are limited in many ways. Students frequently find such texts difficult to read due to challenging, abstract, and technical vocabulary. Readability is often well beyond the grade level of the intended audience, and topics are frequently presented in a manner that is superficial, fragmented, and fraught with errors (Walton, 2002). Of greater concern is the fact that science textbooks frequently become outdated as new discoveries disprove earlier beliefs (Donovan & Smolkin, 2002; Moss, 1992). Although science textbook publishers have made some improvements in terms of text format and organization, sentence and paragraph structure, and the quality and type of illustrative material that they include, Walpole (1999) argued that teachers should use science textbooks primarily as resources to help students “become confident and independent consumers of information” (p. 368).

Reasons for bolstering students’ understandings of informational texts are statistically compelling when we consider that 86% of adult reading deals with information in formats such as letters, newspapers, magazines, directions, menus, and recipes (Parkes, 2000; Smith, 2000; Venezky, 1982). In addition to arguing that elementary school students must learn to read, write, and understand informational text due to its ubiquity in today’s society, Duke and Bennett-Armistead (2003) offered the following additional reasons for integrating informational text throughout K–3 curricula.

- Informational text is the key to success in later schooling: is preferred reading material for some children; often addresses children’s interests and questions; builds knowledge of the natural and social world; and may help build vocabulary and other kinds of literacy knowledge. (p. 22)

As university professors who work with preservice teachers and graduate students at a large state university, we are constantly met with questions about how to help students develop meaningful understandings about science. Our prior elementary school teaching experiences taught us that the integration of literacy and the content area instruction of science offers great potential for maximizing not only students’ understanding of specific content-related ideas and concepts but also their engagement as readers and writers. Yore (2004) agreed that “good science educators recognize the centrality of literacy to the scientific enterprise (p. 69).” He cautioned that reading and writing about science must be linked with authentic inquiry experiences shared by students and teachers. In doing so, students polish skills and strategies that are well-honed by practicing scientists, including constructing and validating hypotheses, questioning,
sifting and sorting the important from the irrelevant, clarifying and summarizing understandings, and linking what one knows to what is unknown.

These same skills and strategies are fundamental to reading comprehension, regardless of the subject area, and should be taught and modeled explicitly by teachers. Building on the work of Dole, Duffy, Roehler, and Pearson (1991); Norris and Phillips (1994); Phillips (1999); and Pressley, Johnson, Symons, McGoldrick, and Kurita (1989), Yore (2004) suggested explicit strategies for teachers who wish to integrate science and literacy, many of which we found valuable in our own teaching. These include the following (Yore, 2004):

- Assessing the importance, validity, and certainty of textual claims
- Generating questions about the topic to set the purpose for reading
- Detecting main ideas and summarizing them
- Inferring meaning
- Skimming, elaborating, and sequencing
- Using text structure to anticipate and comprehend ideas
- Improving conceptual networks (concept mapping) and memory
- Monitoring comprehension
- Self-regulating to address comprehension failures

Use of such teaching practices allows teachers to cross the borders between science and literacy learning in meaningful ways that move beyond presenting science to students as a compilation of information that must be learned and recalled (Yager, 2004).

With integrated literacy and science instruction in mind, we examined research related to nonfiction trade book use and science trade book quality in search of criteria common among recommended trade book evaluation tools. We then sought to develop a rubric-based evaluation process that would capture the numerous points suggested by many expert sources, to try it ourselves by evaluating books on a publisher’s recommended trade book list, and then to pilot test the rubric with beginning teachers.

Related Literature

Nonfiction Trade Books

The terms informational text, nonnarrative text, and nonfiction text are often used interchangeably to designate science trade books that are factual in nature. Duke and Bennett-Armistead (2003) defined informational text as a subset of nonfiction not inclusive of biography, procedural text, and other true stories. Moreover, these researchers defined informational text as inclusive of “many different formats, including books, magazines, handouts, brochures, CD-ROMs, and the Internet” (Duke & Bennett-Armistead, 2003, p. 17). For the purposes of clarifying this terminology, informational texts, nonnarrative texts, and nonfiction texts—texts that are factual in nature and sold in book format by booksellers, rather than by textbook publishers—will be referred to hereafter as nonfiction trade books. This designation is aligned with the thinking of Kristo and Bamford (2004), who “associate[d]nonfiction with trade books—well-written, well-illustrated books on topics related to science, history, math, and the fine arts” (p. 13).

Using nonfiction trade books as an integral part of an elementary science program offers a number of advantages to teachers. Madrazo (1997) stated that use of nonfiction trade books aids students’ understanding of science concepts. Students frequently find trade books to be more interesting and easier to read than science textbooks. Additionally, women and minorities often are presented more positively in trade books than in textbooks (Rice, 2002). Young students and reluctant readers—those who can read but don’t, as well as those who struggle as readers—are interested in the world around them and intrigued by facts and figures related to many topics. Thus, they are drawn to nonfiction rather than fictional narratives (Dayton-Sakari & Jobe, 2003).

Janke and Norton (1983) reported that students can be encouraged to consider and experience the process of science inquiry through trade books. Teachers can easily build on these understandings with introductions to the scientific method. Although the advantages that science trade books offer are numerous, all science trade books are not equal in quality. Due to these differences, some trade books alone are not sufficient for teaching science concepts (Madrazo, 1997; Royce & Wiley, 1996).

More worrisome is the finding that students can and do learn misconceptions about science topics...
from trade books that are poorly written or that contain erroneous or confusing information. (Rice, Dudley, & Williams, 2001). Thus, classroom teachers must investigate recommended strategies and practices for employing trade books, such as those suggested by Duke and Bennett-Armistead (2003), Hoyt (2002), Hoyt, Mooney, and Parkes (2003), and Kristo and Bamford (2004), and also access tools to help them make wise selections of such books. Plummer and Kuhlman (2008) stated that after selecting the science concepts to be taught in elementary classrooms, “the vital next step” (p. 98) is to select appropriate trade books for the teaching and learning that is to take place.

**Determining Trade Book Quality**

Harvey and Goudvis (2007) observed,

> Each year, huge numbers of children's books roll off the presses. The sheer number boggles the mind: Nearly 5,500 new books for young people in 2005 alone; at that rate, approximately 55,000 to come in the next decade. We can't read them all; we can't even meet them all. (p. 60)

With such a wide range and large number of books available, "separating the wheat from the chaff" (Duke & Bennett-Armistead, 2003, p. 38) can be an overwhelming process. Despite the fact that the availability and number of nonfiction trade books have increased, teachers rarely receive substantive coaching enabling them to make judicious selections for their classrooms. Rice (2002) suggested that teachers must consider trade books used for the teaching of science carefully by asking these crucial questions: Will students learn “good science” from the trade books under consideration? Do the trade books contain accurate information, and if so, is the trade book a substantive replacement for the traditional science textbook?

Buxton and Austin (2003) and Donovan and Smolkin (2002) advocated for careful selection of science trade books and suggested that teachers make such choices by considering the following questions:

- Does the book contain significant science content, and is this content presented explicitly?
- Is the author well qualified to write about the topic, and, if not, does the book acknowledge experts in the field who have reviewed and approved the content?
- Does the author assume that the reader has a vast amount of prior knowledge about concepts or vocabulary? Has information new to the reader been carefully introduced and tied to what readers this age typically know? Are the content-specific vocabulary words included within the text explained, presented, and documented appropriately?
- Will the intended audience find the text interesting and engaging? Is the information accurate and up to date? Are the number and nature of subject-specific concepts appropriate for the text’s intended audience?
- Is scientific inquiry addressed adequately with inclusion of numerous real-life examples?
- Is the book well organized with suitable illustrations and other access features such as headings, sidebars, and captions?
- Are women and minorities presented positively, and are stereotypes avoided?

For most teachers, the notion of considering such a breadth of criteria concurrently is a daunting task.

**Recommended Trade Book Evaluation Tools**

Broemmel and Rearden (2006) specifically recommended use of the Teachers’ Choices booklists for the purpose of evaluating trade books for use in science instruction. The Teachers’ Choices project is undertaken yearly by the International Reading Association, resulting in a list of approximately 30 trade books and is meant “to help teachers find books that can be used across the curriculum” (International Reading Association, 2008).

Harvey and Goudvis (2007) suggested consulting other lists of recommendations by reputable professional organizations when considering trade
Making Science Trade Book Choices for Elementary Classrooms

Even with an excellent evaluation tool, a reviewer's lack of extensive content knowledge about the topics included in a text make the task of evaluating science content risky. It becomes incumbent upon reviewers, then, to use a valid process for trade book evaluation and in doing so, to seek authorities in the field to assist them in determining the accuracy of the content in a science trade book. Further, knowing that teachers typically visit their school or public library to select science trade books—where collections are often outdated and limited in scope—we sought to address the concern that teachers might want to evaluate books that may not appear on recommended professional lists. All of these issues were considered within the design and suggested implementation of the science trade book evaluation rubric discussed in the following sections.

Developing an Evaluation Rubric and Process

In our efforts to locate tools for choosing recommended trade books for classroom instruction, we searched for a process- or rubric-based instrument by which teachers can evaluate the quality of nonfiction science trade books. The NSTA website, specifically recommended by Madrazo (1997) as a source, provides an extensive list of criteria used for their panel's trade book selections, including the following:

- Robert F. Sibert Informational Book Award, granted annually to the most distinguished information book by the American Library Association (ALA)'s Association of Library Services to Children subgroup (www.al.org/ala/alsc/awardsscholarships/literaryawds/sibertmedal/sibert_medal.cfm)
- Orbis Pictus Award for Outstanding Nonfiction for Children, selected annually by the Orbis Pictus Award Committee of the National Council of Teachers of English (NCTE; www.ncte.org/elem/awards/orbispictus)
- Washington Post Annual Children's Book Guild Nonfiction Award, given to a nonfiction author or author–illustrator team for their work in nonfiction (www.childrensbookguild.org)
- ALA's Notable Children's Books list, selected by the Notable Children's Book Committee for the Association of Library Services to Children, chooses notable fiction and nonfiction (www.al.org/ala/alsc/awardsscholarships/childrensnotable/notablecbooklist/currentnotable.htm)
- Outstanding Science Trade Books for Students K–12, chosen annually by the National Science Teachers Association (NSTA) and the Children's Book Council (CBC; www.nsta.org/publications/ostb/)

Sudol and King (1996) cited the problem of “finding appropriate content-related trade books” (p. 422) and proposed a set of guidelines to be considered when evaluating nonfiction trade books. These general guidelines encourage teachers to consider a book’s accuracy, accessibility of language/readability, appropriateness of text for teaching purposes, appeal of topic and book format, text type, origin of its recommendation, and suitability for one’s particular students. A comprehensive analysis of selected elementary science trade books is also provided by Rice (2002). However, she focused on a theoretical rationale for using trade books to teach science, rather than providing a method for analyzing their quality.

An important caution, however, for trade book evaluation was issued by Kiefer, Hickman, and Hepler (2007) who claimed that teachers’ lack of content area knowledge and expertise is a problem. Consequently, even with an excellent evaluation tool, a reviewer’s lack of extensive content knowledge about the topics included in a text make the task of evaluating science content risky. It becomes incumbent upon reviewers, then, to use a valid process for trade book evaluation and in doing so, to seek authorities in the field to assist them in determining the accuracy of the content in a science trade book. Further, knowing that teachers typically visit their school or public library to select science trade books—where collections are often outdated and limited in scope—we sought to address the concern that teachers might want to evaluate books that may not appear on recommended professional lists. All of these issues were considered within the design and suggested implementation of the science trade book evaluation rubric discussed in the following sections.
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The panel also attends to the quality of binding, paper, reproduction, and the appropriateness of typeface (NSTA, 2008). These criteria are consistent with the evaluation factors recommended by Rice (2002) and Donovan and Smolkin (2002) for science trade book selection.

Our combined experience of more than a decade as university professors and close to six decades as classroom teachers and administrators taught us that only select veteran teachers choose content area trade books knowledgeably and with input from expert sources. Teaching and mentoring preservice teachers has provided us with the additional insight that few beginning teachers have the content area knowledge necessary to select high-quality trade books and if they were to consult an expert, they would not know what to ask to gain valuable input. Indeed, after investigating suggested evaluation tools, we found that short of searching numerous lists of recommended books or attempting to consider multiple expert-recommended criteria, these methods of selecting excellent science trade books were tedious, frustrating, and often nonproductive.

Thus, knowing the risk involved in choosing low-quality science trade books, we developed and refined an evaluation tool meant to capture the points suggested by expert sources. Following rubric development, we reviewed the 28 science trade books on the publisher-recommended lists in the Macmillan/McGraw-Hill Science series grade 5 textbook (Daniel, Hackett, Moyer, & Vasquez, 2006, pp. A1-b, B1-b, C1-b, D1-b, E1-b, F1-b). Last, the rubric-based evaluation process was pilot tested with beginning teachers.

Modifying Hunsader’s Rubric
During the process of investigating recommended tools and trade book evaluation methods, Patricia Hunsader’s (2004) rubric surfaced as highly credible due to its alignment with Schiro’s (1997) model, one of the first rubrics created for trade book evaluation. In her article, Hunsader (2004) described development of a rubric for assessing the mathematical content and literacy value of trade books. Her evaluation tool considers multiple factors, including accuracy and effective presentation of mathematics content, intellectual and developmental appropriateness, quality of literary style and access features, and whether the book’s story and mathematics complement each other. Additionally, Hunsader’s (2004) tool provides a means for rating the mathematics and literacy value of a book independently, allowing a reviewer to determine that a book may have high literacy appeal but little mathematic credibility, or conversely that a book’s mathematics content is appropriate, but that the book is poorly crafted.

With Hunsader’s permission, we adapted her mathematics and literacy rubric for use in evaluating science trade books. Our expertise as potential reviewers was considered as a model for future teacher rubric review teams. All three authors of this article are former elementary teachers, one with particular expertise in science education and a graduate degree in reading. Additionally, we all teach preservice teachers and graduate students in elementary education and reading education courses at a state university. Thus, our reviewer team composition modeled what we recommend for classroom teachers; they must either enlist science educators to partner in the rubric trade book review process or seek their input as external reviewers who read and evaluate the books independently and return their reviews to the teachers seeking their input (see Figure 1).

Because integration of instruction in literacy and science offers the potential for maximizing students’ understanding and engagement in both content areas, our rubric was developed to assess both. Using Hunsader’s (2004) rubric as a starting point, we synthesized our own expertise, the criteria suggested in the lists noted earlier in this article, the National Science Education Standards (1996), and Donovan and Smolkin’s (2002) suggestions for evaluating trade books. Further, Buxton and Austin (2003) offered the following recommendation: “The books must show science as an active process of inquiry rather than a passive collection of facts, and the scientists in the books must reflect the image of real people engaged in the work of science” (p. 29). Because of the ubiquitous emphasis on inquiry learning in national and state science standards, this criterion was included in our rubric design. After synthesizing all information from these combined sources, we developed aligned rubric questions, created an evaluation scale, and added sections for reviewers to note identifying information and features of books that influenced their ratings (see Figure 1).

After we wrote the first draft of the evaluation tool, we each evaluated five books chosen from the NSTA’s list of Outstanding Science Trade Books and five that were not included on that list. During these rubric trials, we realized that positive responses to the
### Figure 1
Science Trade Book Evaluation Rubric

<table>
<thead>
<tr>
<th>Book title:</th>
<th>Author:</th>
<th>ISBN:</th>
<th>Copyright date:</th>
<th>Out of print</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

**Science content of book:** (Check all that apply.)

- [ ] **Details professional scientists(s) engaged in inquiry**
- [ ] **Facts/Concepts**
- [ ] **Presents science through an engaging/enjoyable story**
- [ ] **Details “how to” experiments**

Before reviewing the book, answer these three questions:
1. Does the book have substantial science content (scientists at work and/or scientific information)?
2. Is the science content (text, scale, vocabulary, and graphics) accurate?
3. Is the science content current?

If the answer to any of the above three questions is “no,” do not continue the evaluation.

**Science criteria**

| Is the book’s science content presented “as an everyday endeavor” so that students can connect it with some of their own experiences or so that they can participate as “scientists in the making” (i.e., pose “I wonder” questions or explore further)? |
|---|---|---|---|---|
| 5 | 4 | 3 | 2 | 1 |
| Yes | Somewhat | No |

**Comments:**

| Is the book’s science content personalized by putting a human face on science practice (presenting scientific inquiry/discovery “in action” through engaging narratives, showing specific inquiry skills in action by “expert scientists”)? |
|---|---|---|---|---|
| 5 | 4 | 3 | 2 | 1 |
| Yes | Somewhat | No |

**Comments:**

| Is the book’s science content intellectually and developmentally appropriate for its audience? |
|---|---|---|---|---|
| 5 | 4 | 3 | 2 | 1 |
| Yes | Somewhat | No |

**Literacy Criteria—framed to fit fiction/nonfiction genres**

Complete either A or B.

**A. Fiction:** Does the plot exhibit good development, imagination, and continuity? Are the characters (if any) well developed?

**B. Nonfiction:** Does the book’s content include adequate information presented in a clearly organized and appropriate text structure?

**Comments:**

| Does the book contain a vivid and interesting writing style that actively involves the reader? |
|---|---|---|---|---|
| 5 | 4 | 3 | 2 | 1 |
| Excellent | Poor |

**Comments:**

(continued)
### Science Trade Book Evaluation Rubric

<table>
<thead>
<tr>
<th>Question</th>
<th>Score Options</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are the book’s illustrations and graphics text-relevant, appealing, and representative of a child’s perspective?</td>
<td>5 4 3 2 1</td>
<td>Excellent Poor</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are the book’s readability and interest level developmentally appropriate for its intended audience?</td>
<td>5 4 3 2 1</td>
<td>Excellent Poor</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do the book’s content information, style, graphics/illustrations, and story/text structure complement one another?</td>
<td>5 4 3 2 1</td>
<td>Excellent Poor</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>For nonfiction only: Do access features (table of contents, index, heading, sidebars, glossary, author’s notes, bibliographies, epilogues, captions, etc.), offer additional information that explains, extends, or verifies information in the book?</td>
<td>5 4 3 2 1</td>
<td>Excellent Poor</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does the book respect the reader by presenting positive ethical and cultural values, especially inclusive of gender and racial representation? (If not applicable, omit this item from scoring)</td>
<td>5 4 3 2 1</td>
<td>Excellent Poor</td>
</tr>
<tr>
<td>Comments:</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Final reviewer evaluation:

1. Average the scores for this review related to Science Criteria; repeat for Literacy Criteria.
2. Select values below based upon the average of scores from the Science Criteria and followed by the Literacy Criteria. Round each score to a tenth of a point.

<table>
<thead>
<tr>
<th>Rating of this book from a science perspective:</th>
<th>5 4 3 2 1</th>
<th>Superb Recommended Use With Caution Marginal Unacceptable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating of this book from a literacy perspective:</td>
<td>5 4 3 2 1</td>
<td>Superb Recommended Use With Caution Marginal Unacceptable</td>
</tr>
</tbody>
</table>

#### Directions for considering scores for this book across all reviewers:

1. Average final value science scores for all reviewers (preferably three, at least one with science expertise).
2. Average final value literacy scores for all reviewers.
3. Final average science _________/Final average literacy _________

To be considered for classroom use, a book should receive final average scores in the 4–5 range for science and in the 4–5 range for literacy.

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following three questions were essential for the selection of high-quality trade books (Donovan & Smolkin, 2002; Moss, 1992; NSTA, 2008; Walton, 2002):

1. Does the book have substantial science content (scientists at work or scientific information)?
2. Is the science content (text, scale, vocabulary, and graphics) accurate?
3. Is the science content current?

Thus, books receiving negative answers to any one of these three evaluation questions would be eliminated as potential science trade book recommendations.

After adding these questions to the rubric in an attempt to streamline the evaluation process, we evaluated five additional trade books chosen from the lists noted in this article and five chosen randomly from media center shelves in order to refine the rubric. The rubric scoring evaluation outcomes supported the recommendations on the lists included in our literature review and what we deemed to be reasonable outcomes for those titles that were chosen randomly. Thus, the rubric presented in Figure 1 represents the culmination of months of work, discussion, and evaluation.

**Trial Rubric Use With Publisher-Recommended Trade Books**

Once the rubric was finalized, we used it to evaluate 28 trade books. Because the books under evaluation were listed as supplemental choices for the fifth-grade textbook (Daniel et al., 2006, pp. A1-b, B1-b, C1-b, D1-b, E1-b, F1-b), it was our expectation that they were carefully chosen and, thus, would be highly recommended. This text series had been selected by many school systems across our state as it was the only textbook choice on North Carolina’s most recent state science adoption list (North Carolina Department of Public Instruction, 2004). All other selections were module or kit-based programs. To ensure interrater reliability, each of us reviewed publisher-recommended books independently. First, each book was read to induce familiarity with the content and author’s style. Then the rubric was applied to determine the science content and literacy value of each book.

After evaluating all 28 books, we met to discuss and compare findings. Scores for each book fell in the same numeric range across all three reviewers for 26 of the 28 books (93%), meaning that final outcomes varied in only two instances. Through discussion and rereading, the science expert reviewer demonstrated that in these two instances, science content was inaccurate or outdated. Thus, these two selections were deemed not recommended. After careful review of the recommended trade book evaluation tools described earlier, we found that the two books eliminated by our science reviewer were not recommended by any of these expert sources. To more carefully judge the rubric’s validity, we compared our collective average rubric scores for the books on the publisher’s lists (Daniel et al., 2006, pp. A1-b, B1-b, C1-b, D1-b, E1-b, F1-b) and books suggested by the recommended sources. Findings revealed that 15 of the 28 publisher-suggested book titles did not appear on any of the lists, and 13 appeared only on the NSTA lists.

When specifically considering the 15 books suggested by the publisher that did not appear in any of the recommended sources, our average rubric scores did not support recommendation of 80% of these books. Further, of the 13 books suggested by the publisher and appearing on only one of the recommended lists (NSTA), our rubric scores recommended only 9. We sought explanations for these differences to see if our scores were valid. Thus, additional factors were considered for three of these four books. Concerns about the fifth-grade readability of two books (later confirmed by Fry, 1977, and Raygor, 1977, readability measures) and limited availability (out-of-print—only used copies can be acquired) of one book confirmed lack of recommendation. Our science expert believed that although the final book, *The Big Rivers: The Missouri, the Mississippi, and the Ohio* (Hiscock, 1997), offered tangential science information, most of its content was geography-related. These discussions mimic those that may occur among groups of teachers when examining trade books. Hence, we adhered to our original determination not to designate these four books as *superb or recommended* for the grade level in question.

Only 2 of the 28 book titles on the publisher’s lists (Daniel et al., 2006, pp. A1-b, B1-b, C1-b, D1-b, E1-b, F1-b) appeared on more than one of the recommended trade book evaluation tools lists. These were *Animal Defenses* by Etta Kaner (2000 Teachers’ Choices list; and 2000 NSTA list) and *A Drop of Water* by Walter Wick (1998 Teachers’ Choices list; 1998 Sibert Honor; and 1998 NSTA list). Both of these books (100%) received final evaluation scores as recommended choices according to our trade book rubric. Table 1 offers titles and descriptions of the books.
### Table 1

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Publisher-recommended books</th>
</tr>
</thead>
<tbody>
<tr>
<td>Books that met recommended criteria for both literacy and science</td>
<td>▪ De Pinna, S. <em>Science projects: Sound</em>. Austin, TX: Raintree Steck-Vaughn, 1998. Features simplified factual information about a variety of scientific principles related to sound, including how sound travels, is heard, and is amplified. Students are portrayed as scientists as text explanations lead to directions for related experiments appropriate for young readers.</td>
</tr>
<tr>
<td></td>
<td>▪ Dyson, M.J. <em>Space station science: Life in free fall</em>. New York: Scholastic Reference, 1999. In addition to familiarizing readers with many scientific principles related to life in space, text, color artists’ views, and related cartoons portray daily life and scientific inquiry taking place on the International Space Station. Readers’ understandings are bolstered through inclusion of related simulations, experiments, and activities appropriate for young scientists.</td>
</tr>
<tr>
<td></td>
<td>▪ Hooper, M. <em>The drop in my drink: The story of water on our planet</em>. New York: Viking, 1998. The important role of water in day-to-day life is presented from a historical perspective of the physical universe. Written from the perspective of following “a drop of water in my drink” back through time, striking prosaic language and full-color paintings lead young readers to more fully consider the reasons why water should not be taken for granted.</td>
</tr>
<tr>
<td></td>
<td>▪ Kaner, E. <em>Animal defenses: How animals protect themselves</em>. Kids Can Press, 1999. Large, full-color artists’ views and engaging text detail how animal defense mechanisms work, including fascinating processes such as bluffing, moving in groups, camouflage, and emitting revolting odors. “Strange, but true” sidebars offer an array of interesting related details.</td>
</tr>
<tr>
<td></td>
<td>▪ Lafferty, P. <em>Light and sound</em>. Champaign, IL: Benchmark, 1996. Text connections and comparisons between the scientific principles related to light and sound are presented in tandem with full color artists’ views and photographs. The notion of scientific inquiry and questioning is featured prominently and links factual information with simple age-appropriate experiments for young readers.</td>
</tr>
<tr>
<td></td>
<td>▪ Lasky, K. <em>The most beautiful roof in the world: Exploring the rainforest canopy</em>. San Diego: Gulliver Green/Harcourt Brace, 1997. Describes the work of female scientist, Meg Lowman, and her study of the tropical rain forest canopy taking place using a remarkable system of slings, ropes, and high-rise walkways. Focuses on specific scientific inquiry in action by a mother who brings her young sons to Belize to study alongside her.</td>
</tr>
<tr>
<td></td>
<td>▪ Markle, S. <em>Super cool science: South Pole stations, past, present, and future</em>. New York: Walker and Company, 1998. Full-color and artists’ views, photographs, and fascinating text describe the work of scientists while stationed at the South Pole, including astronomers, planetologists, and ecologists. Includes focus on engineering to support future environmental research in harsh climates.</td>
</tr>
</tbody>
</table>

(continued)
that met recommended rubric criteria for science or literacy, and Figure 2 depicts the rubric trial process in graphic form. Confident that this rubric provided a means of evaluating trade books that was valid and reliably consistent with expert science trade book recommendations, we sought to pilot its use with teachers who might potentially need it the most—those with little classroom teaching experience.

**Pilot Testing With Beginning Teachers**

Twenty-nine preservice teachers enrolled in a content area literacy course during a summer session prior to their graduation were asked to develop a unit of integrated study aligning state literacy objectives for one grade level with either math, science, or social studies content. In doing so, students were asked to compile an annotated bibliography of at least 10 recommended content area trade books. In addition to participation in class discussions and activities regarding appropriate trade book selection, students were also provided with evaluation tools including Hunsader’s rubric for use with math trade books, this study’s rubric for use with science trade books, and the official guidelines for the Jane Addams Peace Association (1994) book awards for use with social studies books.

Analysis of written rationales for students’ book choices was conducted by two of us, leading to the following conclusions. Of the students who were provided with rubrics for their chosen content areas (science and math, \( n = 16 \)), all used the rubric extensively either to evaluate and select books, or in two cases to confirm choices made intuitively. Recurring student comments indicated that the rubric process was extremely helpful as it offered specific content area guidelines, facilitated careful book analysis, focused on both content area and literacy value, and provided a tool that would be used in the future.

Students who chose social studies for their unit focus (\( n = 13 \)) did not have a rubric available for trade book selection. Five of these students used the list of social studies criteria provided for them and chose books with no noted difficulty. However, the remaining eight students believed that use of a rubric would have been of much greater help to them than a list of recommended criteria. In one case, a student used the literacy portion of the science rubric to evaluate
Independent rubric review of all publisher-recommended books (n = 28) completed by each of three reviewers.

All three reviewers meet to compare rubric score outcomes (agreement on 93% of outcomes; 26 of 28).

Science expert reviewer demonstrates that science content of 2 books is inaccurate or outdated.

Reviewers confirm that 2 books not recommended by science expert do not appear on any recommended source lists and eliminate these books from rubric recommendation.

Reviewers reexamine 4 books suggested by the publisher (Daniel et al., 2006) and not recommended by rubric scores and confirm that these books do not merit rubric recommendation.

Reviewers confirm that the 2 publisher-recommended books appearing on more than one recommended source list were designated as recommended choices by rubric scoring, further substantiating the rubric’s validity.
the literacy value of her social studies trade books. Last, a final student was so convinced of her need for a rubric that she used the math and science formats as models and the provided Jane Addams Peace Association (1994) criteria to develop a complete rubric for evaluating social studies trade books. She further elaborated that the process of using this rubric enabled her to use her knowledge of critical literacy when making book selections and simplified the selection process for her.

**Choosing Quality Books**

As a result of our own and the beginning teachers’ experiences using the rubric developed in this study, we conclude that the rubric provided not only a platform but also a valuable and valid process for questioning, examining, and making more informed decisions about potential science trade books choices than would searching through lists from recommended expert sources. Although some might argue that rubrics are not necessary to evaluate science trade books, the authors and the beginning teachers included in this study found their use to be very helpful. Additionally this rubric can be used by teachers without extensive training and it provides a systematic framework that simplifies the evaluation process.

If training were provided, a possible scenario might involve an after-school session where grade-level teams learn to apply the rubric using the process detailed in Table 2 to evaluate readily accessible science trade books. Books related to potential science units of instruction might be gathered in advance from local public libraries, the school library, classroom libraries, or personal collections. As reviewers become more familiar with the process of rubric scoring, teams of reviewers across schools might schedule scoring sessions, enabling them to share and trade books to be reviewed. Scoring results could be used as a basis for considering books for upcoming media center or classroom purchase.

### Table 2

**Recommendations for Facilitating the Rubric Process**

1. Organize a reviewing team comprising members with expertise in both science and literacy.
2. Select science trade books under consideration for classroom use.
4. Read the book:
   - Determine the author’s style and the overall composition.
   - Note the layout and text features.
5. Next, answer the three yes-or-no questions located in the top third of the rubric’s first page:
   - Does the book have substantial science content (scientists at work and/or scientific information)?
   - Is the science content (text, scale, vocabulary, and graphics) accurate?
   - Is the science content current?
   Conclude the evaluation process if your response to any of the three questions is “no.” Eliminate this book as a recommended trade book choice.
6. Rate answers to questions related to science standards, and do the same for the literacy standards.
7. Average the scores for each section, science and literacy, rounding to a tenth of a point.
8. Select the corresponding Final Evaluation scores related to the final two questions: How good is the book from a science perspective? How good is the book from a literacy perspective?
9. Select books that gain both Final Evaluation scores in the **superb** or **recommended** range. While it may be difficult to find books in the **superb** range for both science and literacy, **recommended** books are also suitable for classroom use. Books that score in the **use with caution** range in both categories or in only one category—science or literacy—generally should be avoided and used carefully **only** by making their shortcomings clearly evident to students. With the plethora of trade books available, there is no need to settle for books that are not of the highest quality.
Moreover, use of the rubric evaluation process described in this study has the potential to support teachers’ engagement in collegial conversations about trade book evaluation among themselves and content area experts, and in turn, enable them to make more informed science trade book selections for classroom use. Through such purposeful decision-making, elementary teachers can move beyond science trade book selection based simply on availability, whim, or the blanket recommendations offered by publishers or experts and on to the important work of cultivating young scientists who are better equipped to make sense of an ever-changing world.

References
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