The Author and the Science Book

GLENN O. BLOUGH

Perhaps this piece should be called "Rights of the Reader" since it considers some of the more important characteristics children and young people are justified in expecting from their science books. Unless they are satisfied, we authors have failed. Unless we have in mind certain legitimate objectives and hew to the line to achieve them, we are almost sure to waste their time and ours. Although some of the intentions and methods are the same for both library (trade-supplementary-auxiliary) books and textbooks used in connection with the science curriculum in schools, we are concentrating here on library books.

ACCURACY OF CONTENT

Informational books commit themselves to tell the facts and ideas as far as they are known and to the extent that they can be understood by the intended audience. This is not always as easy as it may seem. Sometimes the whole truth is too complicated to include. Sometimes it is not known or only certain factors are known, and sometimes authors are inclined to tell more than readers care to know. Despite these situations, readers have a right to read dependable information. If authors write only part of the story they should admit it. It is often appropriate to include qualifying phrases such as "as far as scientists know at present," "many scientists agree," "evidence seems to indicate," "there is disagreement about," or "the latest findings are." Having thus qualified their statements, authors can only hope that teachers, librarians, and others who work with children are helping them to learn how to evaluate what they read in light of such qualifying statements. Sometimes the biggest problem is to decide what to leave out and still have a meaningful story.

Because scientific information grows by leaps and bounds and so-called facts change, especially in some scientific fields, revisions of

Glenn O. Blough is Professor of Science Education Emeritus, University of Maryland, College Park, and author of many science books for children.

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books for any level are frequently in order and readers are entitled to have such revised editions available; adults charged with book selection must attempt to be knowledgeable about the new editions. Having up-to-date information is part of a book's reliability.

Since pupils are urged to evaluate the factual material they use, the practice by authors and publishers of indicating when the text has been checked for accuracy by well-known authorities should be encouraged. Information about the qualification of the author is also appropriate and highly desirable. Pupils should grow in ability to judge the authenticity of the books they use; they cannot do this unless they have such background information at hand. Including such information in the book itself, as well as on the dust jacket, is commendable since jackets are frail.

Pupils should also be urged to go to several sources to double check facts, figures, and other information. This necessitates making several sources available and encouraging pupils to use them. "What makes you think that your information is reliable?" is as important a question as "What did you find out from your reading?"

It should be emphasized that the fact that information grows and ideas change is no excuse for not expecting children and young people to learn some science. While the great supply of information may be somewhat discouraging, and the fluctuation of ideas disconcerting, neither is an excuse for remaining ignorant of the world we live in, or not understanding the methods by which knowledge grows.

When considering accuracy, the matter of anthropomorphic explanations is an important one. Assigning human characteristics to animals is frowned upon, and rightly so. When the intention is to provide information, talking, reasoning animals, sleeping plants and other such fantasies are hardly appropriate. Relatively few books now suffer from this affliction; only occasionally do authors and publishers resort to such devices in attempting to communicate with children.

**STYLE OF COMMUNICATION**

There is no substitute for a straightforward, well organized, interesting presentation. The idea that fascinating information must be cloaked in conversation between an all-knowing Uncle Albert and a super-curious precocious nephew can be questioned. Writing down is out. Underestimating the mental capacity of children and oversimplifying are annoying to many children who approach science books with interest and curiosity. They have reason to expect authors
to know the capacity of their audiences as well as to have the ability to write for them.

Science textbooks used in schools are more often than not vocabulary and concept controlled, which makes for easier reading. It also sometimes bores readers. There is a happy medium between "Jump Spot jump" and "The heart rhythmically circulates the blood through a complex system of arteries, veins and capillaries." At best the first does not communicate much; neither does the second, but for a quite different reason—it assumes more background and information than most eight-year-olds possess.

The most successful trade book authors recognize some of the common reading hazards for children and try to avoid them. They also avoid packing paragraphs with technical vocabulary that is not essential to understanding. Science is indeed exact, but there are often easier ways to express exactness than to discourage readers by too much technical language. Setting a word in italics does not help pupils who are encountering the science word for the first time. Defining it in appropriate language, using it in familiar contexts and re-using it when appropriate does.

Too much technical science vocabulary is not the sole block to understanding. Stating science principles and generalizations without sufficient development and illustration is equally hazardous. The big ideas in science are made meaningful to children through experiences, anecdotes, explanations, word and picture illustrations, and through many other avenues. "Ecology is the relationship of living things to their physical environment" is, for example, meaningful only if the reader has something to bring to the sentence and some help in unlocking its meaning as he reads it. While space limitations are sometimes a real handicap, not much is to be gained by packing the space with generalizations that continue to remain a mystery after the reader has wrestled with them. Teachers know that attempting to cover too much material too fast results in a need for reteaching. They have learned that the process of discovery cannot be hurried. So it is with the printed page. A relaxed writing style that gives readers time to think and a logical development to learn from often makes the difference between enjoyment and satisfaction from reading and taking the book back to the library with disappointment.

We have all had the experience of asking directions to some desired destination and receiving them in such a disorganized and garbled way that we wish we had not asked. Children sometimes have the same difficulty in reading explanations or directions. Writers should put
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themselves in the place of their readers and think through an explanation by asking themselves, "What can I reasonably assume that the reader already knows?" This is sometimes difficult to answer, but always desirable. The writer then determines the logical place to begin the explanation, decides what comes next, then next, until the explanation is complete. Good teachers are able to do this and can make what seems to be a difficult idea appear easy because they have talent for arranging ideas in logical order and can show and help children discover the relationship of one idea to the next. Good writers are substitute teachers in this respect. They keep in mind that, as far as they know, the only help children will have in unlocking the meaning is found in the words they read. This puts a heavy responsibility on the sequence arrangement of words, sentences, and paragraphs. A question for authors might be: If I did not already know this, would I learn it from reading this passage?

Content and writing styles often reflect the experiences of the author. A science writer who himself has never observed what happens in an ant hill, assembled a model airplane, nor grown a plant from seed is less likely to be convincing and clear to readers than one who has had these experiences. Deficiencies in such first-hand experiences are frequently apparent in science books for children.

An author who is limited in experience with children is probably equally limited in communicating with them. Knowledge of children's interests, the kinds of questions they ask and the kinds of answers that satisfy them, their skills, limitations, attitudes, reading difficulties, etc., show up in the end product. A writer of science material must have more than an extensive knowledge of the subject matter, important as that is. He also must have a knowledge of his audience. Such knowledge can only result from wide contacts with a variety of children. It is folly to base conclusions on the reactions of one's own children or those in the neighborhood who like the author and often agree with anything he attempts.

OBJECTIVES

Science books for elementary school children intend to do more than inform. They also intend to introduce children to the methods of science—how scientists have come to know the facts and ideas, how they observe, experiment, compare, formulate hypotheses, test them, draw conclusions or withhold them until more evidence is uncovered. There is currently much emphasis on helping children learn how to
learn, to investigate and inquire on their own the ways commonly used by the scientists, and to become involved with the science around them. The use of instruments in scientific discovery is an important part of scientific processes. Their use in gathering data is an important element with which children need contact. For example, accurate temperatures obtained by the use of thermometers, instruments to measure wind speed and direction and air pressure are all a part of learning how to learn about weather forecasting.

Part of introducing children to the methods used by scientists consists of acquainting them with such attitudes of scientists as: observing patiently; gathering data from many, varied and reliable sources; withholding judgments until the facts are in; and trying not to jump to conclusions. Some books attempt to emphasize this aspect of science learning and they are most successful in accomplishing this if they employ examples and anecdotes that are meaningful to children.

Books also try to inspire appreciation and interest on the part of the reader. Not all books attempt to do this, but when they do they must be able to make contact with the reader through appropriate words, descriptions, and illustrations. Such books often raise questions as well as provide possible solutions; they make concrete suggestions of firsthand experiences for children which may help them develop such interests and appreciations.

Development of interest and appreciation is not easy, especially when the author has only words and pictures to help him. Firsthand experiences are probably the best approach, but there are many books that inspire readers to explore on their own, observe their environment, experiment and see things for themselves by including practical suggestions and helpful descriptions. Here again the experiences, interests, and appreciation of the author are often evident—or lacking.

PROGRESS

Examination of the hundreds of books currently published annually, compared with earlier volumes, indicate that we have indeed come a long way. Physical appearances are now pleasing. The subjects are timely—a panda book arrives in time to provide information about Ling-Ling and Hsing-Hsing, and a skylab book is available at just the appropriate time. Books generally are appropriate in content and writing for the intended audience. Furthermore, hundreds of children find such books available in their local school and public libraries.
The treatment here seems incomplete without a statement of a fundamental question: Have we made as much progress in the effectiveness of the use of books with children as we have in their production? In some places the answer to this is “yes”; in many others it is “no.” When asked “How many people work in your organization?” an international religious figure replied, “I estimate about one-half!” I hope that we are using more than this fraction of what we know about providing the right book for the right child and helping him to use it most effectively. There is still much to be done in translating our knowledge of children and books into actual practice. There is no question but that we are making progress. The question may be: Will we live long enough to use our knowledge to the fullest? Could we perhaps make faster progress? A quiet, beautiful, well-stocked school or community children’s library does not necessarily mean that books and children are meeting in the most effective and efficient manner. Along with legitimate concerns about book processing, budgets, attractive surroundings, etc., let us be as sure as possible that the real function of writing, editing, publishing and using books is not lost in the shuffle.