Preface

A class of fifth-grade students laughs as their teacher reads Jeanne Willis's *Dr. Xargle's Book of Earthlets.* Students are listening to the alien professor, Dr. Xargle, teach his pupils about Earthlets (human babies): "Earthlets are born without fangs. At first, they drink only milk, through a hole in their faces called a mouth. When they finish the milk, they are patted and squeezed so they won't explode." The fifth-grade class giggles at this outrageous lesson as Dr. Xargle continues to lecture. Students then begin sorting cards containing some of the alien professor's "observations" of Earthlets. The teacher asks her students, "Which of Dr. Xargle's comments are truly observations?" Students review their cards and realize that many of his comments are not observations but rather hilariously incorrect inferences. They re-sort their cards into two groups: observations and inferences. This amusing picture book and word sorting activity guide students into hands-on inquiry where they make observations about sealed mystery samples Dr. Xargle collected from Earth. Eventually students develop inferences about what the mystery samples might be. Through this exciting lesson, students construct their own understanding of the difference between an observation and an inference, how scientists use observations and inferences, and how to make good observations and inferences.

What Is Picture-Perfect Science?

This scenario describes how a children's picture book can help guide students through an engaging, hands-on inquiry lesson. *Picture-Perfect Science Lessons* contains 20 science lessons for students in grades 3 through 6, with embedded reading comprehension strategies to help them learn to read and read to learn while engaged in inquiry-based science. To help you teach according to the National Science Education Standards, the lessons are written in an easy-to-follow format for teaching inquiry-based science: the Biological Sciences Curriculum Study 5E Instructional Model (Bybee 1997, used with permission from BSCS). This learning cycle model allows students to construct their own understanding of scientific concepts as they cycle through the following phases: Engage, Explore, Explain, Elaborate, and Evaluate. Although *Picture-Perfect Science Lessons* is primarily a book for teaching science, reading comprehension strategies are embedded in each lesson. These essential strategies can be modeled throughout while keeping the focus of the lessons on science.

Use This Book Within Your Science Curriculum

We wrote *Picture-Perfect Science Lessons* to supplement, not replace, an existing science program. Although each lesson stands alone as a carefully planned learning cycle based on clearly defined science objectives, the lessons are intended to be integrated into a more complete unit of instruction in which concepts can be more fully developed. The lessons are not designed to be taught sequentially. We want you to use *Picture-Perfect Science Lessons* where appropriate within your school's current science curriculum to support, enrich, and extend it. And we want you to adapt the lessons to fit

your school's curriculum, your students' needs, and your own teaching style.

Special Features

1. Ready-to-Use Lessons With Assessments

Each lesson contains engagement activities, hands-on explorations, student pages, suggestions for student and teacher explanations, opportunities for elaboration, assessment suggestions, and annotated bibliographies of more books to read on the topic. Assessments range from poster sessions with rubrics to teacher checkpoint labs to formal multiple choice and extended response quizzes.

2. Reading Comprehension Strategies

Reading comprehension strategies based on the book *Strategies That Work* (Harvey and Goudvis 2000) and specific activities to enhance comprehension are embedded throughout the lessons and clearly marked with an icon . Chapter 2 describes how to model these strategies while reading aloud to students.

3. Standards-Based Objectives

All lesson objectives were adapted from *National Science Education Standards* (NRC 1996) and are clearly identified at the beginning of each lesson. Because we wrote *Picture-Perfect Science Lessons* for students in grades 3 though 6, we used two grade ranges of the Standards:

K–4 and 5–8. Chapter 5 outlines the National Science Education Standards for those grade ranges and shows the correlation between the lessons and the Standards.

4. Science as Inquiry

As we said, the lessons in *Picture-Perfect Science Lessons* are structured as guided inquiries following the 5E Model. Guiding questions are embedded throughout each lesson and marked with an icon **?**. The questioning process is the cornerstone of good teaching. A teacher who asks thoughtful questions arouses students' curiosity, promotes critical-thinking skills, creates links between ideas, provides challenges, gets immediate feedback on student learning, and helps guide students through the inquiry process. Each lesson includes an "Inquiry Place," a section at the end of the lesson that suggests ideas for developing open inquiries. Chapters 3 and 4 explore science as inquiry and the BSCS 5E Instructional Model.

References

Bybee, R. W. 1997. *Achieving scientific literacy: From purposes to practices.* Portsmouth, NH: Heinemann.

Harvey, S., and A. Goudvis. 2000. *Strategies that work: Teaching comprehension to enhance understanding.* York, ME: Stenhouse Publishers.

National Research Council. 1996. *National science education standards.* Washington, DC: National Academies Press.

Children's Book Cited

Willis, J. 2003. *Dr. Xargle's book of Earthlets.* London, UK: Anderson Press Ltd.

Editors' Note: *Picture-Perfect Science Lessons* builds on the texts of 38 children's picture books to teach science. Some of these books feature animals that have been anthropomorphized—sheep crash a jeep, a hermit crab builds his house. While we recognize that many scientists and educators believe that personification, teleology, animism, and anthropomorphism promote misconceptions among young children, others believe that removing these elements would leave children's literature severely underpopulated. Furthermore, backers of these techniques not only see little harm in their use but also argue that they facilitate learning.

Because *Picture-Perfect Science Lessons* specifically and carefully supports scientific inquiry—"The Changing Moon" lesson, for instance, teaches students how to weed out misconceptions by asking them to point out inaccurate depictions of the Moon—we, like our authors, feel the question remains open.