

## PREFACE

*Kid's Eye View of Science* began as a training text for a K-6 science improvement program funded by the David and Lucile Packard Foundation, 1987-96. The primary goal was to help teachers use science to teach science—to use the emerging brain research about how the human brain learns to improve how science is taught. Three editions later, the goal is the same, but the brain research available is generations down the road, confirming the four principles from brain research introduced almost a quarter of a century ago as well as opening up wholly new areas of research, such as the stunning new discoveries about mirror neurons and the impact of aerobic exercise on brain chemistry and thus the brain's ability to learn. While more is yet to come, we already know enough to transform the teaching and learning of science for Grades K-6.

### *A Proven Track Record*

The educational model described in this book, originally known as the Kovalik ITI (Integrated Thematic Instruction), emerged during the late 1970s. The 700 teachers who participated in the Mid-California Science Improvement Program (MCSIP), each for a minimum of three years, helped the authors hone the model. Working with that many teachers over a 10-year period provided the classroom reality needed to make an innovation successful. As you read these pages, you will be building upon the considerable experiences and successes of those teachers. The ITI model, now known as the Highly Effective Teaching (*HET*) model, was created by teachers for teachers.

Using science to teach science had far-reaching effects in the MCSIP schools. Not surprisingly, science achievement skyrocketed, but the outcomes in language, particularly for second-language learners, in reading, and for special education students were also impressive.

Whether working alone to implement the vision of science education described in this book or whether lucky enough to participate in a schoolwide team, the readers of this book will begin on the shoulders of thousands of teachers who have implemented this model in 37 states and in almost a dozen countries abroad over the past 25 years.

The ITI/*HET* model was one of 22 chosen for inclusion in the Comprehensive School Reform Program effort in 1999; a key criterion for such models was that improvement in student achievement, including personal and social growth, was predictable in all settings for all students. The ITI/*HET* model was also selected by Dr. Charles M. Reigeluth, Indiana University, as one of only a handful of models that met his stringent criteria for a curriculum-instruction model (see *Instructional-Design Theories and Models, Volume II: A New Paradigm of Instructional Theory*, edited by Charles M. Reigeluth, Indiana University). For a description of *HET* in an all-subject, fully integrated environment, see *Exceeding Expectations: A User's Guide to Implementing Brain Research in the Classroom*, 5th ed., by Susan J. Kovalik and Karen D. Olsen.

## *How to Use This Book*

As with many books aimed at comprehensive reform, this is not a book to be read in one sitting. It's organized to provide the reader with a quick overview, Chapter 1, The Science of Teaching Science, and with immediate starting points—examples of bodybrain-compatible curriculum in Chapter 2.

Chapters 3 and 4 cut to the chase—how to make curriculum conceptual, how to localize it for your students (bridge the yawning gap between national and state standards and the prior experiences of your students), and how to make it action oriented and memorable.

Chapter 5, The Scientific Thinking Processes, examines these processes through the lens of the unfolding developmental processes of a young child's brain and what constitutes age-appropriate curriculum content, the subject of Chapter 7.

Chapter 8 compares assessment approaches to the brain research-based definition of learning as a two-step process. The authors recommend that teachers commit themselves to the goal of Effective First Teaching (EFT) and focus on formative assessment, mining information that can be used to improve student learning in the moment. The chapter describes how to design formative assessments using the curriculum development tools within the *HET* model.

Chapters 9 through 13 describe the brain research base for the *HET* model. Chapter 14 describes how to translate the four brain principles from Chapters 10–13 into practical, everyday approaches. While the authors well understand how precious time is, it's highly recommended that these chapters be read before reading Chapters 3–8.

Throughout the book runs a central theme: Science curriculum must be based in *being there* experiences, frequent visits to locations where students can experience science as it occurs in the real world. While these locations can be as simple as a corner of the school campus, they need to provide rich sensory input.

What's offered in these pages is a comprehensive strategy for teaching science, one that will ring true with each reader's learning journey into the world of science.

## *Getting the Most Out of This Book*

As the reader will soon discover, the layout of this book differs from the traditional typographical layout typical of books over the past several hundred years. The new elements are not due to attempts at artistic flair. Rather, they are specifically designed to enhance the reader's ability to see patterns in content and make meaning of those patterns, thus speeding understanding and ability to apply what is encountered within these pages.

While discussion of pattern seeking may seem unusual or even foreign at this point in the book, the authors are hopeful that readers will soon grasp the power of the concept of pattern seeking as the brain's chief means of learning.

This being the case, you will find the following elements, each designed to enhance pattern seeking, meaning making, and memory retention.

*A Built-In Outline for Navigation and Review.* To aid in navigation through the book and to provide continuous review of contents, every page spread has a built-in outline.

- In the upper right-hand column of the odd-numbered pages, a mindmap outlines the major sections of the chapter, with page numbers. The section discussed on the page appears in dark ink; the others appear in gray.
- In the box at the bottom of the right-hand column of every odd-numbered page is an outline of the main ideas within the major section highlighted in the mindmap at the top of the page.

These thumbnail outlines serve both to guide one to the desired information and to provide a recurring review to assist in wiring information into one's long-term memory.

*Pagination Within Each Chapter.* Rather than the traditional pagination of 1 to 300, each chapter is numbered starting with the chapter number, then a decimal point, and finally, the number of the page in that chapter. For example, page 10.3 identifies the third page of Chapter 10. This is intended to assist in navigating to a particular chapter currently being studied. Such pagination helps group content into easily located study modules and readily lets one know when one has flipped short of or beyond the desired chapter or study module.

*More Headers.* The reader will find more headers within each chapter to help create a detailed outline of the chapter, a quick scaffolding upon which to add relevant details through the chapter.