Foreword

What does it mean to be "standards based" in science education? Agreement about the content standards—what students should know and be able to do—is but the first step. Science educators must also concur on the evidence needed to confirm that students have achieved the desired results.

Objective tests and quizzes will provide appropriate evidence for those standards and companion benchmarks that focus on factual knowledge. However, when the science standards and benchmarks call for students to demonstrate experimental inquiry, systematic reasoning, procedural skills, and scientific habits of mind, performance-based assessment methods are required.

Because performance assessments are inherently open-ended, they typically do not yield a single, correct answer. Thus, the resulting student responses—products and performances—cannot be scored with an answer key or a Scantron machine. Evaluation of student products and performances must be judgment-based—and observations and judgments are inherently subjective.

To improve the quality of evaluation, judgments need to be guided by explicitly defined criteria. These criteria serve to make an essentially subjective process as clear, consistent, and defensible as possible. We cannot claim to be standards-based in science education if different teachers employ different criteria in judging the degrees of student understanding, proficiency, or quality.

It is in the context of standards-based performance assessment and evaluation that *Rubrics for Assessing Student Achievement in Science K-12* provides such a valuable resource. Combining the clarity and detail of the scholar with the practicality of a veteran educator, H. B. Lantz offers the most complete collection of evaluation tools in science available today.

Several key features distinguish this book. The scoring tools address a wide range of important products and performances found in effective science classrooms and programs. The evaluative criteria are embedded within three useful formats—performance lists, holistic rubrics, and analytic rubrics—to accommodate different assessment purposes (diagnostic, formative, and summative). The assessment tools are differentiated by learning levels. This provides an important "scaffolding" of increasingly complex and sophisticated performance expectations across the grades. Thus, the tools not only support improved classroom assessment, they suggest a coherent spiraling for K-12 science programs. Finally, each of the tools has been extensively field-tested over a number of years in K-12 classrooms.

What I most appreciate about these rubrics is their specificity. Unlike the generic rubrics in wide use for grading purposes, these tools contain clear descriptions of the particular traits and qualities that are desired in student products and performances. This specificity yields three significant benefits: (a) more consistent

Jay McTighe is an educational consultant and coauthor of *Assessing Learning in the Classroom* (NEA, 1995), *Understanding by Design* (ASCD, 1998), and *Scoring Rubrics in the Classroom* (Corwin Press, 2000).

and defensible judgments; (b) more precise feedback, a necessary condition for improving performance; and (c) sharper learning and performance targets for teachers and students.

In sum, *Rubrics for Assessing Student Achievement in Science K-12* provides practical and proven tools for assessing and improving learning and performance in science. You and your students will unquestionably benefit from their use.

Jay McTighe