

## Book &amp; Media Reviews

edited by

Jeffrey Kovac

University of Tennessee

Knoxville, TN 37996-1600

**Successful Science and Engineering Teaching in Colleges and Universities**

by Calvin S. Kalman

Anker Publishing Co., Inc.: Bolton, MA, 2007. 164 pp.

ISBN 978-1933371160, \$33 (paper)

reviewed by Conrad Stanitski

This is a delightful book. Its 145 pages have much to offer regarding topics related to teaching science and engineering successfully at the post-secondary level. Brief, concise, to-the-point, the book is written in a conversational style. The author notes,

This book is intentionally informal. In writing it, I viewed it as a discussion of our mutual interest in helping students learn.

Kalman, a Professor of Physics and Member of the Centre for the Study of Learning and Performance at Concordia University in Quebec, succeeds in doing so. He displays a rich knowledge of the cognitive psychological research done to understand better how students learn science. The book also provides excellent examples of in-class and out-of-class activities to stimulate enhanced learning. In particular, the author applies reflective writing as a method by which undergraduate and graduate students can explore scientific concepts more deeply and accurately. His suggestions show how, through reflective writing, a classroom can be shifted from being teacher-centered to student-centered so that two self-stated goals for any science course can be achieved:

1. Get students to sort out how much they understand about concepts before the class starts and use the class as an opportunity to try and understand the concepts while the professor is available as a source of expertise; and
2. Get students to critically examine their ideas about the material presented in the course and in general to improve their critical thinking skills.

The book's ten chapters are relatively brief; each concludes with a well done bullet-list summary of main points. After a detailed introduction in Chapter 1, the concept of reflective writ-

ing is developed more fully in Chapter 2. It continues in Chapter 3 with a variety of additional applications of this methodology. Chapter 4 examines how students construct knowledge, and how faculty members can assist science students to become critical thinkers, not merely persons who, although they can do calculations correctly, have little understanding of the underlying science concepts. Collaborative learning and group work are discussed in Chapters 5 and 6 along with an excellent variety of techniques and methods by which to conduct such work. This discussion then leads, in Chapter 7, to an elucidation of how to change students' incorrect views of science principles, which provides a logical segue into Chapters 8 and 9 that deal with the development of problem-solving strategies, including the use of reflective writing to do so. The book concludes with a chapter on using the computer to provide tutorials and to manage physics laboratories.

References are bountiful throughout the chapters, and are carefully tabulated in a thorough bibliography. The works cited include aspects of improving teaching not only in the physical sciences and engineering, but in mathematics and biology as well. A list of suggested readings is included, although most are taken from the physics education literature, which is understandable given the author's background.

*Successful Science and Engineering Teaching in Colleges and Universities* is not a weighty, theoretical tome. Rather, it is a very practical work replete with carefully considered, useful, no-nonsense suggestions of ways to improve student learning in science and engineering classes. Such suggestions will be helpful to science and engineering faculty members who are interested in transforming their classes to ones where students come to understand how they learn what they learn, which can lead them to a deeper understanding of the science concepts in their discipline. Whether you are a beginning faculty member or one who has taught for some time, there is much to be gained from reading this book. I recommend it especially for its ability to get the reader to reflect about how teaching is being done in his or her classroom and why the teaching is done in the manner that it is.

*Conrad Stanitski is a member of the Chemistry Department, Franklin & Marshall College, Lancaster, PA; conrad.stanitski@fandm.edu*