Sunal, D. W. and Wright, E. L. (Eds.) (2006). *The Impact of State and National Standards in K–12 Science Teaching: Volume 2 in the Series Research in Science Education*. Charlotte, NC: Information Age Publishing.

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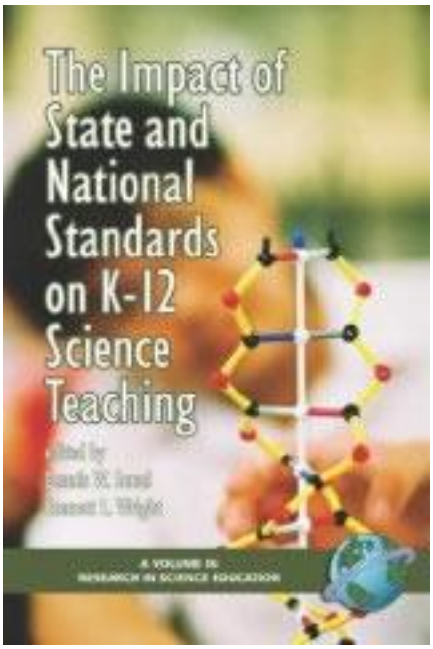
The Impact of State and National Standards on K-12 Science Teaching, edited by DennisW. Sunal and Emmett L. Wright is a collection of chapters by different authors (including the editors) that considers the impact of standards upon science education from multiple perspectives. The book cover calls itself "a volume in the research in science education" indicating that this work is part of a grander examination of science education. Unfortunately, it is unclear where this particular book fits in the series. In the Preface, the editors introduce the current work with its title "The Impact of…" but then refer to "Volume Two of the Series, Research in Science Education" without any title. They then start the second paragraph of the preface with the words, 'This volume" and proceed to describe the guiding questions of the current book. Things get more confusing with the start of the third paragraph with the words: "Volume Two addresses these questions from different viewpoints" and then proceeds to describe very briefly the point of each of the four parts of the book. This introduction would seem to imply that this book is Volume 2 of the series. If so, why is this not stated on the cover or title page?

The situation is further complicated by the existence of a “Preface to the Series” describing the purpose of the Research on Science Education series suggesting that perhaps the current book is the first in the series. Therefore, it is unclear if this book is Volume 1 or 2 of the series. According to the Preface to the Series, more volumes should be expected. Maybe with the next volume, the true identity of the first volume will be known with more certainty. However, this problem regarding which volume one is reading is, unfortunately, indicative throughout the book. While the authors should be diligent in adhering to the professional standards of writing, the editors are ultimately responsible for the errors that appear in this book.



I was quite excited to read this book since it addresses a topic so very near and dear to my professional life: science teaching. Having been involved with science education as a teacher, teacher educator, and researcher for the last twenty years, I have witnessed the rise of standards in science from inside and outside the classroom. Appreciating how standards can be a double edged sword with regards to the teaching and learning experience, I wanted to know what these authors were going to add to the discourse over standards in science education. The timing of a work that takes a reflective stance on the impact of standards on science education is impeccable. I approached this book with great anticipation for what it might add to my current understanding.

As a science education researcher, I am part of the authors’ intended audience. The volumes in this series are meant to help "science education professionals… access a comprehensive, timely, and valid source of knowledge about the emerging body of research, theory, and policy in their field” (p.viii). As a researcher, a book that would “provide a comprehensive view of current and emerging knowledge, research strategies, and policy” (p.viii) in science education would be a great resource. Also, as an editor to a similar type of work, I know and appreciate all the time, effort, and professional labor that goes into making a collection of separate and distinct chapters into a coherent book of meaning and value. Therefore, I looked forward to the opportunity to write this review.

Unfortunately, this book struggles to live up to the promises of its editors with just as many problems as insights. The chapters are a loose collection of previously published material, research studies, and analysis with a rather loose affiliation around the phenomenon of standards in science education. To claim that it focuses on "Science Teaching" as stated in the title, is not quite as indicative of the contents as one might hope. A better title might have been “Standards in Science Education” since there is as much here about students, curriculum, and policy as there is about teaching.

The book is divided into four sections. Part I provides an historical perspective and a current framework for examining the standards movement. More specifically, George Deboer shares an insightful historical description of two distinct strands of standards in the United States. One strand focuses on teaching and learning while the other strand describes the role of standards in systemic accountability. Deboer highlights a well known and significant problem with educational reform when she concludes that,

…teachers are very reluctant to modify their teaching unless it can be demonstrated that the new approach is clearly superior in achieving improved test scores. (p. 41)

Part I concludes with Iris Weis’s description of a framework for contextualizing a growing body of research focusing upon standards and science education. The chapter is largely adapted from a National Research Council report from the Committee on Understanding the Influence of Standards in Science, Mathematics, and Technology education. Weis happens to have been the chair for this committee. Unfortunately, the framework ‘neither advocates nor criticizes the standards” (p. 54). Rather, it provides a generalized means of thinking about standards as an educational reform effort.

Part II is a collection of chapters loosely associated with the impact of science standards on classrooms and teachers. In Chapter 4, Eric Banilower, Sean Smith, Iris Weiss, and Joan Pasley presents survey results on the status of K-12 science teaching in the United States. In most respects this chapter is a rewriting of the Highlights Report from the "Looking Inside the Classroom: A Study of K-12 Mathematics and Science Education in the United States released through the Horizon's Research Group in 2003. It has been edited and tailored to focus solely on Science, but most of the tables and conclusions are the same. Nothing new or different seems to be added. The findings are (once again) disappointing from a teaching for understanding point of view, but encouraging with respect to a standards based approach to science education where improving test performance is the goal.

Chapters 5, 6, and 7 present the results from case studies performed in two states. Chapter 5, by Dennis Sunal and Emmett Wright (the editors of the book), examine Teacher Perceptions of Science Standards in Alabama. This original research (apparently for this book) finds that the goals of the science standards reform effort have not been met. More specifically, the study suggests a disconnect between the overarching equity goal of standards (science for all) and the practical goal of excellence (satisfactory performance on high stakes exams). Even more troubling, Sunal and Wright report that 70% of teachers had a neutral or negative attitude towards standards and nearly half were unaware of any source for standards in science education.

Chapters 6 & 7 both report on case studies perform in Kansas. In Chapter 6, Stephan Marlette and Jenice Goldston ask the question "How well is the message of reform being communicated to school practioners (principals and teachers)?" According to this study, principals and teachers believe that science instruction should be aligned with standards, but both groups do not have a clear understanding of what it means to be 'standards based' instruction. The authors conclude that for 'meaningful change to occur' reform around standards must become more than mere 'implementation'. Those charged with teaching a standards based approach to science instruction must be given the support and development opportunities to 'embrace' science standards at a 'deeper level'.

The Kansas case study presented in Chapter 7, by John Staver examines the role national science standards have played in shaping the science education policy in Kansas between 1999 and 2005. Staver illustrates how a science standards movement that (for some) is moving a step away from local control and one step closer towards a national curriculum can run into serious trouble. Using the example of evolution, the author discusses how the clash between very different groups of stake holders in education centers on the role of standards in education.

The author has some important points to make in this chapter. Unfortunately, poor editing or writing (or both) interfere with the clear presentation of meaning. For example, Staver concludes his analysis by stating:

When able to do so KSBE (Kansas School Board of Education) members who hold fundamentalist Christian beliefs and values enact policy that is consistent with their religious beliefs but is at odds with the beliefs and values of their own committees that were selected to develop science standards for the board because of their represent expert knowledge in modern science and science education. (p. 209)

I find this statement difficult to read and disappointing. Rather, than one run on sentence, this statement should be broken into two parts. The first sentence should end after "at odds with the beliefs and values of their own committees." The second sentence should then read: These committees were selected to develop science standards for the board because of the expert knowledge representative of modern science and science education." The point is important, but the way it is presented interferes with the readers' engagement with the ideas.

Part III is titled the "Impact of Science Standards on Teaching". It would appear that this section is finally going to get to the core issue as promised in the book's title. However, a more accurate title for Part III might be the "Impact of Science Standards on Teaching and Learning'. The chapters in Part III investigate teaching, but also discuss student learning experiences equally.

In Chapter 8, Connie Gabel describes in depth a model for teaching science with inquiry that is both bold and exceedingly complicated and tedious. It is no wonder that the 'paradigm shift advocated in the NSES is not being

met' (p. 215). Gabel provides a thorough and interesting discussion around the chronic problem of teaching with inquiry especially within a high stakes and standards based educational reform environment.

Chapter 9 picks up on Chapter 8's theme of inquiry with Cynthia Sunal's description of a model for the skills and knowledge students need to be active participants in a scientific discourse. Her presentation rests upon the assertion that standards play a vital role in shaping science education. The chapter concludes with the optimistic view that the "national standards' emphasis of on inquiry is attainable with teaching that recognizes inquiry as an important education and personal goal" (p. 295).

Part III closes with Lili Stern and Jo Ellen Roseman's "Improving Alignment of Curriculum and Assessment to National Science Standards". The authors present research for assessing the quality of curriculum materials in science. The criteria for quality consider the degree to which assessment practices are supportive of standards based learning objectives. Chapter 10 (like the other chapters in Part III), is too quick to accept standards as a positive force for educational improvements. I think that the inclusion of a more critical perspective and a greater focus upon the impact of standards (both positive and negative) on science teaching would have improved the value of this part of the book.

In the final part of the book, the discussion shifts from content standards for classroom teaching and student learning to professional standards at different levels and connections to education. In Chapter 11, Gail Shoyer, Teresa Miller, and Cecelia Hernandez describe the challenge of translating standards into practice. By focusing on teacher education, development, and effectiveness within the context of Kansas State University, this chapter describes the positive contributions of standards to each aspect examined. Though short on detail regarding what kinds of improvements were actually observed, the chapter describes the strategies and ideas that went into the reform effort within the higher education community.

Chapter 12 provides another case study, but this time from Texas. Authors Christy Mackinnon, Judith Fowles, Edward Gonzales, Bonnie McCormick, and William Thomann, present a Texas case study of a university-school partnership as the vehicle for change in middle school science. The project is similar to Chapter 7's case study in Kansas where national and state standards are examined in the context of middle school science education. Results indicate that strong leadership for change among all partners is required to insure higher possibilities of success.

Chapter 13, by Larry Enochs and Fred Finley, provides content specific example of how standards play out in a earth science through research. With little new research available on the topic, the authors spend most of this chapter critiquing the science standards most closely associated with Earth Science. The authors direct their ideas to those who might work to revise current standards documents to increase both the accuracy of earth science content standards and their presence compared to other disciplines.

The book's last chapter is an Austrailian Case study by Warren Beasley that examines science standards, teacher quality, and curriculum renewal. Beasley brings a refreshing critical view of standards in science. He also describes in quite eloquent terms the most important point in this book when he defines the contradiction between the rhetoric of national standards and the demands of state assessment systems:

If science education is to become more inquiry driven as promoted by the learned professional scientific societies internationally then curriculum and assessment standards must mirror these standards. The assessment of such standards cannot be achieved through standardized tests. Unless the ownership of the assessment standards resides with the profession and enacted by teachers in individual classrooms then the nature of science education will remain forever under challenge. Currently assessment is ideologically driven by politicians and vested interest groups whose motives seem contrary to those goals cherished by the wider scientific community. (p. 427).

I found this particular point to be very important. After many chapters that seemed too quick to confirm and too reluctant to criticize current science educational practices, Beasley brings a refreshing outside perspective on standards and science teaching.

Taken as a whole, this collection of essays goes far beyond the 'impact' of standards on science teaching. While Part III is dedicated to Standards and Science Education, the wealth of information, analysis, and perspectives provided throughout the rest of the volume, moves the discourse more often than not outside the realm of the science classroom. The emphasis on inquiry is greatly appreciated and needed, but a more thorough analysis around standards and inquiry may have been warranted. It must also be noted that most of the research presented is limited to states in which the case studies were performed—Alabama, Kansas, and Texas. Though some very interesting case studies are presented, there is a noticeable lack of critical discussion around the value of standards in science education or the sacrifices in the quality of teaching and learning some interpretations of standards (and their associated assessment practices) bring to the classroom. The lack of a singular focus, a misleading title, unacceptable errors in editing, and no index all add to a work that had tremendous promise on a timely and important topic, but whose inconsistencies render a rather disappointing product. I hope future volumes in this series build upon the successes and address the shortcomings of this book.