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Book and Media Review

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Review of *Chemistry Education: Best Practices, Opportunities and Trends*

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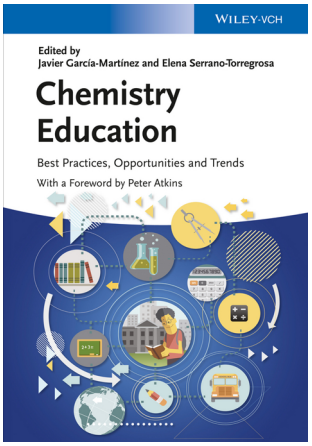
Chemistry Education: Best Practices, Opportunities and Trends; edited by Javier García-Martínez and Elena Serrano-Torregrosa. Wiley-VCH: Weinheim, Germany, 2015. 792 pp. ISBN: 9783527336050 (e-book). $108.99.

With 28 chapters covering a wide range of topics over the course of its 792 pages, *Chemistry Education: Best Practices, Opportunities and Trends* needs the word "Guide", "Handbook", or "Collection" in the title. The chapters in the book include topics such as undergraduate chemistry curriculum, life-long learning, research-based teaching strategies, service learning, chemistry apps, and language in chemistry education. Similar to both volumes of *Chemists' Guide to Effective Teaching*,[1,2] chapters discuss larger issues related to student learning (e.g., Chapter 8, on problem-solving; Chapter 15, on concept integration; and Chapter 17, on the role of language), but then there are also chapters about specific teaching strategies and tools (e.g., Chapter 13, on flipping the classroom; Chapter 18, on effective use of demonstrations; and Chapter 26, on tools for blended learning). I appreciate the diversity of authors in this text. Forty-six people contributed from 14 different countries and five continents. The variety of examples and experiences makes the volume accessible to the global chemistry education community.



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The authors of most of the chapters mix the research literature with personal work and experiences from their schools or courses; this provides a strong, clear argument that also makes the topics relevant and achievable for any chemistry educator. Renée Cole provides a great overview of how research can improve teaching practices, describing many strategies supported by research as effective. Brian Coppola's discussion on authentic learning experiences is quite interesting, and I appreciate Hans-Dieter Barke's chapter on misconceptions with his distinction between preconceptions and school-made misconceptions. Keith S. Taber provides a great discussion of conceptual integration and its impact on both the understanding and teaching of chemistry. I also thought Cathy Middlecamp's chapter makes a strong case for chemistry educators' responsibilities to all students and not just future chemists. There are other good chapters that would be helpful for implementing a specific change (Chapter 13 if someone is thinking about flipping a class, or Chapter 14 if someone is interested in service learning). Other chapters would be great starting points for larger conversations with colleagues about approaches to teaching students, course curricula and purpose, or program curriculum. As with any edited volume, there are some weak chapters. A few chapters belong in chemistry education journals because instead of discussing a larger idea or strategy they described a single research study (Chapters 3 and 10) or they will quickly become dated (Chapter 25, a review of available chemistry apps). Weak chapters are, however, few.

While most of the chapters taken individually are strong, I did not find the book, as a whole, to be cohesive due to its organization and broad range of issues. The book is organized into three parts: (i) Chemistry Education: A Global Endeavour; (ii) Best Practices and Innovative Strategies; and (iii) The Role of Technologies. From the book's preface, the first part is supposed to provide "a broad introduction to the book and touch on critically important aspects of chemistry education" (p xxvi). Chapter 5 discusses chemistry teacher education, yet chemistry teacher education is never mentioned again in the book. If it were a broad introduction, it seems that these should be the larger themes of the book. Chapter 4 makes the case for competency-based undergraduate curriculum, which again is never explicitly discussed or mentioned again in the book. While the chapters are strong, this is not a broad introduction to the rest of the book. Although the third part is more cohesive, discussing the uses of technology in chemistry education, the second part, which is the majority of the book at 16 chapters, is not clearly organized and is a bit repetitive. In the first paragraph of this review, I mention chapters that discuss larger student-learning issues and then also teaching strategies. If you notice, the numbers of the chapters are mixed. As another example, a chapter on gifted education comes just after one on demonstrations and before one on project-based learning. In addition, within the second part some of the chapters are repetitive. Chapter 12 describes inquiry-based instruction and so does Chapter 21, though the term inquiry is not used in the title of the chapter, only in the text. For another example, the topics of problem-based learning, project-based learning, context-based teaching, and community-based or

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service learning, which are variations of inquiry teaching,[3] are presented as discrete chapters (10, 11, 14, and 20) in the book. The repetitive chapters are good alone, but in a book meant to be an overview of different ideas, the repetition does not make sense.

At the beginning of this review, I suggested the book's title needed the word "Guide", "Handbook", or "Collection" in it; "Collection" is the word that should have been chosen because chemistry education is the unifying theme of some great chapters, but as a handbook or guide, it is too diverse and unorganized. I recommend *Chemistry Education: Best Practices, Opportunities and Trends* be used for its individual chapters to spark discussion or to begin your research, but the price does not warrant purchase for the few chapters you will likely use—maybe obtaining a copy for your department or school would be more appropriate.

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Notes

The authors declare no competing financial interest.

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