

Teaching and Learning STEM. A Practical Guide

by Richard M. Felder and Rebecca Brent

Jossey-Bass (2016). Hardcover \$42.75 on Amazon

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Through workshops, articles, presentations, and book chapters, Richard Felder and Rebecca Brent have attempted to convince and persuade more than a generation of engineering faculty that there is likely a more effective way to teach than what those faculty have been doing. Whether it is has been the National Effective Teaching Institute, on-campus workshops across the continent (and beyond), or countless Random Thoughts (published in this journal), Drs. Felder and Brent, separately and together, are world renown in the field of engineering education. To their legacy they have added the long-awaited book, *Teaching and Learning STEM. A Practical Guide* (Jossey-Bass, 2016). At 316 pages, covering 12 chapters, a reference section, and index, the book reads very much as anyone familiar with their work, either through papers or workshops, would expect. It is a sort of compilation/greatest hits book, but edited and divided into four parts: an introduction to college teaching, designing courses, teaching courses, and facilitating skill development. Each chapter itself has an introduction, with both an “ideas to take away” and a “try this in your course” section, for those who may want to skim the details and get to the conclusions/recommendations portion. Beyond the introduction chapter, the contents of the book include Learning Objectives (Ch. 2), Planning Courses (Ch. 3), Planning Class Sessions (Ch. 4), Elements of Effective Instruction (Ch. 5), Active Learning (Ch. 6), Teaching with Technology (Ch. 7), Evaluating Knowledge, Skills and Understanding (Ch. 8), Problem-Solving Skills (Ch. 9), Professional Skills (Ch. 10), Teamwork Skills (Ch. 11), and Learner-Centered Teaching Revisited (Ch. 12).

Between most chapters are two-to-three page interludes that motivate the topic of the following chapter, often in a familiar

way if you are a fan of the Felder “Meet Your Students” series in the Random Thoughts column. Also, within several of the chapters are sections titled “Brainwaves,” which are short asides that discuss how brain function and memory impact learning, especially as it relates to certain teaching methods. For example, the Brainwave and surrounding material in Chapter 6 discusses how retrieval practice on newly presented information (which is what occurs during active learning) improves the likelihood that this material will be stored in long-term memory.

The book, since it is advertised towards STEM teachers (and not just engineering or chemical engineering faculty), takes great effort when providing examples to make sure the various STEM fields are represented. Much of this diversity is handled through parenthesis or brackets within the narrative to allow educators from various STEM disciplines additional access to the approach being presented.

One thing that this book is not, is a reference book on all topics of STEM learning—and the authors do not claim it to be. The book certainly cites the literature while presenting topics and ideas (there are a few hundred references, overall), but what you find from reading this work is that it is also infused with the learned advice and clear, direct language that experience provides. Indeed, when the authors are warning against, for example, the use of slide shows/verbal avalanches in the classroom by a fictitious instructor (Prof. Fulano) and its impact on student attendance (Chapter 4: Planning Class Sessions), they do not say that “Prof. Fulano” is misguided or too harsh on the students for labeling them lazy and apathetic; they say “Fulano is wrong.”

While this book is accessible to all faculty (or prospective faculty), those who have some experience in the classroom may be able to contextualize the material better since they will more easily relate to the situations presented. The book is an easy read and, if you are unfamiliar with the work and style of Felder and Brent, it can be a page turner that will likely leave you questioning how you run your own class. On the other hand, if you are a fan of the work of Felder and Brent and choose to skip this book, you really should purchase a copy of *Teaching and Learning STEM. A Practical Guide* anyway...and give it as a gift to a faculty colleague in need of this material! □