

Foreword

STEM has taken a position in the pantheon of educational acronyms. This educational theme must be in a lead position because other disciplines such as environmental education, geography, and fine arts are positioning themselves for a worthy place with the disciplines of science, technology, engineering, and mathematics.

The ambiguity in the acronym STEM has provided a very positive and constructive contribution to education. This resides in the common agreement about the role and importance of the STEM disciplines in education and society. “Who among you are opposed to STEM?” If this question were asked in a group of educators, few would respond positively. On the other hand, suppose one asked that same group of educators, “What is your perspective of STEM in education? Does it refer to goals? Policies? Curriculum? Specific teaching practices?” I think it is fair to say the answers would vary.

The challenges of STEM education center on the fact that the acronym has been increasingly used, and it has reached a point where the ambiguous slogan requires definition with concrete and specific discussions in terms of educational reform. What, for example, does STEM mean for curriculum, instruction, and assessment for states, schools, and classrooms?

Another challenge is the lack of evidence-based results for any of the various uses of the acronym—that is, until this book. Rather than dwell on the challenges, real as they are, let me turn to the positive.

For those who have responsibility for leadership in any or all the STEM disciplines, this book, *Proven Programs in Education: Science, Technology, and Mathematics (STEM)*, provides a solid foundation for state and local policies, school programs, and classroom practices. As a bit of context for this book, there is a relatively new publication that should be of great interest to educators interested in reform. The journal is *Better: Evidence-Based Education*. The publication’s mission is to get evidence-based research into the hands of educational leaders, particularly policy makers, curriculum developers, administrators, and classroom teachers.

As educators consider initiating STEM programs, it would be helpful to begin with fundamental questions that have evidence-based answers, such as

- What teaching practices matter in middle grades science?
- How do science teachers use research evidence?
- How does one address diversity and equity in science education?

- Which educational technologies are effective?
- What is the role of technology in science assessments?
- How is professional development the key to integrating technology?
- What works in teaching math?
- Which instructional methods are most effective for mathematics?
- What depth of knowledge is essential for mathematics?

This book provides evidence-based answers to these questions by highly respected researchers in the STEM fields. Leaders in mathematics education include Robert Slavin, Jim Hiebert, Doug Grouws, and Norm Webb. Educational technology leaders include Steve Ross, Deborah Lowther, Omar López, Jody Clarke-Midura, Lynne Schrum, and Barbara Levin. Science education leaders with contributions include Mary Ratchffe, Okhee Lee, Wolff-Michael Roth, and Sir John Holman. One could hardly ask for a better line-up of contributors and a superior selection of chapters to initiate the reform of STEM education programs.

All of the chapters in this book are from *Better: Evidence-Based Education*, so they have a similar format and short, succinct length, both of which contribute to easy reading and understanding.

Educators are beginning to ask “How can I address the challenges of STEM education?” and “Where is the research supporting the reform of STEM disciplines?” Well, answers can be found in *Proven Programs in Education: Science, Technology, and Mathematics (STEM)*.

This book is a foundation for those who wish to move beyond the acronym and begin the constructive work of reforming STEM education with evidence-based ideas.

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