If you were to make one of the currently trendy word clouds of keywords from the major science education journals today, two words would be sure to stand out: STEM and Inquiry. First, let’s address inquiry. Inquiry has been a driving topic in science education for years. Shortly after Sputnik science educators realized there had to be a better way to teach science. Students were not achieving the desired results of pushing science forward through reading from texts and repeating back what the written word communicated. As constructivism became more accepted as a theory on how learning takes place, teaching methods were needed to match this philosophy. Students needed a way to construct science understandings in a meaningful way and reading from a book or listening to a lecture was not the way for this to happen. Instead the idea of teaching through inquiry was raised as a solution. Of course, as you read this you are probably thinking to yourself, if the notion of inquiry isn’t new, how come I had so many science lectures in my school career? Well, that is most likely due to a fundamental force of nature, inertia, in this case, educational inertia. There is a great resistance to change in education and changing from lecture based teaching methods to inquiry based teaching methods has certainly been no exception to this rule.

Teaching through inquiry was probably most well articulated into a concrete form of practice by Roger Bybee and the Biological Sciences Curriculum Study (BSCS) with the development of the 5E teaching model. While this is likely the most common implementation of inquiry based teaching in the classroom, if you talk to 10 science educators, you are likely to get 10 different definitions of inquiry. If those same 10 science educators were to observe a classroom, however, they would probably all agree on whether it was an inquiry based class or a ‘traditional’ class. So perhaps it is better to paraphrase a famous Supreme Court decision and say that you will know inquiry when you see it. Reading this book will give you ample opportunities to see and know inquiry.

STEM is the new kid on the block in science (and technology, engineering, and mathematics) education. About 15 years ago when standards for science education were first being written by the National Research Council (NRC), the National SCI-
ience Education Standards (NSES), and the American Association for the Advancement of Science (AAAS), the Benchmarks for Scientific Literacy, one of the main focuses was to begin to break down the barriers between the science content areas of biology, chemistry, earth science, and physics. At this moment a new framework for science education is being developed as a guide for new standards. These new standards are going to move well beyond stressing the importance of integrating the four traditional content areas and are going to explicitly include engineering and technology. While that may sound like STE education, you cannot integrate those three without a healthy dose of mathematics!

Tying inquiry and STEM education together in this book is the reliance on the TPCK framework. The TPCK framework originally developed by my friends Mishra and Koehler is the idea that the most effective teaching in a classroom occurs when a teacher uses technological (T), pedagogical (P), and content (C), knowledge (K) in designing the instruction. In the case of this book, the pedagogical knowledge relied on is going to be the proper and interesting applications of inquiry. The content knowledge will come from any one or all of the STEM disciplines. The role of technology will vary from being nearly transparent to the focus of the example. In each of the examples, it should be apparent why using the technology brings an added layer of value to the activity. Technology is best used to allow students to learn concepts that would have been much more difficult or impossible to experience without the technology. Even in cases where the technology is not providing a novel experience for the learners, it is allowing students to be equipped with skills in using the technology they are going to need to be successful citizens in current and coming times.

The publication of this book incorporating inquiry, STEM and TPCK is very timely. As K-16 teachers grapple with how to best incorporate all of these ideas into their classrooms, having a wealth of high-quality peer-reviewed and vetted examples will be a valuable resource that should not be missed. I would urge STEM teachers at all levels to make the time to read and learn from this book.

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David Slykhuis has been at James Madison University since the fall of 2004. His primary responsibilities lie in the preparation of science teachers in the middle and secondary education program. His research interest involves the use of technology in K-16 science classrooms to increase student achievement. He is currently the Director of the annual Content Teaching Academy for in-service teachers at James Madison University. He is currently a Vice-President and co-Chair of the Teacher Education Council for the Society of Information Technology and Teacher Education (SITE). Dr. Slykhuis received his PhD in Science Education from North Carolina State University in May of 2004. He has five years of high school classroom experience, teaching primarily chemistry and physics.