

An Innovative Upcoming Elementary Science and Engineering Methods Book (Resource Exchange)

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New Methods Book: Student-Centered Elementary Science and Engineering: A Principles-Based Approach

by Pamela S. Lottero-Perdue, Lara K. Smetana, and Sherry A. Southerland

Presented at the ASEE 2026 PCEE Division Resource/Curriculum Exchange

Benefits to Resource Exchange Attendees

Conference participants can engage directly with the first author of the book (Routledge, Taylor and Francis Publishers). Our aim is for participants to learn the following:

- What the authors mean by a “principles-based approach,” and how the principles, two core commitments, and other aspects of the book inform teacher practice and are grounded in the research literature, including engineering education.
- How engineering is (a) integrated throughout the book with science for most of its chapters, rather than treated as an add-on to a science methods book, and (b) simultaneously treated as a unique discipline
- How the structure of the book supports both novice teachers and teacher educators, with the structure including two appendices designed to inform novice teacher learning and practice (Appendix A) and dive deeper into some of the underpinnings that inform the chapter’s central ideas (Appendix B)

Participants will receive electronic access to the first chapter of the book, including its appendices (see QR code on back). This will allow participants to explore the book’s welcoming tone, use of vignettes to introduce key ideas in each chapter, principles-based framework, and evidence-based grounding in greater depth. Appendix A provides links to six resources and two novice teacher activities connected to the chapter’s content. Appendix B explores six resources, including standards documents and research.

This session is designed to inform those involved in elementary teacher preparation and professional learning about the book (available late 2026) for their future consideration.

Summary of Book Qualities

1. Roots student-centered SETL within research-based foundational **commitments** and **principles** applicable across engineering and science subjects; instructional tasks, lessons, and units; and grade levels or student ages

Foundational Commitments: *We commit to the ideas that:*

Commitment 1. All children are brilliant

Commitment 2. Teachers are opportunity makers

Principles: *Doing and learning science and engineering:*

Principle 1. Engage children in sensemaking about their world

Principle 2. Involve uncertainty and struggle

Principle 3. Involve a range of emotions

Principle 4. Are empowering

2. Written in a **succinct and accessible** manner for pre-service elementary teachers, with a welcoming tone and using primarily colloquial, everyday language
3. Is a **resource for science teacher educators** including the text, end-of-chapter questions, and two appendices for each chapter (see description above)
4. **Integrates ideas about science and engineering teaching and learning (SETL)** throughout the chapters
5. **Attends to the unique aspects of science and engineering**, including chapters about the disciplines of science and engineering, respectively
6. Presents student-centered SETL as an **essential part of learning for elementary-aged children**, i.e., ages 5 to 11 in United States kindergarten through fifth grade
7. Offers a **range of suggested teaching practices**, including those that require only small investments of time and effort to larger time commitments and efforts
8. Undergirds the commitments, principles, practices, and other ideas in the book with **evidence-based research**

Chapters and Appendices

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| Chapter 1 | Commitments and Principles: <i>What foundational commitments and principles guide this book?</i> |
| Chapter 2 | Children's Brilliance and Belonging: <i>Who is in your class?</i> |
| Chapter 3 | Learning, Doing, and Belonging: <i>How are these things connected?</i> |
| Chapter 4 | Engaging in the Discipline of Science: <i>How do scientists do science?</i> |
| Chapter 5 | Engaging in the Discipline of Engineering: <i>How do engineers do engineering?</i> |
| Chapter 6 | Assessments: <i>What are the roles of assessment in supporting children's science and engineering learning?</i> |
| Chapter 7 | Learning Environments: <i>What learning environments best support science and engineering learning?</i> |
| Chapter 8 | Tasks: <i>What tasks are we asking children to engage in?</i> |
| Chapter 9 | Talk: <i>How do we get children to talk and listen to one another?</i> |
| Chapter 10 | Lessons and Units: <i>How are tasks embedded in lessons and units?</i> |
| Chapter 11 | Next Steps: <i>Where do you go from here?</i> |
| Appendix A | Instructional Resources for Novice Teachers and Teacher Educators |
| Appendix B | Annotated Bibliography of Relevant Scholarly Work |

Background images taken by Pamela Lottero-Perdue and from the book.

Questions or problems with the QR code or link? Contact Pamela Lottero-Perdue, plottero@towson.edu

Link to Chapter 1: <https://tinyurl.com/Ch1SciEngMeth>

