

## Propositions on Engineering Undergraduate Education

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Here are some ideas about engineering education that I believe – at least for today. I offer them to you as prompts, to elicit your thoughts and enliven our conversation.

1. Many of the skills and habits that we want our students to exhibit are not now taught explicitly – but they could be.

*The Missing Basics: how to ask questions, label things, model qualitatively, decompose problems, experiment & measure, visualize & draw, communicate.*

*R. Keith Sawyer: deep understanding of complex concepts, manipulate knowledge creatively, integrate knowledge, transfer knowledge to real-world settings, innovate collaboratively*

2. It will **never** be possible to cover all of the technical facts and skills that our graduates “have to know,” yet only a fraction of what we cover is actually retained.
3. The two most important things for us to know as teachers are who our students are, and who they want to be.
4. Our curricula are based on building knowledge progressively from the bottom up, yet the way we teach every day acknowledges that this doesn’t work.
5. Engineering curricula are difficult to change, but faculty members are free to make changes both large and small.
6. Improving the way we do undergraduate education will have as much impact on our reputation and future vitality as improving our research.
7. Students have many useful things to say – both before and after they graduate – about what engineering education should be.
8. The “pipeline” metaphor for student development and retention is worn out, and due for a change.
9. ABET can be useful to us in the same way that a required course can be useful to our students.
10. Ultimately it’s what happens between a teacher and a student that matters.