VER the past three years, I’ve had the opportunity to speak at more than a dozen conferences for technology teachers in the Northeast, as well as at national meetings of organizations like the Association for Career and Technical Education and the International Technology Education Association. Far and away, the issue causing the most concern—and the most excitement—among technology educators is “engineering.” I have some thoughts I’d like to share with others in technology education regarding how we view engineering.

**Key Questions**

Some technology teachers see engineering as an invigorating new direction for the field. To them, engineering is the pinnacle of technological careers, and “engineering education” is a logical step forward for the profession known only 20 years ago as industrial arts.

Others are concerned that engineering represents too narrow a segment of the field—a segment designed for high-achieving students at the expense of students we have traditionally served. These teachers wonder whether a move toward engineering is wise when many are still adjusting to the change to technology education.

In talking with teachers, I have come to believe that the issue of engineering in technology education actually boils down to two distinct questions. The first question relates to the role of engineering processes in our programs. The second is whether to pattern our content after traditional engineering content.

I’ll address each question separately, but to me, the most important question is how we as a profession define the word “engineering” in K-12 education. In my opinion, our field should view engineering as a verb—something that people do—rather than as a noun—something that people are.

**Question 1. Should engineering processes be a significant thrust in technology education, even if they supplant hand skills?**

This is the least contentious of the three issues. We have long included the processes of engineering in our programs. Even during the “Russian” or “tool-instruction” era, industrial arts leaders in the U.S. advocated the inclusion of engineering functions such as project management and laboratory-based research and experimentation.

Fifty years ago, many schools still offered “manual training.” Sputnik had not yet launched the nationwide suspicion that we needed to begin training more scientists and engineers at the secondary level. Consider some of the best-known movements in the past half-century:

- **Warner’s Curriculum to Reflect Technology** (1947), extended and refined by Olson and DeVore in the 1960s, and encapsulated in part in curriculum projects such as the IACP and Jackson’s Mill;
- The recasting of technology education as “problem-solving” during the 1980s and “design” in the 1990s.

While not the only recent movements in our field, these have been among the most prevalent. And as a historical progression, they represent a move away from individual craft and hand skills and toward applied and intellectual skills—all in the context of modern industry.

A hundred years ago, the exemplar of the field may have been the craftsperson. But for decades we have been moving toward viewing the engineer as our exemplar.

So my response to this question—whether engineering processes should be a significant thrust in technology education, even if they supplant hand skills—is that the processes of engineering have already been a significant thrust of our profession for years, even if we...
have not been using the term “engineering.”

**Question 2. If the engineer is an exemplar for technology education, should K-12 technology programs reflect the content of college engineering programs?**

In my opinion, we should not narrow our programs this much. It’s true that the processes we have our students participate in are often modeled on what engineers do. But I don’t believe that this obligates us to copy the content in which engineers are trained. Separating out statics and dynamics or replacing hands-on experimentation with mathematical models may make sense in a university engineering program, but we are educating young people, not training engineers.

This is my concern about off-the-shelf programs that treat middle- and high-school technology programs as feeder systems for engineering colleges. It may be the case that the U.S. has a dearth of domestic engineers, but I disagree that technology educators must sacrifice their content because of it.

And what of the content that is sacrificed? Since many of our students will not become engineers, and since we hope to help them become better-informed citizens and consumers, we should provide them with a broad technological content base. This includes teaching not only how products and systems are engineered, but also how societies, families and individuals make technological decisions. It also includes the history and impacts of technological systems.

Engineering colleges, due to accreditation or public-image concerns, have begun to include courses such as “The Engineer in Society” in their curricula. But a vast majority of the four or five years of an accredited engineering program is technical. Even if many of the processes our students engage in are related to engineering, there is much, much more to the content of technology education than the application of technical knowledge.

**A Proposal for the Term**

In the UK, elementary-school technology education has been referred to as “children’s engineering” for 15 years or more. At least in my part of the U.S., the term “engineering” is often used freely to describe technology activities among elementary and some middle school teachers. Maybe this is because K-8 teachers feel that they are only introducing students to careers. You don’t have to be an engineer to introduce engineering careers to fifth-graders, for example.

But high-school teachers appear to be concerned that they will be asked to vocationally prepare engineers, and argue that they are unprepared to do this. Sadly, they also predict that their students “can’t handle it”—even though, when asked, they don’t know what “it” is!

The role of technology education is not to train engineers. But we can—and should—use the word “engineering” to explain and promote our field. Here are two suggestions.

First, our profession should clarify that, as pertains to K-12 education, “engineering” is a verb. It is the synthesis of technological design and technological actualization. It is NOT a vocational program intended to screen teenagers for engineering colleges; it is simply another word for what technologists do, and what K-12 students SHOULD do.

Second, once we’ve defined it, our profession should increase the use of the term “engineering.” It is almost a cliché, but we must remember that a vast majority of teachers, students and parents view “technology education” as “educational technology,” which is further reduced to academic computing. The term “engineering” can be used to clarify that our field is more than using computers.

I’m not sure we should rename ourselves “engineering education.” But “engineering” may be a term educators and the general public can recognize as distinct from academic computing and as valuable for K-12 education. This would require the technology education profession to present a concise definition emphasizing engineering as a verb, a human action, and not describe it as a vocation. Engineering in technology education would be presented as deeply significant, indispensable, symbolic, a major part of our historical legacy, and an important connection to the “real world”—but not the only important part of technology education.

**Final Thoughts**

What’s in a name? In the political reality of our schools and our society, a name can mean a lot. In the mid-1970s, when debate was raging over whether to include “technology” in the name of the industrial arts profession, we didn’t foresee that the name “technology education” would still be confusing three decades later. Whether or not we use the word “engineering” to define technology education, our choice needs to be guided by what is best for the students we serve. Undoubtedly, however, our ability to serve those students is limited by the clarity of our message.

We all know our current terminology isn’t communicating our message. What are we really about? Technological literacy? Design? Engineering? If my discussions with hundreds of teachers can be summarized into a main point, it would be that we do not agree on the meanings of the terms we’re debating. The suggestions in this article are directed at this apples-and-oranges problem. First we must define what “engineering” means in technology education. Then we can debate whether we should use it. ☛