HIGH FREQUENCY
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Editorial Director
Gary Breed
gary@highfrequencyelectronics.com
Tel: 608-845-3965
Fax: 608-845-3976

Publisher
Scott Spencer
scott@highfrequencyelectronics.com
Tel: 603-472-8261
Fax: 603-471-0716

Associate Publisher
Tim Burkhard
tim@highfrequencyelectronics.com
Tel: 707-544-9977
Fax: 707-544-9375

Assistant Editor
Katie Landmark
katie@highfrequencyelectronics.com
Tel: 608-845-3965
Fax: 608-845-3976

Production Assistance
Ken Crocker

Business Office
High Frequency Electronics
7 Colby Court, Suite 7-436
Bedford, NH 03110

Editorial and Production Office
High Frequency Electronics
403 Venture Court, Unit 7
Verona, WI 53593

Also Published Online at
www.highfrequencyelectronics.com

Subscriptions
Subscribe online at:
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E-mail inquiries to: circulation@
highfrequencyelectronics.com

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Back-to-School: A Look at Engineering Education

Gary Breed
Editorial Director

Education is always a controversial subject. The only thing that is not open for debate is the fact that education itself is essential for the continued functioning of human society as we know it. The debate is always around the question, "How?" In engineering, the primary debate is between the concepts of *training* and *problem-solving*.

Training beings with the factual lessons that are required for a technical career—mathematics, physics, chemistry. Then, their specific application to engineering problems is the subject of the remaining undergraduate program. The problem with a training emphasis is that there is too much information to fit into a four-year college degree. It's just not possible to cover all the current electronics applications!

A problem-solving emphasis also starts with the basic math and science, then shows how to expand those basics into more complex functions and applications. The goal is to teach students how to build an understanding of any specific issue confronting them. The problem with this approach is that students do not learn as much about the specific techniques and systems they could be working with in their jobs.

The usual response by engineering schools is to find a balance point between these two approaches. The most workable solution from the educator's perspective is to emphasize problem-solving at the undergraduate level, then have students find an area of specialization as graduate students. While this works well, it does not help students who cannot afford the time and/or money to stay in school through at least the Master's level. It also is an issue for employers who do not want to pay a salary premium for a beginning engineer who happens to have a Master's degree.

I think both approaches are needed. There is no single, ideal engineering program that can do both. The required balance is best achieved by having different style programs at the various colleges and universities. This is not a revolutionary idea—there have always been big differences between small and large engineering schools, or more accurately, between

undergraduate-based programs and research-based programs that want all students to get their Ph.D.

What may be different is a recognition that it's not important to debate over what style of education is "better." Different students have different learning styles; different employers have different desires for their new engineers. And, of course, different schools have different facilities, student bases, faculty specialization, local industry support, etc.

All this discussion brings me to one of my favorite soapbox subjects: What does it mean to go to the "right school"? In today's society, there is far too much emphasis on striving for the best grades, the highest test scores and getting into the best schools. These are admirable objectives, but some of the best engineers working today did not take this route!

The high school counselor for one of my own kids advised us there is a "right school" for every student—which may involve more than academics. A student's needs should also match the school's teaching style, location and social makeup. Finding this type of match can be a huge challenge; no student, parent or guidance counselor can know every option.

Perhaps the best thing to realize is the converse: in some cases, a "great school" might also be the "wrong school" for an individual student. Most employers will select a successful student from a small school over a mediocre student at a big name university.

I may get some argument on this, but I think the prestige of your alma mater only matters when getting your first job. Although this may be extremely important in some career paths, an engineer's success over his or her entire career is based on performance (both personal and technical).

Disasters—Natural and Man-Made

Engineers, in general, have a tendency to concentrate on the tasks immediately at hand. The recent hurricane disaster on the U.S. Gulf Coast reminds us once again that there is more to life than our own localities and interests.

There will always be natural, religious and political difficulties in the world, but when something hits close to home, it's a good time to stop and reflect on our own attitudes. Start by appreciating the good things in your life; it's hard to be anti-anything when you have a positive attitude.

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