



## Skills They Don't Teach You in School

It's impossible to learn everything you need to know for your career in a four-year undergraduate program. A proper education should prepare you with the tools and skills you need to problem-solve in the "real world." However, the typical chemical engineering curriculum does not (and cannot) teach you all of the necessary skills you will need to thrive throughout your career.

If you are graduating and starting your career in the coming months, keep in mind that even though class is over, you still have much to learn. Here are some things your classes may not have addressed.

**Communication and teamwork.** Very few engineers work alone in the real world; we often depend on a bevy of teammates — such as operators, contractors, customers, and managers — to move projects from start to finish. That's why teamwork and communication are two very important skills that young engineers must refine.

"Engineering in university is often taught as individual technical problem-solving, rather than a team sport. Getting others to help you might even be considered cheating," says Alan Rossiter, President of Rossiter & Associates (Bellaire, TX). "Of course, real-world engineering does require individual problem-solving, but we can be much more effective when we have people we can turn to for help, and when we are open to helping others — especially when there is no obvious way that we benefit personally by helping," he says.

How to work effectively in teams, communicate your ideas, and deal with conflicts are a few important skills that undergrads should practice before they graduate, says Truc Ngo, an associate professor in the Dept. of Industrial and Systems Engineering at the Univ. of San Diego. "However, teaching students these skills in the traditional classroom format is challenging and may not be effective," she says.

**Networking.** Most undergrads have a basic understanding of networking, but don't fully appreciate how essential this skill is to a successful career. Not only is it a crucial part of finding a job, it's also important for advancing and getting promoted, making your ideas heard in meetings, and solving difficult problems that aren't in your wheelhouse. People who project confidence and trustworthiness, and who aren't afraid to reach out to their network for help, are more likely to find success in the workplace.

Fortunately, this is one skill that you can easily practice and improve on. At networking events, such as conferences and meetings, be sure to mingle with others. Practice your "elevator speech," so you can give your new acquaintances a clear, 30-second description of what you do for your organization. Bring plenty of business cards to any profes-

sional events that you attend, and be sure to follow up with attendees you meet to grow and expand your network.

**Learning your plant.** Your education should give you a good idea of the theory behind many pieces of basic process equipment, such as pumps, distillation towers, and heat exchangers. But most young engineers who choose to work in a chemical plant will likely have trouble identifying all of the equipment in their facility. Learning the practical aspects of any job is one thing you can't do in school.

"The Univ. of Virginia gave me a good theoretical background to start working in the real world after graduation," says Donna Bryant, Environmental Operations Unit Superintendent, Syngenta. "However, there were a lot of things that I had to learn once I started as a production engineer in a unit," she says. "Many of those things were just how things worked at the plant, but others are more specific — such as knowing what kind of cases you need to consider for pressure relief or vacuum protection devices on vessels, determining what is wrong with a tray in a distillation column by looking at it when tunneling the column, and being able to identify a pipe's size out in the field with the naked eye."

**Problem analysis.** Students are often tasked with solving problems that have many known variables and few unknown variables. In the workplace, there is no answer sheet that will allow you to double-check your calculations. "Because there aren't necessarily as many known variables available in the real world when you are trying to do calculations (at least not as many as you had in school), you need to get creative and sometimes make some reasonable assumptions," says Bryant. "Determining what a reasonable assumption is, and being comfortable with it, is key," she states.

To make these reasonable assumptions, we must often analyze vast amounts of information and data. According to Ngo, statistical data analysis, design of experiments, and statistical process control are three areas where undergraduate education is lacking. "I actually took some of these courses during my graduate school years for simple personal interest, but when I got out of school and worked as a senior process engineer at Intel, I realized how important it was to have these skills," says Ngo. With the growing popularity of big data, young engineers will find it increasingly important to be able to interpret and make sense of large data sets.

Although some of the process equipment and theories that we use are decades old, technological innovations are changing the industry faster than you may think. Being a successful chemical engineer will require lifelong learning and a commitment to continually improving your technical know-how and soft skills.

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