Allowing Them to Fail

Arthur T. Johnson

Published in the BMES Bulletin, vol 33(2), 2009.

I have long appreciated self-reliance. You do what you have to do, and you do it with what you have. You do the best you can, and, when that is not enough you dig deeper into your reserves. You do this to avoid failure, because you have experienced failure and have learned what it feels like to fail.

One of life's most important lessons is to learn the feeling of failure. A second lesson is to learn to overcome failure. A third is to learn the depths of one's own strength that can be called upon when failure is a real possibility. These lessons, and others like them, should be part of the educational process in which many of us are involved.

Without the possibility of failure, it is unlikely that one would learn to reach beyond his or her capabilities, to perform superhuman acts, and to accomplish much more than us mere mortals. It is the possibility of failure and the determination to avoid failing at all costs that moved the gymnast Kerri Strug to overcome ankle pain, and the swimmer Jason Lezak to set fatigue aside and to beat Alain Bernard by 0.08 seconds in the 2008 Olympics. I have been awestruck by the performance Jennifer Hudson gave in the movie "Dreamgirls," and by Wagner's Tannheuser. I have appreciated an elegant electronic design or an ingenious piece of computer code. Watching the A-10s piloted by members of our Maryland Air National Guard as they pass overhead, or seeing the beauty of a new car as it glides down the highway are to me amazing sights. They all have something in common, these arts and crafts; they all are examples of humans reaching for perfection, knowing that the wrong choice, a slip of a hand, or an unattained goal

could doom them and their projects, perhaps even their entire futures, to failure. Those who match up against perfection, who run the risks of failure but are determined to succeed, who can find reserves of intellect and strength that they didn't know they had, who are on familiar terms with the penalties that failure brings, but who persevere anyway to overcome adversity, that's who I want on my team.

Success and failure are two sides to the same coin. Taking that coin from your pocketbook does not guarantee which side faces you, but, unless it is a trick coin, each side will emerge face up about half of the time.

We like to talk about success. Success inspires; success progresses. Bioengineering successes are what make us feel good about our profession and about our own works. Yet, we know that each success was hard-won. We know that we have failed many times, only to try again until the winning combination was found. We have been motivated by success, but goaded by failure. That is why we revise and resubmit those research proposals, why we rewrite those papers, and why we spend long hours in the lab perfecting techniques or many tedious hours trying to make those computer models come out as we think they should.

Those who haven't failed haven't tried anything, and there are those who nearly always make the safe choices that lead to neither failure nor success. Their idea of success is to avoid failure, but they will never really know success.

It is not uncommon that bio-based engineering programs in colleges and universities attract the brightest and most ambitious students. These are students who have known at least some measures of success. By the time they get to college, they have fine-tuned formulas for avoiding failure: try things they are good at, study hard, associate

with similar-minded students, and figure out their instructors. Because of this, they are expected to succeed.

These are excellent students in my classes. They have excelled during every one of their scholastic years. They have succeeded at nearly all of their endeavors. They have played varsity sports, been first chairs in All-State bands and orchestras, elected as class leaders, edited newspapers and yearbooks, published scientific papers, and achieved Eagle Scout ranks. They were expected by the families, their friends, and their teachers to succeed. And succeed they did.

But sometimes expectations can be self-fulfilling. Sometimes the best and the brightest are cut some slack that the second tier are not. Sometimes, the best opportunities are given to those who one expects can make the most of them. Sometimes deadlines are allowed to slip if it is known that past project results have always exceeded expectations. Sometimes favors are given even without thinking about them. Sometimes failure doesn't happen because we don't let it.

That may be good for school, but the world is not like that. We know former colleagues who were denied tenure; we know consultants who lost contracts; we know people who have lost jobs to overseas outsourcing. Even the best baseball slugger misses hitting the ball two-thirds of the time, and at least one political candidate comes up short each election. The world is full of failure. Because of this, they are expected to succeed.

Many of us don't push these students hard enough. We don't offer the real possibility that they could fail despite their formulas for avoiding failure. We don't make it likely that they will find the depths to their capabilities because we often don't expect them to plumb these depths. The result is that we all avoid failure: the students because

they have passed their courses and the faculty because we have successfully made it to the end of another term. As a result, our students find out that good enough is good enough.

It is easy enough as faculty members to take this path. After all, success for us is determined more by our number of funded proposals than by our teaching prowess. If we failed to give our brightest students A's or sprinkled a few D's and F's into our grades, the time we would have to take to explain to students, parents, and administrators why these grades were justified would be that much less time to devote to research.

Students need the real possibility of failure in order to find their mettle. They need to know that their fined-tuned formulas to avoid failure are sometimes not enough, that at times they need more, and they need to know assuredly that they have more if need be.

I am not saying that the bar must be placed so high that no one can succeed. Higher education is a time to revel in learning opportunities that lead to lifetime goals. It is also a time to grow and mature, and to meet challenges in the relatively benign environment of the classroom as practice for life after graduation, where penalties for failure are ever more severe.

Too much failure can be discouraging. No failure can lead to complacency. The real possibility of failure can spur motivation, and that is the type of failure that we should make possible for our students.

There are a lot of facts, figures, skills, and techniques that need to be learned before a college degree can be earned. There are soft skills, too, like learning to live on one's own, operating in teams, and managing one's time. Learning to cope with at least

the possibility of failure should also be one of these, and it's best to learn this skill in the controlled confines of the classroom, before the stakes get too high later.

Excellent students can learn how to dig deeper, how to go beyond the comfort level, and how to cultivate grit when faced with the real possibility of failure. And, if they have given their utmost and failure still resulted, then they can learn how to live with that and move on to the next challenge. They can only do this if failure is a real possibility for them despite their histories of academic successes.

Last year I gave a design project at the end of my Electronics Design course that required students to meet a set of analog and digital specifications for the proper functioning of the circuit. Students typically spend a lot of time in the electronics lab learning to apply what they were taught during the semester. When successful, the circuit works as specified, but students don't always succeed at making the circuit work. One student, who had already spent all night trying to make the circuit work the way it was supposed to, asked what would happen if they were not able to successfully complete the design. I told him that as an engineer with an assignment that went unfulfilled he would not be paid for the job. He needed results; he needed to succeed or he would fail the project. He realized that failure was a real option and redoubled his efforts. He ran out of time, but was very close to finishing the project at the deadline. Later, he thanked me for being honest with him about the penalty for failure and that he found out that he could reach deep to produce a successful outcome.

It may be hard for students to accept that teachers are willing to let them hang until they either drop or rescue themselves, but in the long run most will be grateful. That's what tough love is all about. There is no greater gift that a teacher can give to his

or her students than the gift of knowing themselves. Socrates talked about it thousands of years ago, and so did Edmund Hillary when he said he climbed Mount Everest "because it is there." If you let students know that what they do is serious, that the lives and health of present and future people will depend on their best efforts, then students may find new strengths and abilities to test themselves against the best. And there is no better way to instill seriousness than to have them realize that failure is an option that they must learn to avoid while the stakes are not overwhelming.

We all want our students to succeed. We are amazed with their abilities and accomplishments. We are all sure that they will someday discover new cures, save lives, become brilliant surgeons and Nobel laureates. Our own selves live on in our students. We really need to prepare them now for the challenges they will face later in life.