

# Tom Litzinger

Never give up,  
never surrender

*Director, Leonhard Center for the Enhancement of Engineering Education  
Assistant Dean for Educational Innovation and Accreditation  
College of Engineering, Pennsylvania State University*

*Ph.D., Mechanical & Aerospace Engineering, Princeton University, 1986  
M.Eng., Mechanical Engineering, Rensselaer Polytechnic Institute, 1981  
B.S., Nuclear Engineering, Pennsylvania State University, 1977*

## From teacher to researcher and director

As an assistant professor in my first year of teaching, I received very high student evaluations, even though I was teaching thermodynamics, which is a course that students have been known not to enjoy. These high ratings brought me to the attention of our Associate Dean for Undergraduate Programs, who offered to send me to an American Society for Engineering Education (ASEE) meeting. Five years later, I had the opportunity to become involved in the National Science Foundation's ECSEL (Engineering Coalition of Schools for Excellence in Education and Leadership) Coalition, which was a coalition of seven schools that were working on integration of design across the curriculum. The experience in the ECSEL Coalition helped me understand the full scope of engineering education and the many things that could be done as a scholar of engineering education.

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The NSF ECSEL Coalition was really a transforming experience for me and other faculty members who were involved at that early stage of our careers. My participation in ECSEL put my feet on the path that allowed me to have the job that I have now, as director of the Leonhard Center for the Enhancement of Engineering Education in the Penn State College of Engineering.

When the Penn State principal investigator for the ECSEL Coalition went on sabbatical, my associate dean asked me to serve as the interim PI. Eventually, I became the Penn State PI for the coalition and held that role for seven years, which allowed me to understand more and more about engineering education. It was the first time I came to understand that there is an extensive body of research literature on topics related to teaching and learning. This experience set me up to interview successfully for the position of

director of our education center within the College of Engineering. Without the ECSEL experience, I wouldn't have had the qualifications necessary for the position.

## Mentorship from leaders and inspiration from peers

The leadership at Penn State strongly supported engineering education. One of the most significant influences in my career was from the Associate Dean, Carl Wolgemuth, who exposed me to engineering education through ASEE meetings and the NSF ECSEL Coalition. Deans John Brighton, who led the effort that created the Leonhard Center, and David Wormley were also very supportive of scholarship in engineering education. They were very influential in helping the department heads understand the importance of engineering education scholarship and in supporting it whenever promotion and tenure decisions were made.

In order to make a contribution to engineering education, having a supportive environment is key. It is essential to have a core group of colleagues who have similar interests. There will be difficult times, disappointments, and challenges in finding funding, but if you have a core group who are working together and can support each other, it will allow you to sustain the effort.

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In terms of influence from my peers, the first work in engineering education that I came across was the work of Rich Felder on learning styles. Eventually Rich and I ended up doing some psychometric research on the learning styles instrument that he created. The ECSEL Coalition also provided me with a platform to interact with colleagues who were scholars in education. Over the course of my career, those interactions have blossomed into working with colleagues in educational psychology, curriculum and instruction, as well as higher education.



## Supporting the translation of research into practice

At the Leonhard Center, we work with faculty colleagues on projects to improve learning in their classes. We offer one-on-one consultations or work with small groups of faculty on the use of technology to improve teaching and learning, flipped and inverted classroom techniques, etc. For example, we recently helped a team of colleagues from civil engineering to improve the preparation of their students at the beginning of the capstone experience by using pre-tests and online instruction on key topics related to their capstone project.

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Our commitment is to take what we know about teaching and learning from the literature and help our colleagues bring it to the classroom. However, if one is seeking to make changes in the way a course or a sequence of courses is being taught, one should not focus funding on the individual who happens to be teaching at that time. At almost any university, that person will eventually be rotated from that course into another course. One of the important things that I came to understand was that it is important to have multiple faculty members involved in a change effort. This is a lesson on resource allocation that I learned in the ECSEL Coalition, and I kept it with me when I came to be the director of the Leonhard Center. We will preferentially fund teams of faculty members, and also look for a commitment from the department head on a proposal. We want to make sure that the key administrator is supportive of the changes that his or her faculty are trying to make.

## Challenges to growing successful programs

Because of the nature of the Leonhard Center, we have the ability to try many innovative things without seeking external funds. But it is still a challenge to find sustainable funding to grow programs that prove to be really good. We have had a leadership minor for our engineering students for 15 years and an entrepreneurship minor for undergraduates for a decade. Those programs are outstanding, and we would like to grow them, but they become resource constrained. So although we are very fortunate to have funds from the Leonhard Center endowment to help us develop new programs, growing them does become a challenge,

especially when student interest and average program size have increased. These are really challenging problems, because to match the student growth, you need to increase the capacity for quality teaching, active learning, and hands-on projects, and that is not easy to achieve when new sustaining resources are not available.

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## Taking a long-term view of change

We have slowly built momentum over the years, and we have seen a growing faculty community interested in engineering education at Penn State. Since the 1960s, we have had an instructional specialist in the College of Engineering as a full-time member of the staff to help us understand more about teaching and learning. Penn State was one of the original engineering schools that put a Learning Factory on its campus, a program recently recognized by the National Academy of Engineering. The Learning Factory has transformed into an international experience. We have our senior students working on projects with students around the world, in China, Japan, Singapore, South America, and Europe. There has been a continuous evolution in project- and problem-based learning at Penn State. The types of things the students are doing continued to evolve and became more sophisticated and more realistic. Penn State made a commitment in the days of the ECSEL Coalition to put a first-year engineering design class in place. This engineering design class now enrolls 1,800 first-year students every year.

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One must take a very long view when it comes to change in higher education. Research shows that the timescale of change in higher education is on the order of 20 years. One should not be disappointed and give up if there are no big changes right away. It takes time. In fact, I joke with people that one of my favorite quotes comes from a science-fiction movie called *Galaxy Quest*. At one point, the commander of the starship says, “Never give up, never surrender.” And when it comes to engineering education, I think there is a lot to be said, because what we are doing is very important, but making change in higher education is really hard.

*This profile was authored by Gina Adam, University of California Santa Barbara, based on her 2014 interview with Dr. Litzinger.*