FIRST PERSON
INTERVIEW

STANDARDS IN THE ACADEMY

A Roundtable with **Janet L. Gbur, Darla Goeres,** and **Mellissa Komninakis**

Q As academic researchers, how do standards fit into your work?

A **Janet L. Gbur:** I work with the Cleveland VA Medical Center developing technologies for rehabilitation. Standards are critical, and there is a lot of work in this space that doesn't have standards yet. We're using standards as baselines in developing our own procedures. At Case, the research is on fracture and fatigue of biomedical materials, which has standards to drive those tests.

Mellissa Komninakis: A lot of work we do is based on the Department of Energy's Environmental Management sector, specifically material testing and evaluation for mitigating contamination release. There are very few standards for testing in this field, so it makes difficult to find metrics when evaluating these technologies. My team and I revolve our experiments around standards, and we do so with the goal that different components for our experimental designs may become standardized at some point.

Darla Goeres: I work at the Center for Biofilm Engineering, which is an NSF [National Science Foundation] Engineering Research Center (ERC). An important part of our research center is to have strong ties with industry, and industry needs standards to bring products to market. Standards are also great communication tools. I'm actually sitting in Portugal right now, and starting with a standard or test method is a great way to communicate new techniques with the benefit that if a well vetted standard is used, the results we get here in Portugal should, within a standard deviation, be the same as the results that we'd get in Montana.

Q You all work with undergraduate students, whether in the classroom or the lab. How do you educate them about standards?

A **Gbur:** My lab is primarily composed of undergraduates. The first thing they learn is how to use Compass and find standards, because that's going to drive work for their individual projects. When I was adjunct faculty at Youngstown State University, I taught a materials engineering class that was a requirement for mechanical engineers. I infused the course with standards and gave a hands-on perspective about why standards are important. During the COVID-19 pandemic, it was more difficult to provide a hands-on understanding of the value of standards. I went

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to different companies in our area to ask for test specimens that they had already tested and would otherwise be thrown away. I distributed materials kits, and we did experiments live online. Everybody took measurements according to selected test methods and put their data into a shared spreadsheet. I thought that was important because students need to be exposed to standards before they get to their senior year, when they are doing their capstone projects.

Komninakis: Just to add to what Janet was saying, I didn't really get exposed to standards until I had to do senior projects. Especially with some of our student researchers who are undergrads, we are pushing the importance of standards, especially in experimental designs and testing.

Goeres: Standards are great teaching tools. I work in a microbiology lab, which is a little different than a traditional engineering lab. I like to tell the students that it's like following a recipe. While they may end up doing advanced research someday, starting with a standard test method is like starting with your base recipe. It teaches fundamental skills. When the student is just learning, we know based on their data if they have understood the process and the steps.

Q One of the things I'm gathering is that students aren't consistently exposed to standards during their education.

A **Gbur:** Exposing students early to standards is critical. The problem is finding a way to do so in a way that is not overburdening to existing faculty. Faculty teaching courses may not be familiar with ASTM or, unfortunately sometimes, with standards themselves. There has to be a way that you can lower the energy barrier for faculty to include standards education in their existing curricula. Some universities are fortunate to be able to include technical standards as standalone courses or in lab or capstone courses. Infusing standards into the existing course structure takes a little bit more work – to think about natural places in general engineering curricula where this could be infused.

ASTM can provide easy-to-understand modules. One example, useful even at a freshman level, is as simple as writing a guide for making a peanut butter and jelly sandwich. Everyone will make their peanut butter and jelly differently. If you make somebody read back their standard guide, you will see that it is difficult to make that sandwich because students make take steps for granted and not include sufficient details. I also took a simple approach to hardness testing at Valentine's Day exploring the hardness of various chocolate bars. Students can perform measurements, discuss the hardness of the chocolate, and correlate the data to the structure related to the amount of cocoa butter and 'phases' such as Rice Krispies. It's helpful to find something that resonates with students right away and use that initial introduction to translate into the value of standards in general. That's a tool that ASTM can take leadership on and help develop.

Komninakis: At FIU, we recently started partnering with ASTM to develop curricula and modules about the importance of standards. We are going to use our ASTM student chapter as a delivery mechanism to test them. That could be a different approach between classes, since it can be hard to get a course focused on standards or find students who are interested in the topic. If you get students to a meeting, they might take an interest and continue coming to monthly meetings.

Goeres: I also think ASTM would benefit from presenting standards in other forms. A lot of younger people prefer videos. When I'm talking to people who are under 30, if they want to learn how to do something, they go to a place like YouTube and watch a video. Maybe creating videos is what the teaching module would be. I think that would reach a much broader audience.

Q I would imagine that beyond just exposing students to standards, another element is mentoring them about the value of standards.

A **Gbur:** A lot of students do not go into academia and instead choose industry. It's important to understand that and supply them with tools that help them talk about their education and their experience when they go for that first job interview or co-op interview. They can say that in class, they learned about ASTM standards and how to use them in a laboratory or for a research project. That can be a step up for those students. I am more cognizant now that I've been a part of different ASTM committees to ensure that whatever project I'm on or whatever students I'm working with, they have that fundamental awareness.

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My volunteer work with ASTM has really shaped how I interact with students and standards. From a research perspective, it's important to be aware of changes in standards, because a change in standards can have a big impact on what happens with device development. It's important to stay on top of those changes and let your colleagues know they are occuring – because that may impact decisions made as part of a project.

Komninakis: Before coming here, I wasn't that aware of the importance of standards. Having a mentor who was very passionate about standards helped. When standards are used daily in research, you start to understand first-hand the importance and real-world impact. Even with the undergraduate students who assist on the projects, I'm always telling them to look at existing standards when we're developing test methods.

Goeres: I think Janet really hit it on the head when she said most of our students don't end up in

academia. That's true of Ph.D.s as well. The classic model was you trained a Ph.D. to enter academia and take over running the lab. But the data shows that most people end up in industry. What Melissa and Janet have been saying is key: they need this knowledge to make them competitive and help them get jobs. Involvement with ASTM is a great bridge to help translate what they're learning in academia when they eventually get an industry job.

Q I'm sensing that there are potentially opportunities to grow the place of standards in scholarly research, as well.

A **Goeres:** I have found myself on more than one occasion defending the fact that I work in the area of standard methods. In 2016, a colleague and I staged a debate over standardization. Even though I am an engineer by training, I work with microbiologists a lot. They sometimes view standards as limiting. I think within the academic community, some high-level researchers struggle with the merit of standard methods. And that's something we need as a community to change, to help people see the benefit of standard test methods.

Gbur: I think it depends on the community you're talking to. I think there are some industries where there is a natural understanding. Even from an academic standpoint, if you're going to run a mechanical testing lab, you need to follow standards. Some areas are fairly natural, while others may not be. The challenge is trying to identify that. Maybe one option is rally all the people who are academics in ASTM. Let's have a town hall with them and see what we can do collectively to help change perspectives. We could get a better sense of what is happening regionally and internationally in universities. We can help each other and then broaden that experience for the students.

Q How did you each become involved with ASTM?

A **Gbur:** It was because of my brother. That's the short story. When I started my Ph.D., he had suggested I attend an ASTM meeting. I thought it might be interesting to see if it would help with whatever research I was going to be doing. As it turns out, I went to my first meeting, and they were starting the development of a standard for rotating bending of solid fine wire. That happened to be the very machines that showed up new in our lab when I started at CWRU. ASTM allowed me to meet all kinds of experts and to be a part of developing that standard. It turned out to be helpful because I was able to interact with people who helped with my research.

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Komninakis: I was first introduced to standards when I was an undergrad, but I didn't become involved with ASTM until I started working in research here at FIU. My supervisor is a part of subcommittee E10.03. I learned the role of standards and how important it is for all the testing we do. He and a group developed several different standards for our research on coatings and foams for nuclear decommissioning activities. At some point, we became one of the first ASTM student chapters.

Goeres: As our understanding about how to control and exploit biofilms in clinical and industrial systems has evolved, we understood that getting products to the market would require standard test methods. I volunteered to take on that challenge because I enjoy the process of developing standards, particularly how methodical it is. It's a part of my career that I've really enjoyed. ■

Janet L. Gbur, Ph.D., is research assistant professor in materials science and engineering at Case Western Reserve University. An ASTM International member since 2012, she joined the ASTM Board of Directors in 2022. Additionally, Gbur serves as second vice chair of the committee on metallography (E04) and a member of the committees on fatigue and fracture (E08), mechanical testing (E28), and medical and surgical materials and devices (F04).

Darla Goeres, Ph.D., is industrial coordinator and research professor of regulatory science at Montana State University's Center for Biofilm Engineering where she leads the Standardized Biofilm Methods Laboratory. Goeres served as chair of the committee on pesticides, antimicrobials, and alternative control agents (E35). She is also a member of the committee on medical and surgical materials and devices (F04) and received the 2021 Professor of the Year award.

Mellissa Komninakis is Research Analyst for the Applied Research Center (ARC) at Florida International University (FIU). She is also a member of the committee on nuclear technology and applications (E10). Komninakis received a bachelor's degree in biological engineering from the University of Florida and is currently pursuing a doctoral degree in material science and engineering from FIU.