

Applying evidence-based practices to enhance the student and instructor experience

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Imagine sitting in an auditorium-style lecture hall, surrounded by hundreds of other first-year students as you listen to the instructor using foreign science terms and speaking of abstract concepts. You're feverishly scribbling down notes while wondering, "Will this be on the test?"

Your instructor doesn't know your name. You could sit next to them at a café without the slightest bit of recognition. But that's OK. If you can just recall the myriad multisyllabic words for the exam next week, it doesn't matter if your instructor knows who you are ... right?

Scientist-turned-instructor **Lisa Elfring**, associate vice provost for [instruction and assessment](#) ^[1] and associate specialist in the [Department of Molecular and Cellular Biology](#) ^[2], combines her background in research and education to improve teaching practices for introductory undergraduate biology courses. Drawing inspiration from K-12 educational practices, Elfring aims to enhance both the student and instructor experience through personalization, technology and evidence-based teaching strategies.

"As somebody who is trained as a scientist, I know there's an incredibly rich and diverse set of research literature that we use as a basis for all the scientific discovery," said Elfring, also a member of the [BIO5 Institute](#) ^[3]. "As an instructor, however, you don't always realize there's equally strong educational best practices literature to help you understand what works, what doesn't, and in which circumstances."

When Elfring came to the University of Arizona in 1998, she spent several years teaching introductory biology courses. By immersing herself in the college education process, she was able to experience firsthand the challenges both students and instructors faced.

The field of biology encompasses a whole dictionary of terms, many of which can be challenging for students, even if they are learning the subject in their native language. Elfring observed that not only was mastering these terms a challenge, but there was too much emphasis placed on memorizing the terms first. Application seemed like an afterthought.

"You can tell students whatever you want, but until they actually work with the ideas, try them out, apply and compare them, and sometimes get them wrong, they don't actually understand," she said.

Elfring also found it difficult to connect with her students because of enormous class sizes. With 300-500 students taking the same first-year biology course, it's nearly impossible for a college instructor to observe each student's learning style and cater to their individual needs.

"It's incredibly difficult to give undergraduate students in a factory-sized course the same individualized attention that K-12 teachers can," she said. "Because college students can't get a personalized learning experience in a class with hundreds of other students, it's easy for them to feel as if they don't matter."

To begin to tear down the factory-like experience of large lecture-style classes and replace it with more individualized components, Elfring focused on creating a community and by placing value on the student – both of which are evidence-based practices.

Putting names to (hundreds of) faces

Though it's easy for a student to feel unnoticed when they have hundreds of classmates for one course, Elfring strived to connect with her students by learning their names.

"On the very first day of class, I'd say, 'The biggest reward I have in teaching is helping individual students to make progress towards their goals. The only way I know whether or not I'm doing that is if I get to know individual students, so I'm going to try and learn your names,'" she said.

To attempt this feat, Elfring asked the students to print their names on manila folders and hold them above their heads. She would look each student in the eyes, then look at the printed name, and finally say their name while looking directly back into their eyes. Through this basic exercise, Elfring was able to learn more than 80 names.

Though she acknowledges that she will never be able to learn every single name, Elfring knows that the simple effort makes a big impact.

"While it's not much, even just knowing that I was trying to learn their names helped the students understand that I wanted them to be known," she said.

Elfring has also implemented active-learning techniques through which the students spent out-of-class time on readings and homework, replacing the traditional lecture portion of class with group work and discussions. Instead of focusing on the definition of a term, Elfring aimed to have students focus on the application of the term at the same time of its introduction to their science vocabulary.

Additionally, Elfring has employed technology to gauge what students know prior to beginning the course. By using predictive testing at the beginning of the semester, she was able to tailor her lesson plans to unfamiliar concepts as opposed to wasting time on topics students had already mastered.

Once she implemented these approaches, Elfring quickly saw improvement in student achievement and course satisfaction, as measured through graded materials and student course surveys, formerly called teacher course evaluations.

As the associate vice provost for instruction and assessment, Elfring shares her practices with colleagues across the University. She's proud to say that not only do their students also reap similar benefits, but the instructors also enjoy teaching more. Using these techniques, educators can spend less time speeding through a textbook's worth of information and, instead, help individual students and smaller groups within large classes to apply the facts and practices outlined in the textbook to real-world examples.

While Elfring has made great strides in improving in-person learning, the COVID-19 pandemic has posed new hurdles.

To allow for social distancing and mitigate the spread of disease, many classes have moved online, making a personalized educational experience based on active learning, often in groups, more challenging.

Connecting and collaborating in the virtual classroom

"It's an incredibly important time to be teaching," said Elfring, who taught an upper-division biology course during the spring semester. "I can experience firsthand what challenges the instructors are facing and the challenges the students encounter. It's really important to have both perspectives."

Virtual education requires more attention from both the instructor and the student, and because everyone's learning environment looks different right now, it's hard for the instructor to create a space conducive to learning. Normally someone who likes to read body language and gauge the noise level in the classroom, Elfring finds it impossible to do so over Zoom.

Most importantly, Elfring is missing the connection with her students.

"Not being around students makes me feel disconnected from what we do at the University," she said.

However, virtual learning does have its benefits. The Zoom platform provides the ability to send students to breakout rooms to discuss concepts much like they would in small groups in-person. Students are also able to collaborate with one another in real time through shared electronic documents and presentations.

Elfring knows there is still much to be done to enhance the experience for both students and instructors.

She and others are looking at how the quality of teaching is assessed, as well as conducting grant-funded research on the efficacy of instructional teams that include the instructor, teaching assistant and preceptor.

"You're never done making changes to your teaching to make it better for students," she said. "The day I think I don't have anything else to change is probably the day I will decide to retire."

*A **version of this story** ^[4] originally appeared on the BIO5 Institute website.*

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