

# Teaching decisions: What do engineering educators say?

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**Core idea:** By exploring the processes through which engineering educators make teaching decisions and the factors they consider, we use decision making as a lens to understand their teaching practices and gain a better understanding of how to help engineering educators make more effective decisions about their teaching.



## Studies of Engineering Educator Decisions (SEED)

### Goal of the research

To understand:

- The types of teaching decisions that engineering faculty make
- The processes by which they make teaching decisions
- The factors they consider in making teaching decisions
- Their level of satisfaction with the outcomes of these decisions

### Methodology

- Hour long semi-structured interview
- Critical Decision Method – a qualitative interview approach by using a set of cognitive probes to determine the basis for situation assessment and decision making during critical incidents

### Participant demographics

- All faculty within or affiliated with the UW College of Engineering
- 33 participants across 9 of 10 College of Engineering departments
- Tenure level: 12 Full professors, 7 Associate, 7 Assistant, 7 non-tenure track faculty
- 10 women, 23 men



### How do you make teaching decisions?

"I reconsider my classrooms all the time. After every class that I teach, I go back to my notes, which are on the computer, and I make notes for next year, this worked, this didn't work, update this, change this, do this like so. So I think that's kind of a decision making in that, I'm re-planning the next year. Then there's a whole dimension of decision making that you do in real time in the classroom, something happens unexpectedly, so decision making happens at multiple levels."  
*[Ethan, full professor]*

"...Well, once again, the difficulty is that I don't plan things... Again, I'm looking at what the technical -- the way the technology is going and I'm more -- I have an evolutionary approach to all of the classes... And so it's not a -- it's not a conscious decision, all right, tomorrow we're going to do this. It's all right, this is important, we're following this direction, we're learning in this direction."  
*[Keith, non-tenure track]*

### Planning Stage Decisions

"...I send an e-mail to all the professors saying, okay, I'm going to give my midterm on the Wednesday of the fifth week or the fourth week or whatever. And some of them respond, some don't. And so I had a case where like the professor announces two days before he was going to do his midterm on that same day, after I had already asked him, you know, to try to work with me on this. And so I communicated with him, and I said, you know, I contacted you with the e-mail, I tried to sort this problem out, and then you end up assigning it on the same day. And he says, well, when I was a graduate student... we had to do all our tests on the same day. There's no reason why they can't do it, blah, blah, blah, blah, blah, blah, blah.

I'm like this is bullshit, because you know that if they do two midterms on the same day that they're going to be less prepared for one than the other, so, I mean why put them through that. We want them to do as best as they can in each class. It doesn't make any sense...

I went back to the students, and I said, okay, he changed his date to my date. I talked to him about it, he's inflexible, so I'm changing my date, at last second. So then I turned mine from Wednesday to Friday. And then I said, don't tell him I did that, because he'll change his to Friday, you know. I was just pulling their leg, but, you know, the students appreciated the fact that I was willing to work with them, you know. I mean this guy was going to be a horse's ass. I wasn't going to..."

*[Nathan, associate professor]*

### Interactive Decisions

"...So I was teaching... night classes at the community college, and I was teaching them about atmospheric circulation about how hot air rises and cold air sinks, and I had these two boys in the back of the room who were just chatting up a storm, and,

So I walked back to the back of the room and I said -- I said: What are you doing? And -- no, I said: Obviously what you're talking about is more important than what we're talking about. Can you please tell us. And they're both dead silent. I said: Come on, we want to know, you know, it's more exciting than what we're doing. And they said: Well, we're arguing about who's hotter, Christina Aguilera or Britney Spears (Laughter).

I said, well, clearly we should all talk about that. So I went up to the front of the room and drew these stick figures of Christina Aguilera and Britney Spears. And so I said, okay, class, we're going to vote, who's hotter? And we happened to be talking about atmospheric circulation, so it actually worked in. And they all voted that Christina Aguilera was hotter, for whatever reason. And so she got to be hot, and so I'm like, okay, what does the air do above Christina Aguilera if she's hot? And so we got back in where hot air rises. "

*[Katherine, assistant professor]*

*Notes: (1) Quotations edited for readability; (2) All names are pseudonyms*

# Considering “Time” and the “Real World”

“...any time I try to introduce something with a real world example there's a trade off, right, because introducing something physical and taking the time to explain -- explain the principle or taking the group of students down to see a piece of equipment that's attached to a wall, I mean it takes time, and one can cover, you know, 10 equations in the time that you ...

So, you know, it's -- it's the factor of what can I get across, how important is this principle to everything else that they're going to need to know after. Is it so underpinning that they can't do without it, or is it something that, yeah, I could spend the time doing that, but it's not on the critical path. It's if they don't understand this now it's something that they can pick up later if they need to.

So, um, yeah, all those things come into mind, and I'm not sure that they all receive equal weight, but there's certainly -- certainly factors in trying to decide should I spend the time on this or -- and how much time should I spend on it, and, of course, it's a continuously dynamic process.”

*Bryn, Associate Professor*

# Considering “Time” – Blurring the Boundaries Between Teaching and Research

“...the courses I tend to choose to teach are courses that are related to my background, related to my interest, either laboratory or hands-on.

The senior-level course is a new course that I had developed, the one I teach in spring, and that was based on my interests -- started out as just materials, and gradually evolved toward the role of materials in construction and constructability, and so the senior course I teach is on reinforced concrete construction, and we talk about constructability issues, not just how materials affect it, but also understanding the whole process.

But that I guess would be a decision. I decided to offer -- to develop that course and offer it because it was kind of a continuation of my evolving interests.”

*Eric, Associate professor*

# Considering the “Real World”

“For example, when I'm teaching a class, my clear decision I make is to emphasize numerical computer simulations of heat transfer problems and not emphasize, you know, the analytical approach, okay.

Analytical means the exact solution, okay, so instead of, finding the exact solution of the complex heat transfer problem, I would rather find out numerical solution of the complicated problems.

The reason is most of heat transfer problem have no exact solution. They cannot use the mathematic equation to describe this solution, just test using computer to test this, to simulate.

I believe that is a decision I made ... It's because in the industry, the people in the industry who do the work and study on the research, and the most of the questions has no analytical solution, no effective solution, so there's an only numerical -- numerical approach is only approach, and the most convenient approach, okay, to solve the real world problem.”

*Eugene, Full Professor*