



<virtual> Capstone Design Conference 2025

Thursday, June 12, 2025

1:00-5:30pm EDT

Session 3 Nifty Ideas and Surprising Flops

Session 3: Nifty Ideas and Surprising Flops (4:00-5:00 PM Eastern)

Facilitator: Susannah Howe (Smith College)

Sidekick: Hadar Ziv (UC Irvine)

Nifty Floppers:

Kris Jaeger-Helton (Northeastern Univ)

Kristi Bartlett and Regina Hannemann (Univ of Kentucky)

Peyton FitzGerald and Matthew J. Traum (Univ of Florida)

Arkasama Bandyopadhyay (Texas A&M Univ)

Beth DeBartolo (Rochester Inst of Technology)

Shaz Vijlee (Univ of Portland)

Noe Vargas Hernandez (Univ. of Texas Rio Grande Valley)

Description: Lightning-round presentations of good (and bad) ideas that instructors have tried.

Nifty/Flopper	Institution	Topic
Kris Jaeger-Helton	Northeastern University	Capstone Orientation and Mentoring
Kristi Bartlett and Regina Hannemann	University of Kentucky	Incorporating Product Design Students
Peyton FitzGerald and Matt Traum	University of Florida	Outsourcing Custom Components
Arkasama Bandyopadhyay	Texas A&M University	Polling for Design Review Requirements
Beth DeBartolo	Rochester Institute of Technology	Hiring Computing Co-op Students
Shaz Vijlee	University of Portland	Ungrading in Capstone
Noe Vargas Hernandez	Univ. of Texas Rio Grande Valley	Senior Design Project Haiku

Capstone Orientation and Mentoring (Kris Jaeger Helton, Northeastern University)

- Pre-Capstone orientation model
- 2023: Pre-capstone design letter: TLDR
- 2024: Changed the process to bring slides *and* posters to pre-capstone orientation: OK.
- 2025: A few weeks before Capstone 1, held an evening event with former and “rising” (future) Capstone students, including an exchange session between the two groups, which worked out very well! The current Capstone 2 students were working on finalizing posters and pitches. The future Pre-capstoners attended for an orientation to see posters, hear an orientation, observe current capstoner students in the final preparation process, and get a chance to interact with current capstoners in person.

Audience Questions:

- How did the students receive the orientation letter?
 - Format: As an attachment to an email
 - Sentiment: Most students seemed to have read it, but there was no real connection established to the program or the coordinators.
- How many rising capstoners did you have?
 - ~60 total, ~30 for Summer 1 and ~30 for Fall
- Was attendance mandatory? Was scheduling a time difficult?
 - Not required; it was a courtesy for the students and entirely optional.
 - The time was chosen to be after school and co-op hours. It was a Monday evening and many were available, but not everyone.
 - Hugh M: no and no; it was after hours and in our dedicated space
- Scheduling question – Much of our capstone(s) ends before summer break, so it might not be for all future capstoners, some of whom are 3-4 months away from starting if they are in the Fall offering of capstone. However, some of them were also in attendance.
 - Not mandatory - it was a courtesy to them.
- Will absolutely do again!

Incorporating Product Design Students (Kristi Bartlett and Regina Hannemann, Univ of Kentucky)

- Incorporated product-design students with the two-semester engineering capstone
- Also participate in the design competition together
- The joint/collaborative designs look to be better

Audience Questions:

- Which boat competition examples were included in the slide?
 - ASNE Electrical Boat competition PEP
(<https://www.navalengineers.org/Education/Promoting-Electric-Propulsion-PEP>)
- Would you do this collaboration again?
 - Absolutely yes! Are planning to already, and also working to expand to other disciplines

Outsourcing Custom Components (Peyton FitzGerald and Matthew J. Traum, Univ of Florida)

- Senior capstone course in ME
- Design and realization/manufacturing of an ME concept
- TAs used to fabricate everything in the classroom – but that needs to change (became a bottleneck)

Audience Questions:

- How critical is having a makerspace available to capstone programs?
 - Extremely. At UF, students have access to knee-and-column mills, engine lathes, drill presses, and a variety of sheet metal fabrication tools. We also have a plethora of 3D printing devices and a couple CNC machines, so the sky is the limit. I only allowed students to work with the manual machines because 1) I didn't know what their CNC background looks like, and 2) I didn't have time to train them on how to use it. Safety was my top priority. I would say, for prototyping, 3D-printing is massive for making sure that everything fits together and is a great resource for proof-of-concept. That should be non-negotiable. As for the other machines, it certainly helps to have the basics so students can have an understanding of how metallic parts are made.
- How was the quote and part turnaround time with local fabricators? My experience is that local was much slower to respond than online, and speed is very important.
 - I had told local shops that they should deliver the parts to students two weeks prior to the end of the semester, giving fabricators about six weeks to redline and manufacture. I did not want to incur any sort of expedition fee if I could help it. All of them delivered, some of which were even a week early. In terms of pricing, compared to on-demand shops like Xometry and OSHCut, local shops were around the same. I think the only on-demand site that was absurdly cheaper was SendCutSend.
- Tell Jeff Bielling that Keith Stanfill says hello—he runs the WaterJet in the Wertheim building...
 - Will do! His waterjet machine was an incredibly useful resource since the one in our lab kept crashing 😊
- How much exposure do students get to GD&T?
 - Not enough. In my experience as a student, the first and last time it is mentioned was in my first year. There are quite a few situations where it is necessary and I certainly did not feel well-equipped to apply it to an engineering drawing. I've had to relearn it through online resources (which I provided to the students). I think one important thing that needs to be emphasized is that it does not need to be applied to every feature on a drawing.

Polling for Design Review Requirements (Arkasama Bandyopadhyay, TAMU)

- ME Capstone at Texas A&M includes a design review process, with documents and milestones

- Adding polling and survey questions using [mentimeter.com](https://www.mentimeter.com)
- Looks like this was a good use and improvement in engagement and active-learning (active participation)
- Helped students with their tasks, retention of information, etc.
- This can be shared with other instructors in similar positions, as a helpful tool especially for large classes

Audience Questions:

- Will the use of academic online requirements engineering tools translate to benefits in dealing with commercial requirements?
 - Hopefully, yes. But these are still young adults and budding engineers we are talking about and they often lack maturity at this stage of their academic careers. I hope they are able to take away the message that customer needs and formal document requirements are very important things to be mindful of throughout their engineering careers.

Hiring Computing Co-Op Students (Beth DeBartolo, RIT)

- Large multidisciplinary capstone program with growing enrollment in mechanical engineering, but less so in electrical engineering and computing → puts a damper on executing multidisciplinary projects
- A confluence of several factors is taking place
- Software/computing students are required co-op experiences, but could not get them
- So the best scalable idea was to hire co-ops from the College of Computing, who would do paid work – and this idea worked to address this issue at RIT!
- Co-ops worked 30 hours per week, supporting multiple capstone projects

Audience Questions:

- How much were co-ops paid?
 - \$0.50 over minimum wage, same as our TAs. Not great, but that was what I could confidently support.
- Did you do something similar with EE students? Or plan to ?
 - I threw EE-related topics to these co-op students - embedded systems, some controls...they stepped up and did it. We did look for evidence of willingness to learn new things like this when reviewing resumes. And because they were on co-op, the expectation was that they had time to do this - it's not like they were just in a 5-course-load semester and this was "bonus" work, it was literally their job to learn what they needed.
- Did the CS students help with developing formal requirements specifications for the initial design?
 - In some cases yes, especially when the computing students were on the project from day one. In other cases, the computing student stepped in midway through the project to support a specific need many months after requirements had been set.
- Who assessed the Co-op students to confirm they met the requirements for co-op credit?

- The teams' advisors met with the co-op students along with the rest of the team, so they were talking with them and seeing their standups. I also met with the co-op students weekly as a group to help monitor progress and workload balance. At the end of the semester, I solicited input from the advisors before filling out the co-op evaluation forms. They were also part of the team peer evaluations.

Ungrading in Capstone (Shaz Vijlee, Univ of Portland)

- Univ of Portland: small college with professional schools
- Capstone is closest to the real world
- Piloted a form of alternative-grading called "Ungrading" in a small section of 15 students (who were off-cycle because of co-op)
- Document of reference: [Grading for Growth](#)
- Instead of giving grades on individual components/assignments, capstone faculty gave formative feedback/assessment, and then helped students self-assess using a set of rubrics
- It worked!

Audience Questions:

- What was the process of deciding the letter grade for each student at the end of the semester?
 - I triangulated all feedback - from the faculty advisor, from the teammates, and from their self assessment. If there were any significant discrepancies (which there were only a few) - I would work with the student to understand. They felt heard and empowered, and I didn't receive any pushback.
- How do you satisfy ABET?
 - Fantastic question - in this case, I was not doing assessment in my course (because of the small population and exception to the norm because of the CO-OP cycle). I think it would be possible, but we would need to clearly articulate the process that we use to assess the students in each category. The process of assessment and evaluation still holds, it just isn't as quantitative (or falsely quantitative).
- With ungrading, is it possible for a student to fail the course?
 - Absolutely, that would happen with students who do not do good work AND do not take feedback into account to improve their work.
- How about the "unmotivated" students - was the course grade only Pass/Fail?
 - I luckily didn't have any this term, it was an A to F course. If someone is truly unmotivated they would do two things 1) low-quality work and 2) not implementing feedback. Students who do this would not pass or would get a low grade.
- Is it possible to try ungrading on 1 or 2 assignments, or need to do the whole class?
 - Absolutely, try it for a small item first. It works well with more ambiguous assignments.
- Does this differ from specifications grading where you give them all of the rubrics to get certain grades then they decide what they want?
 - It is very similar. I wanted it to be more interactive (like a Performance Evaluation in industry).

Senior Design Project Haiku (Noe Vargas Hernandez, UTRGV)

- Have capstone teams write a haiku (don't worry about traditional haiku structure/rules, aim to connect to nature and juxtapose two ideas)
- This form of communication helps teams express their project to a non-technical audience and get at the essence of the projects
- Use the haiku during introduction for final presentations, can share with sponsors

Audience Questions:

- Have you explored 6-word stories? If so, how does it compare with the haiku approach?
 - yes, this format works well too, as does creating memes
 - anything to get students to think outside the box and be creative in their communication
- How does this relate to Performance in class?
 -

Sample Haiku from the Conference Attendees:

*Tilting head
altering perception
revalued understanding*

*Our students bring me joy
No matter how many last minute emergencies
They drop in my lap*

*Capstone is our jam
virtual OK
Can't wait for A&M!*

*never stop learning
together we can do more
capstone is so great*

*This is much more fun
Than doing my homework for
The class I'm taking*

*First, long zoom meeting
Then get up and walk around
Now back at my desk*

*The day passed quickly
I surely need to reflect
great stuff this fine day*