



## Panel 5A: Nifty Ideas and Surprising Flops

**Facilitator:** Susannah Howe (Smith)

**Panelists:** (see table below)

**Description:** Learn from instructors who had ideas that worked beyond their wildest dreams and ideas that failed miserably. This popular and often entertaining session is a great place to learn from others' firsthand experiences.

Nifty/Flopper	Institution	Topic
Jim Hartman	UNC Charlotte	Dedicated Lab Space for Senior Design
Robert Hart	UT Dallas	Student Safety: Project Hazard Assessment
Keith Stanfill	UT Knoxville	Rebranding Senior Design as Consulting
Dorian Varga	U Washington	Capstone Dashboard
Kristina Kennedy	Ohio State	Know Your User before Designing for Them
Aaron Rubin	Smith	Design Reviewers: Peers vs. Faculty
Kris Jaeger-Helton	Northeastern	Posters, Papers, and Pitches
Beth DeBartolo	RIT	Mirror, Mirror: Reflection in Capstone



# Capstone Design CONFERENCE 2024

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## Jim Hartman (UNC Charlotte) - Dedicated Lab Space for Senior Design

- Dedicated Lab Space - outgrowth of department you are in (single disciplinary) can use that equipment
- Multidisciplinary a desire, but equipment use a challenge
- Aiming to be R1 next year
- As teaching grows because student population has grown (now around 30K), Senior Design getting squeezed out of labs as a result of growth
- Initially: wanted a big lab, but cost was an issue
- In 2020 ended up in an old cafeteria building (had been used for catering, building built in the '60's); had issues: needed AC!
- 70-100 industry projects a year, largest university industry partnership that the university has ( a money maker!) - why not getting treated better?
- Jim started doing outreach; went to RIT conference in 2018; 2022 saw dedicated facilities in Dallas, brought photo evidence back to administration
- Academic Affairs needed to provide approval. Invited deans, etc. to events to see what program was doing
- Funding/space issue continued
- Opened science building which enabled them to move the different pockets into a full-blown 10K sq/ft facility
- All people are now housed together
- 2 conference rooms with video conferencing - so students can meet with sponsors who can't come to campus
- Now have fabrication room, welding booth, assembly room, tool room, etc.
- Now have a lab manager - formerly affiliated with NASCAR
- All folks involved with interdisciplinary design are displayed on the wall - for awareness and publicity
- Facility is resulting in allowing students to get to testing quicker, ultimately enhancing recruitment of projects
- Not every team gets a table, but also not every team has a build. Also have a room in another building dedicated to ECE
- Eyeing 5K additional sq/ft for future building/developing
- Safety is an issue, but fabrication lab is closed if lab manager is not there.

### Questions from Audience:

- 1) How many students are you supporting? 340 start in the fall and 140 start in spring
- 2) How do you handle training the students? ME student or METechnology student - get training in their own lab; others have access restriction unless they can prove they can do it (willing to teach students who don't know how to weld)
- 3) Schedule time with lab manager to do trainings



## Robert Hart (UT Dallas) - Student Safety: Project Hazard Assessment

- Project Safety - impetus was an unfortunate accident (minor injuries, though!)
- Background: Students incorporate safety into their prototype design
- Students know how to work safely
- What about temporary hazards that present during prototype building? (e.g., gear box on top of tower, heavy, will take multiple people to lift - Robert prompted students to create a plan to make this happen)
- Monitoring is a challenge with 40-60 teams working
- Solution: Project Hazard Analysis (PHA)
  - Students go through a checklist and ID the type of hazards they'll likely encounter
  - Come up with a plan to address those hazards
  - Also need to list any work outside of the studio
- Process:
  - Team creates document
  - Instructor team sits down and reviews every document - how good? Bad? Missing info? (follow-up with team)
  - Then instructors make a decision as to whether to approve as is, or if more info is needed
  - If more info is needed, instructors re-review after team meets with campus safety team
  - If all looks good, then instructors approve
  - Students not authorized to move forward until they are approved
  - Every team is required to do this process
  - Students have to respond to all 18 prompts on Hazard List
  - Changes after approval?
    - Teams' responsibility to notify faculty
- Lessons learned:
  - Important to do this at the right point of the project - too early = clueless students, too late = missed window
  - Identified the perfect window as: right after the CDR
  - Teams need to be specific in information they give
  - PHA is not graded
  - In second stage, important to have many sets of eyes, not just one
- Timeline
  - All teams have the same timeline
  - Working through challenges with this, such as students who preemptively ID these challenges
- Turn-around time?
  - 1 to 2 weeks to work through the process
  - Safety person - has an online scheduling system, is pretty quick to get back and meet with students
- Hazard List = 18 items to prompt them to check boxes and add, as needed
- **THIS PROCESS WORKS!** Caught students who ordered chemicals they weren't equipped to handle



## Keith Stanfill (UT Knoxville) - Rebranding Interdisciplinary Senior Design

- Background: this course was designed as a capstone for Integrated Business in ENGR Program
  - Don't have to be an honors student to take an honors course at UT
  - Average GPA 3.7
  - University support has been indirect
  - Students are recruited in their freshman year, half ENGR and half Business
  - High-performing students
  - First cohort was to graduated a year after Keith started
  - Based on what he did at UFlorida
  - Meets ABET, general ed requirements
  - All projects have an external sponsor and faculty mentor
  - Open to all students in Tickle and Business School
  - Boutique program
- Challenge:
  - Finding projects (technical and business content) with relevant problem
  - Time tracking - as teams and individual
    - Half-assed effort
    - Key info tried to gather: how much time did you spend planning? What about research?
    - Extra credit in the spring
- Last year at online mini conference, Blake Johnson at UIUC brought up difference in how sponsors reacted to this type of program
- Solution: Keith set this up as a consulting experience = UT ISD (graphical wordmark)
  - Corporate structure
  - Develops business and ENGR talent - delivering results on-time and within budget
  - Communications are positive, BLUF (bottom line up front)
    - Weekly "CEO" memos (in the style of Lou Gerstner, CEO of IBM)
  - Reinforce consulting practices: Client focused, add value, estimate and track time
  - Team owns deliverables (not just the business student); technical deliverable - everyone owns it, too
- FLOP aspects:
  - From day 1 - business students were alienated
  - CEO memos on Canvas were unread
  - Students didn't appreciate the oversight/time mgmt
  - Deliverables siloed by discipline
  - LOST TRUST
- NIFTY aspects:
  - C-level individual met with teams as a business coach
  - BLUF communications = great benefit
- Working to make changes, going to keep going with this idea



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## Dorian Varga (UWashington) - Capstone Dashboard

- Assoc. Director of capstone at college of engineering at UW; staff at the dean's office
- Collect and track capstone projects across 10 engineering departments
  - As they grew, had difficulty tracking what projects were within what departments and open to what projects
- Worked with campus IT to develop a dashboard to track all projects and create databases
  - Retains the project info over the years for tracking
  - Can directly then post all their past projects to the website and cut out the web/marketing team
- Challenges
  - Collaboration with IT team, and how to take all the data from the PDF application and import it into the database.
  - Each department has different timelines and uses it slightly differently - tricky to make it work well for all

### Questions/Comments from Audience:

- Who has access to what data in the database?
  - We can control who has access to what access. For example, faculty can see projects in their departments, students can see projects in their department, companies can not see anything (other than what is externally published)
- PDF vs online form idea
  - Encourage the companies to go online by allowing them to submit attachments
- EduSourced as a option
  - This does 95% of this - except maybe the publishing to the web aspect
  - Other schools using it: University of Georgia, University of Vermont
- How do you get all the information you need?
  - Set a soft deadline a few weeks ahead of time, but they don't always meet thing - have to follow-up and modify the addendums some



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## Kristina Kennedy (Ohio State) - Know Your Users before Designing for Them

- Know your users before designing for them
- Value creation process, try to teach in lecture
- 3 pillars: Problem, end users, market characteristics
- User personas, etc
- Activity: make a pair of glasses for me (instructor) using pipe cleaners
- But what did students actually do?
  - Things that don't fit, colors she doesn't like, designs that poke/are uncomfortable
  - Students never come up to ask more questions to find out what she likes
- She doesn't accept any of their designs - and this is a powerful teachable moment
- But the students really like this exercise - in the final eval, many noted it specifically as something that was impactful for them

### Questions/Comments from Audience:

- How did you set this up at the start of class?
  - Maybe need to adjust the setup more at the start so it's less open? Or more specific? So it better encourages them to ask questions at the start?
- Comment: this is actually a great way to get them to realize something they are doing it wrong
  - Even though they know on paper that if you ask 'should you learn about the user' they know 'yes'
  - But when you give them the activity, you see what they actually do
- Idea: could you do it again afterwards, once they know how they failed?
- Stanford d-school activities - structured activity that walks them through a gift giving exercise or wallet design exercise (<https://dschool.stanford.edu/resources/the-gift-giving-project>)



## Aaron Rubin (Smith) - Design Reviewers: Peers vs Faculty

- Design reviews format last year
  - Teams of 3-4, present for 10 minutes, Q&A with reviewers for 20 minutes
  - Reviewers = Shadow team of other students plus 1-2 faculty
  - Content examples: scoping, conceptual design, etc.
  - Goals for students:
    - Primary = technical feedback
    - Secondary = idea generation, presentation skills, planning, ID campus resources
    - Overall: move the project forward
  - Goals for instructor:
    - Primary - See depth of student knowledge (catch BS, is it all flair?), provide technical feedback
    - Secondary - Get 10k foot view of project
  - Mixed results
    - With that many people in room, especially students, the technical feedback isn't that useful - maybe doesn't move the project forward?
    - But can get good ideation from a broad audience
    - But hit a lot of the other goals
- New design review format this year
  - No more shadow team of students
  - Additional experienced reviewer (shop staff, alum, etc)
    - Not necessarily the same extra person each time
    - Do have to get the new person up to speed, but also allows them to practice explaining it - can also be done w/ background document
  - Reviewer workload = 30 min of prep (reading materials in advance) + 30 minutes of being there
  - Get much better technical feedback review, but at the cost of idea generation

### Questions/Comments from Audience:

- How to help the idea generation?
  - Consider setting up a pairing with another team
- Format of feedback?
  - Live oral discussion back and forth with loose contemporaneous notes
  - Could have the shadow students attend but not ask questions, instead providing written feedback later
  - Or maybe reserve the last 5 minutes for student questions
- Suggestion
  - Audience member found that their teams weren't listening to written feedback from students
  - So added an assignment that was a short reflection on what they learned and why and why they would do or not do from it.



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## Kris Jaeger-Helton (Northeastern) - Posters, Papers, and Pitches

- Overall concept - when to tell students about end-of-year deliverables and how to do so?
- Earlier approach:
  - Set up a lot of context around student mid-term oral presentations
  - But didn't have as much or anything for the final posters and presentations
- Last year - new approach to give more info
  - Provided examples of papers and some photos of the presentations
  - Worked ok, students had a better idea of what was coming, but still didn't have full buy-in
- This year - interactive approach → did a mini expo, just lined up past posters and papers
  - Selected mix of quality and types of projects
  - Took a full class session
  - Asked students to engage with what they thought were good and not good posters and papers
    - Note: when collecting posters from previous teams, instructors make it clear that they can be shared with future teams and elsewhere
  - Benefit of students getting up out of their chairs, lots of engagement
  - Students could see how all posters were different
  - **Worked really well!** Got much better posters and papers, and the students really like it

### Question from Audience:

- When did you do it?
  - Mid semester, capstone 2 (so halfway through second semester of 2-semester capstone course)
  - Timing was close to when students would start working on their own papers, posters, and pitches (which was better than much earlier in the year when the deliverables seemed far away)





## Beth DeBartolo (RIT) - Mirror, Mirror: Reflection in Capstone

- Capstone (already) requires a lot of writing
  - Not a single big report, but a lot of mini reports
- Beth doesn't want to add more if it's not worth it
- Learning to write vs writing to learn
- Beth piloted two types of reflection assignments
  - Short reflections (1 paragraph) after each design phase - 8x/year
    - What did you plan to do?
    - What did you actually do?
    - What did you learn (from the differences)?
  - Longer reflection (1 page) at end of every semester
    - General: reflect on what you learned
- All reflections were individual
- No real grading or accountability
- Verdict? **It works really well!**
  - 75% compliance (despite assignments being not graded)
  - Some students really get into it, writing multiple pages
  - A lot of great insight

### Questions/Comments from Audience:

- Format suggestion: Consider other types of reflection mediums: drawing, video, audio
- Prompt suggestion: Use scrum/agile style questions/prompts
  - Stop doing
  - Keep doing
  - Start doing
- Q: Are these reflections repeats of the course eval? (i.e. "instructor sucks!")
  - Reflections are due after the course evals are done; get some of it, but most are good
  - Reflections are not anonymous - have student's name on it
  - There may be some complaining, but more about explaining and trying to learn from it
- What specifically do you ask in the prompts?
  - Don't currently customize prompts, but might next year
  - Might give a selection of prompts to choose from