Baby Steps or Giant Leaps: Models and Means for Promoting Interdisciplinary and Inter-University Opportunities in Your Capstone

CAPSTONE DESIGN CONFERENCE WORKSHOP

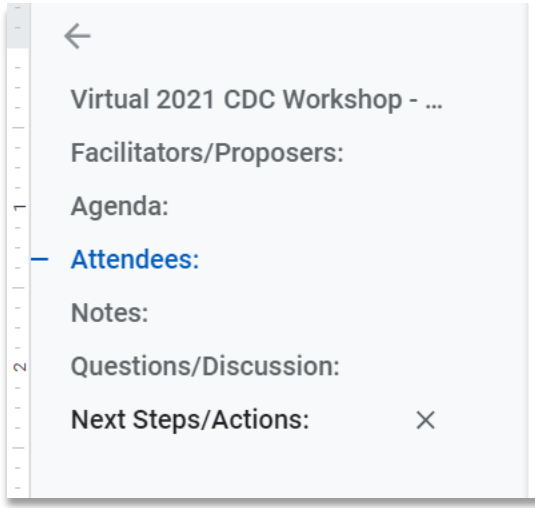
JULY 21, 2021

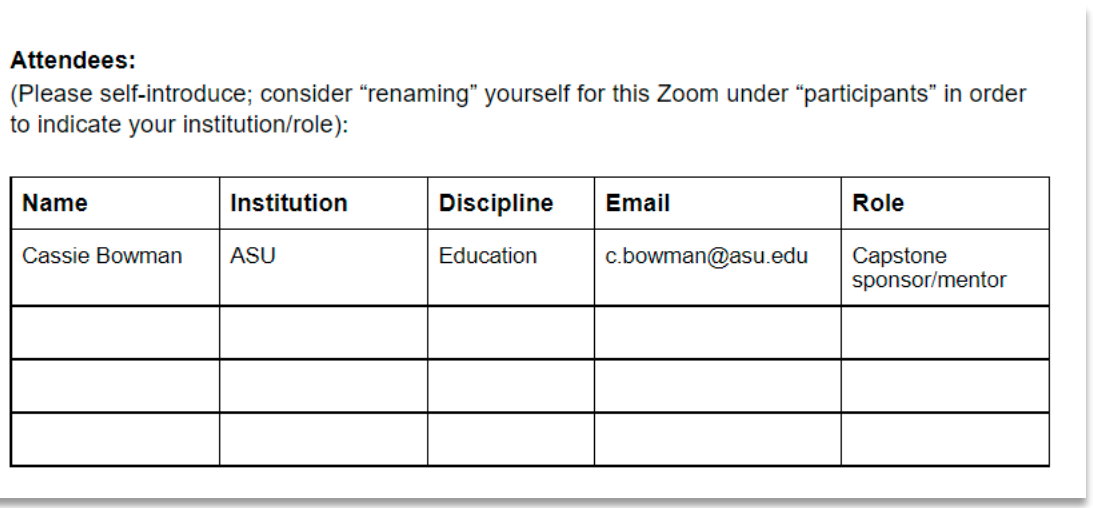
Agenda (Google doc here: https://bit.ly/36K0003)

10:00-10:05 PT/ 1:00-1:05 ET	5 min	Announcements from Todd Polk (UT-Dallas)
10:05-10:15 PT/ 1:05-1:15 ET	10 min	Interactive Introduction: Logistics, intros, Google Doc, breakout rooms, etc.
10:15-10:25 PT/ 1:15-1:25 ET	10 min	Interdisciplinary Capstone - Obstacles and Opportunities
10:25-10:30 PT/1:25-1:30 ET	5 min	Q&A - Head to Breakout Rooms
10:30-10:55 PT/ 1:30-1:55 ET	25 min	Breakout Rooms (select your own): 1. Curricular Approaches 2. Grassroots Approaches
10:55-11:05 PT/ 1:55-2:05 ET	10 min	Report-out/Q&A: Curricular
11:05-11:15 PT/ 2:05-2:15 ET	10 min	Report-out/Q&A: Grassroots
11:15-11:30 PT/ 2:15-2:30 ET	15 min	Wrap-up: Document take-aways, discuss next steps, Slack channel in CDC workspace; exchange contact information, sign-up for group listserv (CAP-ALL@asu.edu)
Optional (post-workshop): Talk w/ Steve Trimble (ASU) about new Mechanical Engineering Capstone handbook coming out		

Introduction (Logistics)

- Welcome
- Live Google Doc (no sign-in required): https://bit.ly/36K0003
  - Contact info and the agenda
  - "Introduce" yourself as an attendee
  - Contribute to the "Notes", ask/answer questions, suggest next steps





Attendees:
(Please self-introduce; consider "renaming" yourself for this Zoom under "participants" in order to indicate your institution/role):

Name	Institution	Discipline	Email	Role
Cassie Bowman	ASU	Education	c.bowman@asu.edu	Capstone sponsor/mentor

- Breakout Rooms
  - Select either "Curricular Approaches" or "Grassroots Approaches" – you can switch between them.
- Need help? Just post in the Zoom chat!

Inter(Multi)disciplinary Capstone

- Capstone/senior design is often considered a gateway to professional practice, regardless of discipline.
  - Professional practice is increasingly characterized by interdisciplinary teamwork…
  - But single-discipline capstones often persist in engineering[1], the arts, communication, business, and beyond.
- Interdisciplinary capstone challenges offer practice for interdisciplinary workplace challenges.
  - Interdisciplinary capstones "attempt to unite two or more orientations that **may (or may not) share any substantial overlap** in terms of substantive and theoretical concerns" (Hauhart & Grahe, 2015, p. 10).
  - "When students are developed fully within a single discipline program that also offers their capstone, the structure promotes the student, instructor, and advisor expectations…. However, as students are assigned outside of their engineering discipline to support other capstones, **the potential for misunderstanding** of how their unique disciplinary skills support the capstone outcomes increases" (Cooper, Fulton, & Homan, 2015, p. 700).

[1] Per Howe, Rosenbauer, and Poulos (2017), about 50% of respondents reported including "faculty and/or students from at least two different disciplines in their capstone courses" (p. 1398), though this is inclusive of other engineering sub-disciplines.

So Why Bother?

"In 10 years, a liberal arts degree in philosophy will be worth more than a traditional programming degree."

- Mark Cuban (entrepreneur), 2017

"[Cuban's] reasoning is that AI and automation will transform the job market so much that degrees that teach how to think in a big picture way and better collaborate will become more valuable."

- Anant Agarwal (CEO of edX) in *Forbes*, 2018

And Employers Already Want This

- Rios, et al (2020) analyzed 140,000+ job ads for what skills were included. The most frequently listed skills were “soft” skills:
  - Communication, Collaboration, Problem Solving, Social Intelligence, Self-Direction

- LinkedIn (2020) did an analysis of skills that are in high demand relative to their supply. In "soft“ skills they found the top 5 were:
  - Creativity, Persuasion, Collaboration, Adaptability, Emotional intelligence

- NSF-funded “Capstone to Work” (Paretti et al., 2019) asked 60 recent grads what transferred to work from capstone.
  - Self-directed learning (85%)
  - Teamwork and communication (74%)

Rios, J. A., Ling, G., Pugh, R., Becker, D., & Bacall, A. (2020). Identifying critical 21st-century skills for workplace success: A content analysis of job advertisements. Educational Researcher, 49(2), 80-89.
Paretti, M., Ford, J., Howe, S., & Kotys-Schwartz, D. (2019). NSF #1607811. What transfers from capstone design to the workplace? http://cdhub2.org/links/c2w/

LinkedIn (2020). The Most In-Demand Hard and Soft Skills of 2020. https://business.linkedin.com/talent-solutions/blog/trends-and-research/2020/most-in-demand-hard-and-soft-skills

Obstacles Persist… As Do Attempts

- Common obstacles to interdisciplinary capstones have been documented in the literature[2]:
  - Accreditation requirements (e.g., ABET) and how they are distributed/documented across departments
  - Logistics (assignments/deliverables, preparation, sharing/tracking expenses, showcase schedules, etc.);
  - Bureaucratic roadblocks (prerequisites, cross-listing required courses, departmental approval);
  - Shared physical space (after-hours access and co-located tools needed by all disciplines);
  - Limited faculty time and incentive and/or department support;
  - Conflicting student schedules and demands (jobs, classes, family responsibilities)
  - Conflicting student perceptions of the value of other disciplines and roles.
- Despite challenges, interdisciplinary capstones exist, commonly under one of two conditions:
  - Arrangement between individual faculty (within or across universities) at a **grassroots level**
  - Intentional **curricular (re)design**

[2] See e.g., Abdel-Mohti et al. (2016), Cooper et al. (2015), Dean (2016), Estell et al. (2014), Goldberg & Malassigne (2016), Hutter et al. (2018), Krishnakumar et al. (2020), Pettigrew & Ginige (2020)

Q&A and Breakout Room Prompts

What strategies have worked?

What strategies haven't worked?

What are the (your) persistent challenges?

What are the possible solutions?

What other lessons learned are important to share or document?

What advice would you give someone who was trying to do this on their own?

Is what you are doing sustainable (if you left, would it continue?)

Report-Out: Curricular Approaches

What strategies have worked?

What strategies haven't worked?

What are the (your) persistent challenges?

What are the possible solutions?

What other lessons learned are important to share or document?

What advice would you give someone who was trying to do this on their own?

Is what you are doing sustainable (if you left, would it continue?)

Report-Out: Grassroots Approaches

What strategies have worked?

What strategies haven't worked?

What are the (your) persistent challenges?

What are the possible solutions?

What other lessons learned are important to share or document?

What advice would you give someone who was trying to do this on their own?

Is what you are doing sustainable (if you left, would it continue?)

Wrap-Up

- Document take-aways (add to the Google Doc; will archive on the CDC website)
- Next steps
  - Join the Slack channel in CDC workspace
  - Exchange contact information (in the Google Doc or individually)
  - Interest in signing up for group listserv? (we have CAP-ALL@asu.edu)
  - Connect (in person?!) at CDC 2022 at UT-Dallas

Optional: New ME Capstone Handbook

- Stay on to chat with Steve Trimble and Abdel Shuaib (ASU)