



Panel 4D A Cornucopia of Capstone Course Challenges

Facilitator: Keith Stanfill – University of Tennessee, Knoxville

Panelists:

1. Todd Polk – University of Texas at Dallas
2. Aaron Rubin – Smith College
3. Jay Goldberg – Marquette University
4. Michael Hall – Rose-Hulman Institute of Technology

Description: This panel will cover a variety of challenges that don't fit neatly into other categories, but still need to be solved.

Notes:

Jay: One of the items I was thinking of addressing. What are the rules for IP? Who is on it? What if all students didn't contribute? Also, liability issues when transferring to a client, particularly for assistive devices.

Aaron: Group assessment and dynamics. How do you figure out what is happening on an individual level?

Mike: Time estimation. What should be expected?

Todd: Projects move at different speeds. Internal design reviews can help them catch up.

Keith: Jay, what have you discovered.

Jay: I was at a company being sued for patent infringement. Got taken off other projects for 3 months to work with patent lawyers. Need to make sure people on the patent made a significant contribution. It's not just building and testing the prototype. A student who was left off could invalidate the patent by showing that the authors actually didn't come up with the idea.

Todd: On the student side, this is the sort of thing you can be asked on interviews. What did **you** do on the project?



Panel 4D A Cornucopia of Capstone Course Challenges

Jay: On the liability problem: Team works with disabled person to make a device for them. Legal says - if you give them to the person, they could get hurt so don't do this anymore. They worked with legal to figure out this. Other college wouldn't transfer devices at all, which isn't fair to the client. Another school would transfer the device and not tell legal. Liability waivers are the way to go. Clients need to know that students won't be around for repairs in the future. They make sure their devices are not life sustaining so the failure of the device is not catastrophic. It is ok to give it to an industrial client, as they will assume the liability.

Keith: We had a group that couldn't plug in their device to demo it until it got vetted by EHS.

Audience member (AM): Small clients may not have the resources to vet things or may be really dependent on it.

Keith: Need to make sure clients know this is a best effort student project. Students probably should have brought client in earlier.

AM: Should projects start with a student agreement or an industry project?

AM2: Relationship between student and company should be the main focus.

AM: What about students getting injured driving to a company site? Who's liable?

Keith: Depends on department. Are the students filling out a travel request? If they are on official university business that's different than just driving down the road.

AM2: Look at notes from Safety Culture panel.

AM3: Risk management folks generally have a lot of info on how to determine the potential risk. If you have a huge number of projects they need to be involve.

Keith: Make sure to check for university for existing NDA policies and templates. Need to worry about companies putting in non-compete clauses and such.

Todd: I've called clients and said that you can't say 'students can never talk about the project' because they need to interview for jobs and such.



Panel 4D A Cornucopia of Capstone Course Challenges

Aaron: Also some NDAs make presenting information at the end of the course tricky.

Jay: How did your patent folks deal with the public disclosure issue of presentations?

Keith: BYU has all students sign an NDA partly so on campus discussions are not considered public disclosures.

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Aaron: Two years ago we had students report hours on a daily basis, not as part of a grade. Also started using a performance review, like in industry. Having the sense of hours worked makes it easier to help sort out team problems. Some students undervalue others' tasks. Has them categorize where they spent their hours - even for stuff that isn't strictly project related. Team bonding activities should be counted under 'overhead'. Weekly time commitments to jobs and family also considered. Performance reviews happen a lot in industry, not discussed in class a lot. Got alumni to send in templates for performance reviews. They boil down to: What did you accomplish last year and what are your goals for next year? 10-12 minute conversation can provide a lot of knowledge about team dynamics and individual accomplishments. One student taught everyone else SketchUp which allowed for a lot more ideation. Knowing that let the instructor be able to encourage that.

Jay: Also useful tool for figuring out where time can be wasted.

Aaron: Students can have a hard time figuring out how long things take or how long they spent on things. Helpful to ask why they are spending more or less than the expected amount of time on the project.

Keith: Practice in time estimation definitely necessary.

Todd: We ask for reporting but it tends to be very inaccurate. Students should work for 10 hours, report 2 hours, but spent 3 hours in meetings alone so...

Aaron: Students can put in 10 hours without them being useful hours. This seems to happen more than fudged time sheets. If someone is spending a ton of time in research, can push them to write up/summarize stuff. You can tell when people aren't fully contributing. Do the design



Panel 4D A Cornucopia of Capstone Course Challenges

reviews during finals week - 15 minutes per student to discuss goals for the spring and accomplishments for the fall.

Keith: If you're using individual advisors for each team, they can do the design review/team feedback and meet with students about what they need to improve. Students also have to write a reflection and discuss plan to approve. Students who don't do this tend to have low grades.

AM: (on subject of references): Has a google form for students to request a reference including resume upload and why they think they would be a good reference etc.

Jay: Do we need to have FERPA form of some sort to allow to share information?

Keith: UFlorida has a form students need to fill out.

AM: Specifically talking about grades is no longer allowed without permission from the students.

Todd: For jobs, there is no 'student has waived right' form as from a university.

Keith: Things change again when its a government form.

AM: I tell students that I'm not a good reference for some things like security clearances because I don't know what they did outside of class.

AM: I've had three times when students have said 'I worked for NASA' when it was really a NASA sponsored project.

AM: I get approached by companies without the student having told me it was ok. They felt it was sort of an end-around the FERPA problem.

AM: Could send recommendations to employers of students they might be interested in.

AM: We found out we legally cannot provide resumes from students. If I'm out to dinner and run into someone who asks "Would you hire this person?" it gets very awkward.

Keith: Does anyone provide resumes?



Panel 4D A Cornucopia of Capstone Course Challenges

AM: Needs to go through career services.

AM: Sending job announcements to everyone works better.

AM: Handshake - matches students with potential employers.

AM: When we know someone is hiring, we blast info to everyone. But we ask employers for specific information.

Keith: How about trying to catch up teams using internal design reviews?

Todd: We used to go up to the lab the night before capstone day and 90% of the students were up there doing last minute stuff. Internal design reviews helped keep students on track, and they can lose points by not being prepared. They meet before breaking for winter, then again in the spring. They need to demonstrate functionality 4 weeks before end of semester.

AM: Prototype has to be done 4 weeks before presentation

Jay: When 8 weeks left, check in to see where they are on prototype. They also need to turn in an experimental verification document 4 weeks before the end which forces a prototype.

Aaron: We also have a design review, but we've found variable results. Can you give details?

Todd: Robert and I meet with each team for 45 minutes. They need to justify their design and prepare to meet with client. No advisor input at design review. Also gets them used to presenting to their boss's boss.

Shraddha: They're on a quarter system and they use the 4th quarter to test and iterate and make changes.

Keith: The idea behind the project is supposed to be 'design build test' but some folks see 'design build turn-on.

AM: How do they deal with multidisciplinary projects?

Todd: To us, they're all engineers on the teams, not a particular type of engineer.



Panel 4D A Cornucopia of Capstone Course Challenges

AM: Is there a coordinator at college level?

Keith: Might want to table that until the next panel session.

Aaron: We like to have folks from other disciplines for multidisciplinary projects.

Todd: Sometimes that can blow up when people suggest project goes in a different direction.

AM: We have panel reviews - manufacturing review, budgeting review, testing review. No clients and advisors can't say anything. Different students lead for different reviews. Need to pitch their budget to the finance folks. But they don't get the money until they get their approval. Check in on things based on plans. A lot of stuff gets broken before Expo.

AM: We used to do midterm presentations and a demo. We make the second term students to present to first term students and second term students. First term students give feedback on how likely they are to be ready for capstone day.

Todd: We have to worry about sponsor permission to present in front of others.

AM: We still have projects that don't make it and sponsors are crushed. What do we do?

Jay: The clients shouldn't really be crushed. Don't they communicate?

AM: Some clients should have been more engaged, but the instructors have to absorb the pain.

Todd: We tell clients up front that if they don't engage with the students, they're not going to get what they want.

Keith: I don't deal with entrepreneurs because they pivot too much and students can't keep up.

AM: The other version of this is a small company that takes off mid term.

Shraddha: We will do another project for that client for free if they get a bad term.

AM: Setting expectations is critical up front. But it is still an educational endeavor, and they are still learning. We can't guarantee products. Need to spend time onboarding clients and let them



Panel 4D A Cornucopia of Capstone Course Challenges

know that critical path projects just won't work. Also good idea to call clients early if things are going south.

Aaron: If we scope these so there is no possibility of failure, that's not a real world project.