



Panel 4C: Use of Artificial Intelligence (AI) as a Tool in Capstone Design

Facilitator: Matthew Swenson (UIdaho)

Panelists: Lionel Hewavitharana (SAU), Katy Daniels (UT Knoxville student), Matt Goodman (UIUC), Claude (AI)

Description: Is AI a tool or a crutch? What role does it play in Capstone, and how do we ensure students use it ethically and intelligently? The panelists hope to have a lively discussion about these questions and more.

Notes:

This session is being recorded in Zoom with AI transcription. The below notes are done by human.

Following that, the [transcript](#) is provided. Feel free to use your own AI to compare/blend the two!

Human Transcription Session Notes

AI use survey was distributed to attendees at beginning by Lionel

Matt: Teaching capstone for 12 years, introduced into AI a few years ago on college-wide committee for faculty use guidelines. Everything they created a semester later was out of date. Developed LLM tool to evaluate progress reports, but extremely inaccurate. Seen AI Chatbots for stakeholders. Seen students use it inappropriately in capstone.

Katy: Used AI for Masters doing an LLM, new to capstone, knows/understands prompting

Lionel: Taught capstone for 14 years, (couldn't hear), Policy creation in university to start introducing AI into course curriculum

Matt to audience: Have you incorporated AI tools who have incorporated it into their course

Forest (Georgia Tech): students are using it for everything. Help on how to evaluate quality? Prototyping is going much faster in coding, how is this being screened/vetted.

TAMU: First semester is Writing Intensive course requirement. 35% of course has to be individual writing. Policy is No AI can be used on that 35%. Team reports okay to use AI. No way of knowing if they did it. Can usually tell if something is very good. Some instructors say if it's too good, the student may be asked to come in and write something in front of the instructor to prove writing quality. They think that Writing Intensive requirement will go away very soon because of AI.

TAMU: Shifted to quality of work is more important. Use it but higher the standards of what is expected. There is no way to prove use of AI. Prototype quality needs to increase. What an A project looks like is shifting. AI tools help multidisciplinary use or for students who are one type of major but need knowledge of a different (Biomed looking into how to understand ME knowledge, for example).

RIT Software Engineering: AI has given us a dearth of new projects. Even for old projects, look to see if they can AI this. Sponsors want to know about AI, so learning how to leverage AI for the sponsor in industry. Use the “kids” to help integrate AI into the older industrial organizations

Shane: They won't stop using AI. Same response when new tech comes in. Submit drafts, many low stakes drafts early in term. Have the students revisit their work. Have them turn on Track Changes so they learn to review the work.

Vermont: Used Google Notebook LM, uploaded syllabus to it, gave it some info on the course, then ask it to create a podcast of the course. Podcast syllabus! For students that don't want to read it.

Harvey Mudd: Formally approved AI usage on application of projects (CS). Sponsor has to agree ahead of time on AI use in project. Some all for it, some cautious, some sponsors don't want their confidential information uploaded to AI for it to get trained on. Teams falling out on teammates accusing each other of using it.

Liberty University: No formal policy. AI changes too quickly. Provost asks faculty to warn students to use it ethically. Student must be first and last editor of the document. AI doesn't generate content, generates flow. Oral directive from Provost that Faculty cannot use AI for grading. Had a team that used AI for Matlab code, team couldn't answer anything about their code that faculty couldn't understand. Made them delete the code and had to work out the code with them. Unattainable to do this for all teams.

VTech: Multidisciplinary capstone. Students are coding apps in a weekend, so quickly. So should we just require more from them. No longer just create the app, now do we need to implement it too?

TAMU CS: Oral evaluation to observe articulation of requirements and design. Hopefully AI hasn't found a way to dictate through earpods! They are given impromptu questions that they need to think fast. Technical mentor vets the validity of the answers. End of semester, industry expert then evaluates final quality product.

UW: Multidisciplinary CS students - can tell they used AI, but their students know exactly what they created. Sponsor said they could have access to the sponsor's powerful AI tool. Sponsor supports students to use AI in good ways. Instructors use AI to summarize peer feedback to help track progress.

CS Mines: AI is accelerating product cycle, so deemphasize product and focus more on process. Why did you do this? Why? WHY? Redevelop critical thinking of decision and critical thinking. What are you doing and Why are you doing it? Explain it to me.

Charlotte: Don't have a problem with using AI as long as students can justify what AI is giving them. Worried however that the students are getting an undergraduate education (just skimming the surface).

Utah: Students are resistant to using AI as well, particularly for ethical reasons such as water use, data center fights, not learning enough, concerns of AI taking jobs. They think they are contributing to the problem. This summer they are integrating AI component to every assignment in capstone. Given permission if course evals will be low next time around because of it.

Unknown: Students who are top performing are the ones that definitely don't want to use. Frustrated that bottom students are using it to cheat.

Northeastern: Paper on intentional fusion of AI. Teaching discernment so students can outline their knowledge of when to use it, when not to. Students have to disclose whether they used AI or not.

Cornell: Concern about fundamental understanding. Capstone has it a bit easy because students are on the cusp of finishing and going into industry. Yes, assessment is a concern. But how do you ensure fundamental understanding from the beginning. How do you use AI to study to learn the fundamentals? Use it as a tool to help think. Professors have old school thinking of materials prepare the student through assignments and tests. Have AI teach students how to think that way for their courses. Do whiteboard exercises where the students have to work it out live on the board after presenting their work. Need to quickly move your classes forward as quickly as AI has progressed.

Moderator: Moving to new question. What does industry expect our students to do from an AI standpoint? Do they expect students to have a foundational knowledge of its usage? Do we have responsibility to teach this to our students?

Matt: Sponsor company of a team uses AI extensively. All company data is shoved into an LLM. The company expects the students to know how to prompt the AI and know when the information is valid. Sponsor also said they couldn't give students access to their LLM due to security so students on the project were not allowed to use AI! They want the students to critically think about usage. We have the opportunity to assess the learning process for this application.

Katy: Agree that students can't be stopped from using it. Need to use it as a thought partner. Students have to submit their prompt! That shows their thinking process, their writing style. The more clear the prompt, the better quality of the output. Love the idea of using a subject matter expert that helps the students with the process to help students evaluate the output.

Lionel: Industry hasn't been interested. Upcoming year though we have two companies are interested. Companies don't pay attention to learning outcomes, many sponsors want the solution and don't care how the students get there. Industry may not like their data into the public domain that AI uses.

TAMU: Industry wants the best final product. They don't care how it was generated. We shouldn't be asking in capstone if they have fundamental knowledge - that should have been their first three years, not their final year. Have to rely on the prior faculty to provide that. AI users think they know they are good users of AI - but where is the trust coming from?

Vermont: Dean came to them to say Board advisors are pushing him to put more AI into curriculum. Asked Dean, okay, what learning outcomes should it be about? Dean had no answer. Industry has no answer.

Great fundamental question: What is the learning objective of adding AI to capstone?

Industry person: Industry is embracing AI rapidly. Everyone trying to figure out how to best use it. Validation and verification is key. It won't fly in industry if the engineer can't justify why they did what they did. Liability!

Ohio State: What are the durable skills that the next generation should have in the workplace and in society?

TAMU: Industry is trying to wrap heads around it. ABET panel last week with Tech managers at known companies were there. Wide range of complete dependence to healthy skepticism in the panel. Students need to learn to supervise the AI agents. Quality assurance movement: Integrity, longevity of final system design, maintainability of final output. Set targets and make students explain the process.

Georgia Tech: Instead of teaching students to solve problems, teach them to find the problem. AI can solve problems. But can students learn to talk to customers and develop the constraints? Learning to do problem definition.

TAMU: Agree industry is struggling with things. Companies are giving them projects that have an AI component as part of the project. Some industries are lost and don't have people in the company that know how to do this. This will change what makes a good engineer. Machines are getting better at doing the grinding parts of computation, etc.

Texas Tech: As a community, we need to agree on what the purpose of capstone design? Is the purpose the final product or is it on the process the teams go through? Particularly, multidisciplinary - what do we want our students to get out of it?

UT Dallas: BART navigation tool. Project wasn't well defined at the beginning, took a lot of time to redefine it all then students didn't have enough time to test solution.

Arizona: Use AI to create an assignment on how to effectively use AI.

Ohio State: Honors Multidisciplinary Capstone - for verification and validation, learning objectives is to create validation methods. Everything must go be logged and go back to original objectives of the project. At end of day, all teams have Curo accounts that the instructor can look at prompt history.

Moderator: What are other people doing to get students engaging with AI (rather than focusing on assessment)? What tools or prompts are you having students do in capstone?

Matt: Students like to skip over the stakeholders. Not capstone, but in a design course, the team of instructors have created AI chatbots that are stakeholders. Students interview the different chatbot stakeholders - each chatbot has different instructions. The students end up getting conflicting information on purpose so that the students learn to determine how to move forward with different requirements to a project. Great for students that want to engage in the interface at 2am.

Katy: For Honors Interdisciplinary course, they use program GPT4All. Stays entirely on the the student's computer so no privacy issues for data. They have to put sources into it themselves. Then prompt the AI: Implement green design based on sources.

Lionel: Previously students did work outside of class a lot. Now they have to do everything in the classroom for the 3 hour class time. Prompts and AI outputs need to be logged during this time, then the instructor verifies it was done during classtime. Make students create a document, then AI prompted to create document and you compare the results. Only then can you use AI output.

Ohio State: Used to work on product design consultancy. Don't have a consulting option in capstone in the same way, so use AI to be the consultant. Help students with creating user manuals by prompting AI to use the system.

CS Mines: use it to fill gaps in student experience. They don't know what they don't know. "Here's my idea. Give me ten issues that you can find about my solution?" Most of our students have zero experience working in industry, so have AI be a stakeholder that they interact with.

3 Intelligences Method for meeting with the client - exercise at start of class. Now 3I method is students answer questions, then as a team compare results, then what does sponsor want, THEN what does AI think.

Question from audience: What access as faculty do you have for AI? We have limited access.

Matt: Paid version of ChatGPT is the Netflix shared password analogy. Some experimented with what free version versus paid version can do for classes. This becomes an inequity problem because some have paid access and some can't. Some universities have paid access to specific AI tools. Illinois has option to make their own chatbots so there isn't data security issue.

TAMU: Going back to question on what tools we use. In ME capstone, we don't care whether you wrote the software or not. For us that is a means to an end. Need to properly validate your system, that's the emphasis. We might be underestimating the knowledge that the students have on using the tools - they likely know more than us. They need to tell us how they are using it before we can figure out how to change our courses. Students consider paid subscriptions of AI the same as they do with textbook fees. Also, some students are getting free versions of advanced versions of AI from companies as trial versions - so again they may know more than us.

Ohio State: AWS and Azure accounts given at the university. So students can be given different levels of AI based on needs of the project, dolled out by instructor. Use lower functioning ones at the start when full access not necessary in the design stage, then ramp up. Uses Claude Opus, Copilot, GitHub, Google Cloud/Gemini not great. [Discussion on using tokens, not understood in time for notes.]

Ohio State: Interested in the "allowed" and enforcement side of this conversation. Students can access other tools, like advanced tools compared to what we might require them. What teeth do we have as instructors if we cannot enforce unlimited use of it.

Lionel: Results of survey given at start: [AI transcription due to too fast to type:]

Okay, Lionel, I wanted to check with you real quick. You handed out those surveys and have been looking at those pages. Are there any observations that you've made that you want to share with one group?

Oman, Sarah

07:54:12

Almost everybody says AI and engineering transform design of critical thinking, erosion of creativity, erosion of engineering ethics, and tendency to transfer engineering judgment to AI.

Almost everybody says like that

Oman, Sarah

07:54:26

And can the quality of CAPS27 project content be ensured if AI is used ethically and creatively?

And

Honestly, what I would say is, and should every engineering department develop a formal AI use policy for capstone design courses? Almost everybody says yes

Matt: Going back to the enforcement question. The only way to enforce it is to hover over the students. Then when/how? Where do you draw the line? Too administrative and restrictive. Doesn't fit the goal of capstone. Give them the toolbox, it's up to the senior to determine which tools they want to use.

RIT: A lot of students are anti-AI. Interested that AI can be used to raise the bar on final. But how do you set the bar if some teams are using it and some aren't? Is it fair to judge teams differently based on AI usage or not?

UC Boulder: Changing first assignment of Project Understanding. What do you think the project will be? What will your role be? Now going to add How will use AI in this project and how will you protect your project partner if using AI? Add course AI policy in the assignment itself.

Moderator: Reflection with last few minutes. Three things jump out:

1. Reassuring to be in a room where people all over the country are wrestling with same problems.
2. Noticed the answers/perspectives change between disciplines.
3. Walking away with tangible ideas on how to be proactive with AI usage that can be implemented immediately.
4. Healthy, informative discussion that has been very productive.

AI Transcription:

06:32:54

This is a panel discussion for use of artificial intelligence as a tool in capstone design.

06:33:02

My name is Matthew Swenson. I am an associate professor in mechanical engineering at the University of Idaho, and also the director of our Interdisciplinary program

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our capital program there. I'm happy to be facilitating this discussion. It's not a topic that I am very versed on, so I'm eager to hear what these panelists and what the rest of the folks in the room have to say about this topic, because it is one of interest

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I know to me personally, and I imagine for a lot of you as well. So I just want to welcome and thank our panelists that are here today, Matthew and Katie and Lionel. They have varying degrees of knowledge and also interest in this topic as well

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And we're looking forward to a lively discussion over the next hour and a half

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One of the first things we want to do here is that Lymel has a brief survey that he wants to hand out on a piece of paper for everybody to fill out. We're trying to get a feel for how much you all have used AI in your capstone courses, if at all

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And this information, we want to collect these back and we may refer to this later or at least have information we can take with us. We're just curious to what is currently being used out there. This is, of course, an emerging tool, an emerging topic, and perhaps everybody's at different phases of

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Using it and we would be interested in knowing more about that.

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So if you just take a couple minutes to just fill that out real quick.

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Lionel, how do you want to collect all those? You want to go back in about 5 minutes and pick them all up.

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Okay.

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While you're doing that, I'm pleased to inform everybody that Sarah here is taking notes, and it's my understanding that she is using an AI tool to do that. So we'll see how well it actually works. We might get a bunch of gibberish at the end, but I don't think

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The problem would do a pretty good job

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And I think Sarah is going to back up, take notes as well, if I understand

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Well, thank you very much, Sarah, for being willing to do that.

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Just give everybody another minute. Looks like some folks are finishing up. Maybe, Lionel, we can work our way around the room and pick them up.

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We get on with this.

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And then when panel members are talking, can they use the microphone directly? Yes, they are requested to

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I do what I'm not doing

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What are we doing? You got any more time

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You imagine the snowing has a more conversation between the others and I do. I'm going to allow these folks to introduce themselves and share some of their experience, but I expect and hope for. And quite frankly, strongly desire that this is interaction between audiences

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Can you just tell the audience to to really speak up when when they're asking their questions?

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Yes.

06:38:43

Yeah, thank you so much for taking that a few minutes to do that ages. You may breeze through them here as we're going to see if you can identify some recursive trends here. But how this is going to work

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I'm going to let the panelists introduce themselves, talk a little bit about their own experiences. And we're going to have a lot of interaction. I've got a microphone here that I can walk around the room and field questions from folks

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But these 3, I don't believe they profess to be the end all, know-all experts on artificial intelligence. They just have some experience and were willing to participate in this panel. So I imagine there's other knowledge and expertise out there in the audience, and so we're interested in having this interaction and enabling other people to talk and share their experiences as well.

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That's how I foresee this going for the next hour and 20 minutes or so.

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All right. Are we done with the quizzes?

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Okay, all right. I feel like I'm teaching class again. Okay, I'm gonna go ahead and let these folks introduce themselves and tell us who you are, where you're from, and if you could share briefly

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What tools have you already tried using within your capstone line courses, and what worked and or didn't work using those tools? And good luck being brief on that. Thank you. My name is Matt Goodman. I am faculty at

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The University of Illinois

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I'm faculty. It's the podium, Mike.

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It's all

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This better? All right, perfect. So faculty at the University of Illinois, I have been teaching Capstone now for 12 years or so, something like that. I got introduced into AI, the AI world a couple years ago. I was on a college-wide committee looking at

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creating guidelines for faculty use in AI in the class, in the syllabus and things like that drafted some policy, came back a semester later, and everything that we put was completely out of date. So back to the drawing board

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In terms of capstone, I've used, you know, we developed an LLM tool to kind of evaluate progress reports. It's currently worse than a coin flip. So less than 50% accuracy there

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I've also seen use of AI chat bots for different stakeholders and things like that. So that's kind of a cool. I've also seen students use it really, really poorly in trying to generate ideas and copying and pasting

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literature review, things like that. So, seeing the gamut of the different things over the course of two ish or so years that AI has been on the scene. That's me in a nutshell.

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Hi, everyone. My name is Katie Daniels. I'm from the University of Tennessee Knoxville. I'm subbing in for Jonathan Forwin. He's one of my students who had a family emergency. I'm going to be so real with you right now. I do not know much about AI. I use it. I used it for my master's doing an LLM

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I'm very new to Capstone. I have about 3 semesters under my belt, but what I do know is that there's good and there's bad, and it all determines how you use it and how you prompt AI. So that's where my knowledge comes into play, is prompting it.

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Good morning. My name is I'm a professor of engineering at the Council University. I have been teaching

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For the past 14 years

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So the point of science and engineering AI technologies into

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Can you speak up? Can you speak up? Please. Yes. Okay. All right, so College of science and engineering policy decision

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Include use AI tools in its process. And they identify the capstone design is the best one to start off with. So the last year we started introducing AI into capstone design in a limited way

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And then based on this year's experience, we might expand it in future. So still is the use is in its enhancing

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Okay, I'm going to engage some audience participation here right off the bat. I already see a hand up. I'm curious if there's other people out in the audience who have already introduced AI tools into their capstone design course, and I'm interested in hearing, and I think everybody else is too

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How that worked or how well it worked. Did it work? Did it not work? Things like that. Is there anybody out there in the audience that would be willing to share their experience?

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All right, maybe I'm

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I'm Craig Forrest from Georgia Tech, and I

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I think about it just the other way around. So maybe I'm missing something if there are some AI tools that I should be using. But all I know is the students are using it for everything, and I need your help to understand how you evaluate quality when this is happening

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I mean, all the reports are AI written

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And the prototyping that takes used to take a month and now takes a weekend when you're writing code, for example

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So I need to understand, are you changing your expectations for the students? Are you somehow vetting this or screening this?

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not to rent or anything, I just want to understand how you're assessing quality in a in a in a qualitative grading course already when you got AI all all over the place. That's my that's my number one question for the whole session

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So at Texas A&M, I think we may have told you that we have two semester capstone in mechanical engineering, for example, and the first semester is arriving intensive course which means that it's one of 2 writing intensive courses that every engineering student has to do through their four year

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lifetime

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And so because of that, we

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35% of it is an inch of that has to be individual writing

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And we

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This year, this coming fall this coming fall, we're going to say that no AI can be used for the 35%, the individual ready. The team writing, the two team reports later

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We are okay to use AI, but no AI for that 35%. So of course we don't have any way of knowing whether they did it or not because we don't have tools to know. But we can tell if something is really, really good right or really well written

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Especially if it's someone of duration, you can make it look quite good. So right now, we don't have a way of, I don't think we have a really good way of knowing that it was done one way or the other. We have some instructors have said, well, if it looks really too good, we may ask them to come in and write a sample

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200 world you know something in front of that, right? That's one some instructors have thought that'll be because we are not allowed to use AI tools to detect your AI tools, not within, but we are not allowed to use them anyway, because we had one usage of that

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2 years ago, and Kristen almost lost their job. So you know it was well publicized. So I guess the bottom line is that right now, after the first thing they are allowing usage of AI, and we also think that

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In 28, this is 26, 27. We think that 27 fall, we think that there will be a major change and AI will be writing will be allowed in writing in terms of or there will be no writing intensive courses anymore because

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Everyone, we all use AI, and then we tell these students from this 35 they should not use AI. It's such a double standard. There's an absolute double standard that everybody, all of us do it, and everybody in industry

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is doing it. And we are telling them, we're preparing them for industry and yet they're insisting on this little last vestige of thing that we refuse to let go. But we think in two year, whatever we do this year will probably be the last year that we insist that they don't use

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Did you have a thought?

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So I was going to say that we've kind of already shifted to

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the quality of their work that matters. If they can make tools, give them higher quality work.

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then you know the reference that they used it, and we let them use it because even if you have a rule that says they can't use it, basically you're just giving a big advantage to unethical people because you can't detect. There's no reliable

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Stand up in court and defend

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Detection that they used partition tone.

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It's like, it's hard to tell somebody copied if they do a good enough job obscuring the copy, right? I mean, so anyway, we

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We kind of said

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That ups the expectations, though, and our projects are getting a lot better, right?

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The prototypes completion rate, quality of the prototype, all those things are increasing, right? So the standards

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You know what it takes to have an A project is coming up quickly

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And I think for our, I'm in a biomedical engineering program here, and our engineers tend to be kind of raw. They know a little bit of a lot of different engineering disciplines. So AI helps them a lot, right? Because they can architect, they have the vision

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But then they struggle with some of the details because they don't have enough practice in circuit design or circuit layout or they don't have enough practice in CAD like a mechanical engineer would get. But if they have those AI tools, they're much more productive

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system level perspective and reducing details of aptitude. I think and I come from industry, like 30 years in industry and only

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With seven years in academia, maybe not counting PhD.

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From an energy perspective, it doesn't matter how you got to the answer. It matters how good your answer is from an industry perspective. I mean, legal things

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Awesome.

06:50:08

Sam Malachowski, RIT software engineering. Sorry about the AI thing, but that's okay. What I wanted to say was for us, and I think this might be true to some extent.

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AI has given us a dearth of new projects. So essentially we can look at any old project and say, can we AI this right? And we have organizations. It's not only new projects in terms of maybe extending new projects to use AI tools, which I think

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There's a varying possibility for a varying majors.

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But also we have a large number of sponsors who

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kind of want to know about AI, and that kind of customer education part of capstone

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It has become an essential tool. So we have students who want to do practical AI driven applications, and we have

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sponsors who want

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To introduce AI in a practical way, kind of with, you know, the kids these days

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It really, in many ways it's introduced a very natural way for us to to approach many older industrial

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type organizations

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So

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For my class, the way I they're not going to stop using AI in my opinion. We're not going to stop using calculators. We're not going to stop using the automatic transition. It's the same response when technology comes in. So in order to get them to, even if they're going to use AI

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and make them submit drafts multiple of the same, even if the first draft is only worth like 10 points and the final draft is worth 100 points

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Submit week one, a draft submit week three

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The final, and by having them revisit, it's really make them turn on track changes so that you can see the changes.

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And at least they have to review the work

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I just wanted to share a simple example of how I'm using AI as an instructor.

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I used Google Notebook LM. I uploaded my syllabus to it, and I shared some online resources and other information about my course. And then I asked it to make a little podcast telling people what the course is, how to succeed, what resources are available

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And it made a 30 minute podcast. I give students syllabus and I say, if you don't like to read, you can listen to the podcast. And it's a really, it's like an engaging interview between two people about the class. They did a really good job.

06:53:01

Just

06:53:08

So I oversee computer science projects. And last year we

06:53:14

sort of formally approved

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AI usage for the programming parts of these.

06:53:21

Yeah.

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But one thing we have to be very clear about was the sponsor has to agree.

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Some sponsors are all for AI. You could say the students will play further in their project. They can sell better and

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Others are a little bit more cautious, and that

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One of the big things is some sponsors don't want their confidential data uploaded to certain

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Yeah, they don't want their data to be trained on by Google or open AI, etc. And so that's something we've had to be fairly careful with

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One other thing I noticed is this is sort of a new fault line. If there's to the extent that there's any sort of restrictions on what sort of AI they can use in a project.

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We find teams falling out, though I think you use AI for this. Oh, no, I didn

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Fun new complexity. Yeah. Let's see.

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Joby, Anthony, Liberty University Mechanical Engineering

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We don't have formal policy, like you were saying at the beginning, AI changes too quickly, but we do have a written directive from the provost that students are going to use AI

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So we're asking them to use it ethically. It's one thing to use AI to generate an outline for a paper or brainstorming. Help me find resources. But as long as the student is the first and last editor of the written document, then that scene is

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ethical use because they're going through and writing everything. AI is not generating the content. They're generating a flow or ideas.

06:55:06

Well, we do have an oral directive that instructors cannot use AI for grading.

06:55:13

We had one do that and submit a student's work to AI to say, Hey, grade this for me. And that's not clear if fir code was broken, but that's a really big scare that we had

06:55:27

For me personally, I had a team this last year that I'm pretty sure they use AI to write their MATLAB code. And when I asked them about it, they had no idea what was going on

06:55:38

They couldn't answer anything about the code. And then I couldn't help them because they didn't know what they were. Right, so what do you do

06:55:45

I work them through, I said delete the code and start over. Manually? Yes, I sat down and worked at the whiteboard and worked through some of the math with them and said, this is what you're trying to do in MATLAB. You have wasted so much time generating information that I can't even read or help you understand

06:56:02

Because you don't even know what you wrote

06:56:05

So I had to take time and work at the whiteboard right there. It was. I spent a lot of time at the whiteboard with this one student, with this one team, and I have seven other teams. I can't do that. Next semester and the semester after that. So what do you do?

06:56:20

At the moment, I don't know.

06:56:27

Can I get another example while we're talking?

06:56:31

So, I teach a multidisciplinary capstone, you know, the CS students are vibe coding awesome apps in a weekend. And I don't know what to do, should I say, okay, coming to a prototype on a Monday and then we'll talk about something beyond prototyping, like implementation with customers

06:56:50

Like, should we just all raise the expectations for what they do with their prototypes? Because it's no longer enough to say, have your app ready for the final showcase. If they can do it in a weekend.

06:57:04

Okay.

06:57:08

Good morning, Pauli Wade, Texas AM. So I handle the I'm one of many faculty handling the computer science and engineering

06:57:18

class

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capstone class. And one of the things I've had to rely on is oral evaluation, where we observe and we observe how well students articulate their requirements and their design

06:57:34

And that's something that AI at the moment cannot do for them. I don't think they've AI has figured out the earpiece and dictate through the earpiece. So so we've had to

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Oh yeah, wear eyeglasses, right, that's right, that's... but still

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They're gonna be given some impromptu questions, and they're gonna have to think fast and

06:58:03

And be able to articulate now we have a technical mentor who's an SME subject matter expert, and we rely on them to vet the output of the students. And then the gentleman in the maroon there that had the 30-year

06:58:19

experience in industry. Then, at the end of the semester, we have them evaluate the quality of the product. So it's more of a multi

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How do you say vantage point kind of grading. So, but I don't stop it at all. I try to make them claim every week they have to put in their log how they use AI. But we all know they're all scared of honor council, so they're not going

06:58:46

So truthful. Yeah

06:58:53

Serene Maled from University of Washington, co-leading the capstone projects. I have another example actually helps with the example of yours. One of our projects is multidisciplinary with computer science students and the computer science students will come to the meeting and you can tell

06:59:10

that they've used AI. But whenever I ask them questions, we know exactly what they're talking about

06:59:16

Okay, good for you. And they're working with a sponsor who openly said at the very beginning, I'll give you access to our powerful AI tool so that you can use it when the students said we can write a white paper for you. The sponsor said, just give us your report. We'll throw it to our AI

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So I'm trying to say that if we're working with industry sponsors who are already using AI

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Somehow we need to train our students to use AI so that they're ready for the industry

06:59:48

Another example or an example of why we use AI for a capstone as instructors when we get peer feedback and then we have tons of those, we have a big cohort, we throw that into an AI tool and that summarizes for us the students are saying, and then that helps us track progress

07:00:08

And find the red flags for those students that we need to see in person.

07:00:16

We could probably go on all morning here doing this. All right.

07:00:21

So I just wanted to take a quick response. This is Adam Moran from the Colorado School of Mines. I think you bring up a valid point. So as AI continues to remove friction and continues to accelerate the product development cycle, I think we have to de-emphasize our focus on the products

07:00:36

And re-emphasize the process of learning. So my students are getting more and more frustrated with me because I go, I don't really care what the diagrams look like. I don't really care what your code looks like. I have five whys for you, and I'm going to keep digging and poking and poking and poking on why did you do this? Okay, but why did you do that? Why did you keep going there

07:00:55

and really emphasizing the development of their critical thinking that their engineering mind versus, again, something that they can generate in 20 min with a AI. So I think it's that fundamental shift in them saying, yes, you're going to have amazing products.

07:01:09

But do you actually understand the context or is it expanding your thinking to now give you the maturity as an engineer? That's now they can go from first year interns, where I have to manage you and watch you and give you very strict instructions, to they're behaving more like second or third years by the time they graduate

07:01:25

In terms of having that sophistication and understanding. So I think we just raised the bar, and we focus more on that process again of, no, but what are you doing? Why are you doing it? Explain it.

07:01:42

Meg Harpins from Charlotte

07:01:46

I don't have a problem with students using AI in CAPSTA, as long as they disclose it and they can explain the critical thinking that AI used to get to the result.

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One of my bigger concerns, though, is that they're using AI so frequently throughout their undergraduate education that they're not actually getting an undergraduate education

07:02:04

They're just skimming the surface

07:02:15

We're starting to move from where we're trying to patrol for AI and have students not use it to where we're trying to train them to use it as a tool effectively so they're ready to use it in industry. So we kind of see that that's where it's going. One of the things that I've encountered recently is that some of our students are resistant to using AI because of ethical concerns. They're concerned about environmental things, and I'm curious if anyone else is seeing that

07:02:40

I'm mechanical, so not on the CS side. We may be slower adapters, but it's interesting to me that student feedback is, well, we don't want to use AI. That's not what we're supposed to be doing.

07:02:54

What is the ethical

07:02:56

One of the issues that we are having

07:02:59

Yeah, so a lot of it comes so in Utah right now, we're also have a big data center fight that's happening. And so students are concerned about water usage. They're concerned. I think there's some concern that they may not be learning or be authentic

07:03:16

They're concerned that AI is going to take their jobs. So there's concern that

07:03:21

That they're kind of contributing if by using AI in their studies, they're contributing to those concerns. So I'm curious if anybody else has seen that.

07:03:36

Yeah, I have so the Can you take that? Yep.

07:03:43

So this summer is this we're supposed to we're working on I was we're working on integrating an AI component into every assignment for senior design.

07:03:57

And we'll see how it goes. My department heads assured me that if there are poor course reviews, that it will be okay. We'll see how it launches in the next year.

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So right now, like the expectation is we'll have a few students and usually it's a very small percentage of students, but it's at least one group of five out of 25. At 20% ish.

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So I think that's a question that we'll see as we sort of introduce it more formally

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You got to follow up on my course about it? Okay, great. I can just ask you your question there. First time I've had that occur to me also, where I had a couple students who did not want to use it

07:04:53

I'm not really a doctor of it.

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And what I found out is our top performing students. It's like your top 2%. I teach at a much smaller campus, so I know my students a lot. I have for many, many classes, and it's definitely our like

07:05:07

highest students who did not want to use it.

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Chrissy Verhelton, Northeastern University directed Capstone for 12 years in industrial engineering. I also did a paper called Intentional Infusion of AI in Human Machine Systems course, and we started working on teaching discernment

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And the students were actually outlining the positives and the drawbacks of using AI. And I'm also going to be doing a second paper because I saw a pattern of the top third

07:05:54

read students and how they had some resistance to AI. So they're starting to become sort of self-discerning and self-motivating about when to use AM, when not to. So that conversation has been really helpful

07:06:08

Anytime they do do a presentation, they do have to disclose. Anytime they do do a presentation, if they've used any AI, they disclose that, but they're not reading anything, and they don't have text-heavy slides, so they actually have to know what they're talking about. They have to field the questions as well

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Hi, I'm Brian Bauer, Cornell University. I'll just

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capstone a lot of great comments on that. The concern about fundamental understanding

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for the earlier classes, I feel Capstone actually has it easy, because we are literally on the cusp of going into industry, and yes, we're dealing with all the changes rapidly, but I don't personally feel as conflicted, notwithstanding some of the ethical issues, etc, about students getting ready for that

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How do you assess all those things? Yeah, those are troubling, but I work with some pretty progressive people and you've got some ideas. But how do you make sure they understand the fundamentals earlier on?

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And I advise

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advisor for 24 engineers. And what I've noticed from them, the tops what made me think of it was the top student comment

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We think it's hard for them to cheat the way we run some of our fundamental courses. It's very, think about an old school

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And so what we've been working with my cohort is, how do you use AI to really study, to really learn those fundamentals. And so turning AI into

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tool that helps you think and integrate as you prepare to study. So I had students, many of them come to me saying, you know, I do all the problems

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But that doesn't seem to help. What do you know the professor knows you do all the problems and so thinks more laterally about the agenda. The itinerary

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And then sets up the problems that way. And so, how do you help AI

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Or how does AI help you think that way? Think the way the professor does about how they're going to think about the materials prepared for the test. So that's a much more interesting, sort of sophisticated. They are learning the fundamentals while they're doing it. And so, to me, that was just this little light of, oh, okay

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discernment, I like your board, I'd love to read your paper, because to me, that's what we ultimately need them to do. One other little thing we've done, I teach energy is sort of an interest of mine. I do these energy modules with very motivated selective, very motivated students

07:08:28

all this business about wanting to use AI correctly. These are the right people for this. And so what we do is they do papers, we encourage them to use AI tools, analyses, let's say, then they whiteboard. We get them up there. They have a short session, and we say, okay, that's really interesting. Could you walk us through

07:08:46

That many turnaround at the chalkboard or the whiteboard and they say, okay, here's how we did that thermodynamics, or here's how we did it. And that's the assessment is a very, very short, sharp. Are you ready to actually back up what you're asserting? And if you're working with motivated students and you can work with them beforehand, they've used AI and they're ready to answer the question, you feel good about it. It's like, okay, these are people that are turning the corner

07:09:09

on use of AI. It doesn't solve any of the problems that we talked about here with a big class and lots of students and moving fast and how to change your curriculum and apply. It was literally, in my limited experience, I'm a professor of practice at one time for a third year, this is... this subject wasn't on the agenda 3 years ago, and it's the only subject on the agenda now. So how

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How quickly

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We can move our classes forward is still an active question.

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So that's actually a pretty good segue to the next

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direction I want to take this. This was a lot of lively discussion around mitigating the use of AI in custom design

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But it's my sense. And you all can tell me if you know different or have more perspective on this. That AI is being used more and more in industry

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In whatever capacities you might be able to imagine. And so the question is, and I'm going to present this to the panel, but probably also to the larger audience.

07:10:09

What does industry actually expect our students to be able to do

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As we are preparing them to go out into industry, what are they expecting our students to be able to do from an AI standpoint? Are they expecting students to have some foundational ability to use AI in certain capacities

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As a positive thing, as opposed to something we're trying to mitigate them to do, are there things that we maybe have a responsibility to expose our students to is preparation for going into industry? And that's a question. I don't know that I know the answer

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But that is a question. So I'm curious if anybody in the panel has any thoughts on that.

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So I'll give a kind of anecdotal evidence. One of the teams that I was advising capstone teams was working for I don't know if I can say the company, let's say a mining company that makes large equipment headquartered in Illinois.

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They use, extensively use AI and they love it. And they put everything into, you know, they have a company wide policy and they lock it down and things like that so they can shove all of the company data in there, and it is they love it and things

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What they want the students to know and how to do is that, how do you prompt AI?

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How do you know when AI is hallucinating?

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How do you figure out whether or not that output, that AI is even feasible? And so that critical thinking, I think the from Colorado School of Mines, right, you're talking about the process, and that's something that I've also talked about is

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So much we've been looking at assessing the students learning through a product. We need to we have the opportunity to look at how are we going to assess the actual learning process. That's what we want, that critical thinking. So that was the company. They had very, you know, they want the students to know this

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Now, that being said, they told the senior design students, we can't give you access to our AI, and therefore you cannot use AI at all in this senior design project, because all of our information needs to be hidden in firewall and things like that. So that is that one experience. And, you know, very, very clear. And then, as someone else, I think, mentioned as well is that

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You know, some of the other ones are like, yeah, sure, throw it in OpenAI, I don't care, or, you know, everything that we've given you is, you know, confidential grain or whatever kind of thing, so it's out there anyways. But I think the big thing is that they want the students to think critically about the outputs and how you

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prompt the AI to further the design process instead of giving you a solution.

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So somebody said in here that you can't stop students from using it.

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I wholeheartedly agree with that as a PhD student myself, you're not going to get me stop using it. But what you can do is help them learn to use that as a tool to their advantage without that cognitive offloading

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And so that just means using it as a thought partner, like somebody said, having it produce outlines. But what I like to have in the class is making them submit their prompt

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So that shows that they put in the time, the effort to actually think through this process before also going to get onto AI to advance their work. So by having a good prompt, you have to have a detail. You have to provide background. I like them to include their writing style

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And it just means the more content you get, the better output you're gonna get. So be more clear and direct. And so by having them include that prompt, you are seeing them actually put in time and effort. So that's something I like to say. And I also really love that idea of a subject matter expert, because students

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They are still learning, so they're not going to be able to really check the output as well as we would prefer them to. So having somebody on hand, like a subject matter expert to help them with that process and say, well, here's where this went wrong, or here's what's really good, and just work with them through that process to evaluate the outputs would be a really great idea

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We have done some industry projects previously, but we did not

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use any AI, and because AI models are not kind of very well developed, and the company also was not interested in using AI. Now, this upcoming year, we probably have 2 industry sponsored projects, and then we are still working with those companies to kind of talk about how to arrangements how to use AI

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In this design. So most of the times from my experience is that when companies don't sponsored projects, they don't pay that much of attention to the learning experience of students. They just want to kind of know if they are job done because they think that now we are spending

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We

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This is how it should be done. So there's always the campaign and then we just need to work for the solutions and kind of a workforce on array question how to complete the project. So I expect that they might allow certain

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But they might not be willing to

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Give us their data so that we can put their data in the public domain. So as soon as the video use AI, that means you are putting data in public domain. So there might be some

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Some data, maybe they can allow. That's some data they may not allow. So you just have to work for modernity. So this is our first experience. So

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I did not

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Still don't have a complete idea and then how it should be tagged. But it's my experience that we just need to kind of solution with the best

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All right, any other perspectives out there on what industry is expecting from our students and how we can prepare them for industry?

07:16:18

I think the industry, like somebody else said, really wants the best final product

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And we don't really care about how it was generated. And so because this is at the tail end of the gaps of their lives and they're almost going to go to industry

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This is not the time that we should be asking ourselves, do they have the fundamental understanding? That's why we know in the first three years, because otherwise, we are going to be in this constant thing. I think that we need to all accept that at the capstone level

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We are going to the at least my opinion, we should create the strategies and methodologies so that

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We assume that we want to make them ready for industry, and that the

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Prior faculty has done the job on first three years

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Otherwise, we would just be

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you know, repeating it. If they did not get the fundamentals in the first 3 years, this is not the time that we're going to make them invite and they're going to go into industry anyway.

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And the other thing I noticed is that people always feel like they are the best users of AI. Every one of them. If you ask yourself, you'll say, oh, you can trust me with AI because

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I know that I my mind is so good that I can tell what is good AI and what is bad AI. We have absolute faith in ourselves that we are good users of AI, but yet we do not give the same same

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You know, trust or ability to anybody else. So I noticed that with everyone. Everyone says, oh yeah, yeah, I use it for coding all the time, but you know I test coding daily for me very fast. But I don't know exactly how to make sure that it does everything right, you know.

07:18:04

Because people have confidence in themselves. And why do we take that away from our seniors who we should give them the same thing. Hey, use it and use your best interest. I mean, are their judgment

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That much worse than ours

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Yeah, good answer.

07:18:26

Yeah, I just wanted to share an experience I had related to this question last week, my dean came to me and said, I'm getting a lot of pressure from my board of advisors

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to incorporate more AI quicker into the program. And I think the best place to do it is Capstone. Say, great

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I'm not sure that I agree with you, but I can do that. What do you think the learning objectives should be?

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And I got blank stare. He had no clue

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What industry, what specifically industry was asking us to do other than for AI

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And I'm guessing a lot of people probably have similar experiences, but I thought I'd share. They're just scared.

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I think this is just a great fundamental question. If we're going to start incorporating AI in the capital, what is the learning objective?

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Hi, I'm Ana Garcia from Off course. I'm actually from industry, the outsider here.

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Hi, myself, went through all the states of grief with AI in the acceptance stage. Marcine offers

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industry embracing AI rapidly

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Back to the comment that, okay, what do you want AI to look back in

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The curriculum. I think everyone is trying to figure out how to best use it

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I can tell you that from

07:20:00

My perspective

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Validation, verification is key. Going back to the scenario. Okay, I backed in this

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I don't know how it works, I don't know how to troubleshoot it, and that is not an offline industry.

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Liability ends with engineering with the company generating that product. No one's going to point their fingers at openai or Anthropic or whatever company you pick.

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So

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More than teaching AI itself. I think it

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stitching validation and verification, liability, really understanding how can you test the code

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Maybe visualize the outputs in a way that

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You own the product and you can back in. You can communicate it, you can troubleshoot it, etc.

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So the learning objectives piece.

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I think that's a very important question

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As to what are the durable skills that the next generation are

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should have in the workplace, in society because as soon as you can define something very clearly, crisply, you can put that into AI and AI will give you

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reasonably good answer. So if I don't want to pick on anyone, but like every scenario that I hear, I can say, okay, what if you ask AI to do it, for example, give me the prompt. Okay, ask AI for the prompt, and AI will give you a prompt, and

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So it

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What fundamentally do we need the next generation to know? And I don't have an answer, but I think it's a question that we should all start asking ourselves with AI sort of changing the landscape of things.

07:22:10

Colleen Wayne, Texas A&M. Well, I've got happy news for all the colleagues here. Industry is trying to wrap their heads around it. We hosted an ABET review panel like a few weeks ago, and it was with tech

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managers and tech practitioners in companies that you guys have heard of

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It was a wide range from complete dependence

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tubes, healthy skepticism. They have... they're also trying to search. And so, one thing that

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I try to emphasize in my classes is

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for students to learn how to effectively supervise these AI agents like, for example, the gentleman from industry, it's more on verification and validation, which is

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the whole quality assurance movement. And the main tenet of quality assurance is to be able to understand the customer's quality objectives. And it's not just correctness, whether it meets requirements. There's a lot of things, integrity

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maintainability, which is the longevity of the code, and have the students be able to understand and articulate the process

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For them to be able, like, for example, to fulfill maintainability. And they need to be able to know these rules like maintainable code is something that has, you know, a function that has

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500 lines of code maps, and has good variable names, and they need to be able to vet AI and know the company rules for quality code, for example. So that's my whole focus is being able to set targets

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And then have them explain the process.

07:24:05

Okay, I got an idea for this learning objectives thing. That's a little bit provocative. And that is that instead of teaching students how to solve the capstone problem, we instead teach students how to find the capstone problem

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And that that's that problem solving is a commodity with AI and instead you teach students how to talk to customers, figure out

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What are the functional requirements for customers constraints

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And this is a special

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skill that you can define the problem well. Maybe it takes a month out of the class, so one out of 3 or 4 months is now focused on problem definition. It's a totally shifting of the priorities in Capstone because of AI.

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I'm already doing. Okay, cool.

07:24:58

Hey, who else has all the answers to this? Oh, come on. Yeah, here we go.

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So I do agree that industry is struggling with this, especially outside of the tech, right? Outside of where they're building these things. Other industries are worried about how they're going to use this. So, I mean

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We're in BioMed, right? I just counted up

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Quickly, 7 of our 35 projects and an AI component in the solution, in the product, right? Machine learning, AI, large language model. That's what the industry projects were coming to us were asking for solutions

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That used AI. So they're giving us back burner projects, things they're worried about, things they want to do, things they don't have the right people to do.

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So we're in kind of a driver's seat from a perspective on some of these, right? Because they're lost

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They don't have people on hand who know how to do this. So it could be a real advantage to to catch some projects. And then I think, too.

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In the end, I think it's going to change about being a good engineer is. Like it'll shift the balance, right? There's kind of this

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Balance and engineers, right? There's a really hardcore focus on a problem, grind out work kind of engineer, right? And then I had a bunch of guys like that. And then I had a few guys who were architectural kind of guys who

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Didn't do much of the detail work, didn't really care about that, but they changed products.

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You know, specifications into product concepts and to develop those kind of things. I think that the balance is going to shift away from

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A hardcore trying things out because machines are going to get better and better on federal pretty soon

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It won't pay enough to do

07:27:01

Hello, I'm Stefania from Texas Tech University, and I just wanted to comment on something I arrived a little bit late, but I have been hearing everybody. I think as a community, we first need to agree on the purpose of capstone design class because, for example.

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leaving my opinion or at Texas State, our main purpose is for students to learn the design process. Then we're going back to your comment of, you know, why are you doing this? Why are you using this criteria? Explain me why versus if we're, you know, the main purpose is

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To build a product that is great for the sponsor and is mostly on the product scenario, then AI has a little bit more talk in it. Like we use AI for the final product, how much we use it.

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So as a community, I think we need to agree a little bit on what are the main or the three main purpose behind a capstone design class.

07:27:58

This was also a question that I asked in terms of the multidisciplinary or the multi-department, like, what do you want your students to get out of the capstone class? Yeah, just wanted to point that out. If we can agree on a purpose, I guess we can get the AI

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Don't be fair.

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Good morning, John Proschel from UT Dallas. As I was talking with the team

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The student team on the Bard navigation tool

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They shared and I second the comment about using AI to help find functional requirements because the project given to them was not well defined at the beginning

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And it took a number of iterations to really understand what they needed the solution to do, and that consumed so much time that they literally never even had a chance to test it on writing the BART train before

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Their time was up.

07:29:09

So as I'm thinking of using AI in senior design, I think one of the main things that I would want the students to get out is is learning not to implicitly trust everything you get out of the AI

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Right? And so maybe using AI to generate what's what's a good assignment

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Teach

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you know critical thinking of what the AI gives you.

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I think that's probably a big one. And then I think the other thing would be what are ideas where it makes sense to expand use of AI, whether it's generating functional requirements or maybe it's modeling stakeholders

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Creating user personas for, you know, generating user needs

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Creative ways that can like almost like here's you, you know your

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Secretary Assistant who's, like, doing all this work for you, and now you're sifting through, and I'm like, which ones work for what we're doing

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That tees up my next question really well, so don't lose that, but I want to let this gentleman speak as well.

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Yes, I'm Michael Robloff, Ohio State. So the question was on learning objectives. So for my honors based multidisciplinary capstone, when it comes to verification and invalidation

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have learning objectives that are kind of stated like students will be able to generate appropriate software and or hardware tests at the unit component or system levels while incorporating software begin to be practices such as test driven development, need to make sure that all prompts go back and refer to

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To the plan every single time it does a should have released testing by independent groups connecting tests to original requirements. All prompts should always have to go back to the original plan specification document that if

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The AI generator students generate and it should define acceptance criteria, which again, it always has to refer to for every bill for every deployment.

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And it should be, and of course you should generate a rubric

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that you are evaluating when students make these. I'll use a sprint-driven methodology, so they will be turning in MVPs every two weeks. So there will always be a rubric to evaluate an intermediate product against. So

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At the end of the day, you know, and that's just one of the requirements I have in there. At the end of the day, all the student teams will have, in my case, because it's what Ohio State's approved. They will have Amazon

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They'll have a cura counts, which is kind of like claw code, but Amazon version of things. And so I can see from a log standpoint that the prompts are, right? They could also turn in these prompts

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And it's just going to become part and parcel. Right? Working production systems are table stakes. So process does become more important. Their ability to critically think and explain that becomes more important. And yes, if they are unable to articulate

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In formal report outs, their critical thinking processes, yeah, it's going to be an issue. So I think that's

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Any other reflection from the panel?

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All right, anybody else?

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Okay, so here's my next question. When I first saw what the topic of this

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panel session was the use of AI tools

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I didn't think so much about mitigation

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I was thinking, okay, I'm really interested in hearing what other people are doing around the country within their capstone program to

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Get its students to engage with AI in a productive way to help prep them for industry. And a couple of people have already alluded to this idea. Are we

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When we're creating an assignment that says, hey, students, go use AI to accomplish this or students, go use this AI tool to do that or to achieve this learning objective or whatever. I'm not really doing that yet within our capsule program. I'm genuinely interested in hearing

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But others have started using tools, creating assignments, or prompting students to specifically do this for a specific learning objective or something like that. So I'm really curious to hear what our panelists have to say about that, and if there's anybody else out there that could share specific strategies that you have been using to

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Proactively get your students to start engaging in AI tools with some form of purpose or objective.

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One of the things that I find challenging with students doing design is that they like to skip over the stakeholders. And so one of the projects that I'm involved in is with the mechanical engineering department. It's not capstone, but it's a design sequence

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200 level, of course, so sophomore level, and the team of instructors have created these AI chat bots as different stakeholders. So then the students can go and interview those stakeholders to get the design requirements, and there's different stakeholders, and depending on who they talk to, and depending on what their prompts are, they may get different conflicting information, which is another

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core, you know, skill that you should have in terms of design. So, by generating these AI chatbots, the barrier for finding stakeholders is now almost minimal. The students can then

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you know, interact with these at 3 AM whenever they, you know are actually doing their their assignments and things like that to, you know, work work through the design process and take that information. So that's one tool kind of on the instructor side that you know has the students kind of engaging with

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in AI interface there.

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Go ahead. All right, for my honors interdisciplinary Capstone course, we are having students use this program called GPT for All.

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and it's a localized one, so it stays completely on the students computer. So no data privacy issues coming from it. So they're not open source, basically. And what we have the students doing is we're having them

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Research

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green design and trying to implement that into their project. But the issue we have is we do that during the second semester of the course, in the middle of it, so they've already figured out basically what the solution is going to be, so it's really hard to get them to shift focus and try and implement this. So what we do is we have GPT for All come in, and they write a prompt that's very detailed. They also provide

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70 to 100 sources that they looked up themselves. And they're all unique and 30% of it is peer reviewed journal articles, 30% is standards and regulations, 30% is industry reports, and then 10% is just general reference materials. And what they do with those is they plug it in to that library

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They then run that prompt and it gives them this output, which they take and they try and implement some of the outputs into the project. That way they're not having to start over from scratch to implement these things, but they're able to keep moving forward with progress and not lose any steep

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So that's just one key design. Sorry, green design. So like sustainability, stuff like that.

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All right, I'm a biosystems engineering major now.

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I do all sorts of things with, like, circularity green design, so that's, like, my favorite lesson to teach.

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Previously, I used to let them, let's just do a lot of work outside of the classroom

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So, for example, if I need to just survey students normally kind of do it at home and then bring their survey to the class. Now I don't let them do it.

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They will hand you everything in the classroom because we have three hour class

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And then

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They need to... so they will be using AI in my personal sense under my supervision. I will not let them kind of use AI outside of the classroom, say anything. So what kind of the things that they use, they do the prompts and the AI outputs, they need to lock them

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And then I sort of certify that that's genuine. And anything other than that, I will not accident

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the way that I use is this. For example, latest survey that I kind of in the first class, I asked them to use AI and generate

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comments that they need to research. And once they generate those comments, I go through those topics and then try and have a discussion with teams, and then kind of selling certain topics that are relevant to us. And everything generated by AI, we

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You will not simply accept without a review

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And after that office must research, and they they prepare their research document

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And then we go through that research document and then get, okay, understanding of what is in there, and then we feed that document AI and get a treaty. So we have two different documents now

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And then we can compare those two documents and then incorporate one to the important things might be made by AI.

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So that is how we do it. So, we implement the same process in TMP and EDS as well. When you are developing engineering design specification, you can feed the project requirements and

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Ask AI to kind of copy the design specification, and they do need to look at those design specification, and then see whether

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The specifications are really valid to your course. Sometimes the AI cannot specifically identify the operating conditions, and then they cannot provide specific details because engineering design, specific edition, specific it should have specific details

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So, for those types of things, you need to get involved in. So AI is capable of producing a general document, but you need to work on that document and then upgrade it.

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So that is the start of AI models that we have right now. Now

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Keep in mind that these models are using UI inputs to improve their models, as I said. So in about five years time, the AI models can basically be completely different

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So that we will have a very big thanks, because you are not only a capstone instructor, but you are going to be an enforcer of how you use AI in your classroom design.

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I can see that the counselor is an instructor will have a very big role in future other than just teaching the course

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All right, that one here, what other tools or

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things that people are proactively using in their capstone courses.

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Hi, Dan Wazlewski from Ohio State. So in my past life, I worked at a product design consultancy. So we had a lot of really talented designers that would help us visualize and help with visual communication.

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We don't have that in capstone with a button, depending on what group you're in, with a bunch of engineers. So I think the biggest thing that I push for is using it for their visual communication, helping with renderings, helping with log throughs for user manuals and things like that with their product in context with the people

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how they're using it, or just helping with the front end user interface and things like that, but being able to use that as a visual communication tool which that they're not trained or practiced in and it just gives a little more polish to the projects that they aren't going to have otherwise because they don't have that skill set in the classroom.

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So just building on what Dan mentioned, right? So Dan was kind of highlighting that using AI can help extend skills that they may not possess. So graphic design, communication. I like to use it to fill the gaps in the experience that they don't possess. So biz novices, they don't even know what they don't know

07:42:01

They don't know what questions to ask. They don't know how to poke and interrogate and kind of push back on their ideas. So being able to engage with AI and say, here's my idea, what are 10 issues you find with this particular concept? And then have them actually evaluate and say, oh

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Three of those 10 are actually worth it, you know are real risks or real things that we need to be thinking about. That's a really good use of that AI, because it allows them to get outside of the limits of their own knowledge, of their own skills, of their own experience. You know, similarly, when we talk about using stakeholders, right? Think about if we were working on projects with a developing world. Most of our students have zero experience with what it's like with the infrastructure

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the culture, all of these kind of other elements that go into that type of project, they can at least get a simulated version with that AI stakeholder. It allows them, again, to get beyond what their limitations are in terms of their experience, in terms of their skill set, in terms of, you know, wherever they may be coming from. So

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A lot of the, excuse me, a lot of the assignments integrate again, using it as a coach or using it as a kind of constructive, critical element of their process.

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That was great about filling in the gaps. I do a method called the three intelligences method where the students do something independently. They pull together collaboratively, and then they get the informed intelligence to see where the gaps can be filled in. And we did that for meeting the client. What do you do to before you meet the client

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What's your agenda and how will you follow up. We have them do that independently. I did a workshop a couple of conferences ago, and a paper on the three intelligences on meeting the client. But now we do independently

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Collaboratively in your team to see how you align with your team members and how they can fill in the gaps and how you need each other, because you didn't all come up with the same ideas. Then we tell them what we know that the clients want, and then we have them go look in AI

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And then they say, oh, I got most of what AI had, but I didn't think of IP or finances. And so it's a great supplement, but we don't want them to go to AI first so that they get the exercise and then it fills in for them. And they also see what AI missed

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Within another hand, Brent saying

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Thank you.

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I have a question actually regarding I've been hearing a lot of tools used here, and I'm curious to know what access do you have as faculty to AI because we have limited access and they would love to have more access to corporate

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Approved access to AI so that they can use some agent that can help me, for example, point students on teams. But we don't have that. I'm curious to know what are you using actually and what students, what access students

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This corporate license for that

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That's actually a completely fair question in my mind. I'm curious what people think about that looks like

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Yes, I will jump

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So I'll talk about the students first. There's been a lot of talk with faculty, you know, colleagues at the University of Illinois that the paid version of ChatGPT or whatever is the new Netflix sharing password. And so, it is very, very strong in terms of

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And you take a look at what the free version can do and what the paid version can do. And there was a study that, you know, someone took their 200, 300 level course and did so sophomore junior level course through all of the prompts, homework, exams, etc. into ChatGPT, the free version, and

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a B, you know. So it's definitely the tools are out there, you know, if the 3 version is can do that. You can imagine what the pay version can do so that's where the students are. And so this actually is a very

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Delicate topic because now we're talking about inequity, right? You know, and you're talking about, okay, you know, where can we level the playing field? And so that's something that is challenging for us as instructors because I don't have a solution for that yet

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In terms of what faculty, I know that we at Illinois have a like an enterprise license for Copilot with our

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Microsoft's suite of stuff. We are very fortunate that we have a national supercomputing application center actually on campus. So they have their own Llm farm there kind of thing. They've got, you know.

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Illinois Chat, so we, like, can make the little, you know AI chat bots and things like that. So everything's in-house. We don't have to worry about FERPA and things like that, which is fantastic. So that's I know we are kind of lucky, but I don't know. I know that's not ubiquitous across the board. But that's

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I have, and kind of in there

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Hmm.

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I just wanted to go back and I don't want to detract from this, but you're talking about what tools you know we use. So I'm in the mechanical engineering department, and so I know a lot of folks are software folks, and you folks are... your job is to make sure that the software

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Stuff is done really well and so on. But for mechanical engineers on our product, we don't really care what, whether you wrote the software. We let you have three ring to Claude and Claude's granddad, or can make you write the best software

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All we do is we hope is that you... because that's not what we are interested. We want you to build the best, best product

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So we want. So for assigned I realized for different departments, it's going to be different right for a software thing. That's everything. That's your bread and butter for us. That's a means to an end. So for us we want to make sure you use that time to properly said.

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To properly validate, verify, validate, and prove that your product works. If the rep doesn't work, it's mostly because your software is bad.

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So go back and fix the software, but if this group care about how. So we have been freely advocating use of AI software in mechanical engineering because

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That's not what we are. That's not what we are trying to teach you how to make software. So it's different for different departments where you are freely doing that. And I think similarly, in a couple of years

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riding is going to become... we're going to be totally... we are not going to be able to tell anyone. Writing is going to be... that's how we are not going to say, don't use AI tools, Grammarly, or whatever. Everybody's going to use tools, just that we do in real life.

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And the other thing I was going to say was, I think that we might be underestimating the knowledge that our students have on AI tools

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I don't think we have nearly as much knowledge as they do. Let's be happy to accept this. And so to us, for us, we are kind of thinking, oh, you know, we are going to be like your thing. In some cases, they may be the ones who need to

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Tell us how they're using it before we even figure out

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I feel that they have access to higher versions, either they're paying for it because they think it's worth it. We are not faculty at all. We don't pay for anything and we just use a free version. But students, it was 30 bucks a month, oh man

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They are paying \$50 for a week for textbooks, right? They think of it as just chalk it up to that. And another thing is companies, companies are giving students

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Advanced tuitions for free

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They know these beta users and some of these students who are very are giving good feedback back to Anthropic and and and and open AI are getting free versions of more advanced versions than even are out in the public.

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And so I think that in a lot of cases, they are

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Using them more that they know more about what's

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possible that we

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All right, so the answer to the question on the tools, so at Ohio State, we're very privileged, although it's a very cumbersome process to go through. I have AWS and Azure accounts that I can regularly use on a monthly basis. So AWS gives me

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allows me to access Hero accounts for my students, which is basically the Claude coding equivalent. So for them, and so for my capstone, I can give them accounts at \$20 level, a \$40 level for

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One, 2000 tokens or a \$200 a month level for 10,000 tokens, all right, depending on needs. For Microsoft and then Amazon AWS has for the actual apps that they would build or the software infrastructure where they need to use AI models

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They have a whole ecosystem called Bedrock that they can use to build those capabilities. Now, obviously, you wouldn't want to have a Claude Opus 4.8 model in your production systems. That would be insanely expensive, but

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For doing the design and the development and the verification work, maybe you use Opus a lot, and then you put in some min max model and a production system that's very nearly tow. For Microsoft, they got the AI foundry, right

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Copilot, GitHub get integration is much harder, at least from an Ohio State perspective, in terms of giving students those accounts. So which is kind of unfortunate, because Vs code tends to be on all our system images. So

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And Amazon doesn't really integrate well with that particular ecosystem, but there are ways around it. And also on both like Microsoft and Amazon, you can actually get authentication tokens. So you can use those tokens for something like LLM integration if you know anything about that.

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There's also Google Cloud product services with Gemini and stuff. I'm not as big a fan. Google has a bad habit of trying to end up life their products regularly, so I tend to stay away from Google products as a rule, but... or at least keep my students away from them

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But those are just a few of the tools. I mean, I guess, you know, if you have heard the phrase token maxing lately in the news, a lot of that's that's the big thing going around in industry right now, right? If you're not token maxing, are you really using the full capabilities of AI right now

07:53:02

Ohio State.

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I heard a theme of students being allowed to use certain tools, and I got into the word allowed the enforcement part of it

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If we sort of ask ourselves

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can be really enforce any AI usage? I know it's a little bit of a provocative statement

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But if we can't enforce usage, and sure, we can make certain tools available, but students can access other tools or they are given access to other tools, advanced tools

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How do we, I just wanted to know perspectives of others in terms of what teeth do we have as instructors or faculty if we have no capability to enforce the use of

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Unlimited the use of AI means

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Okay, Lionel, I wanted to check with you real quick. You handed out those surveys and have been looking at those pages. Is there any observations that you've made that you want to share with one group?

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Almost everybody says AI and engineering transform design of critical thinking, erosion of creativity, erosion of engineering ethics, and tendency to transfer engineering judgment to AI. Almost everybody says like that

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And can the quality of CAPS27 project content be ensured if AI is used ethically and creatively? And

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Honestly, what I would say is, and should every engineering department develop a formal AI use policy for capstone design courses? Almost everybody is

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Did you use AI to make your question? Exactly. Did you use AI to make the questionnaire? I kind of reviewed it. I asked AI to review it. I kind of deal with all these questions and then I have to kind of three format

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And Matt, did you have another comment? I might have jumped the line there in front of you. Yeah, yeah, yeah.

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So going back to this enforcement question, you're absolutely right. If we try to say you can't use it or you have to use a certain way, the only way that you're going to be able to enforce it is that if you are hovering over the students

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You know, and so then it becomes, are you doing it in class? Are you doing it in a lockdown browser? You know, so where... where do you draw the line and things like that? And I think that becomes

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to administrative and to restrictive, and then it does not fit the overall goal of my capstone. I give them the tools. You know, there's a toolbox, you know, has your hammers and nails and wrenches, but it also has all of your AI tools

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You are now the senior. You're going off to graduate. Pick which tool you're most comfortable with and you want to get the, you know, learn the process and then do that. So if you want to or want to restrict it, you're going to have to, you

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be physically with them while they're doing it. That's the short answer of that

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Hi, Eric Baker from RIT. We kind of off of this is we have a lot of our students are very anti AI. And my kind of question is that like AI is useful to raise the bar

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What is capable from a capstone project is like for my discipline, it's like being able to prototype very quickly increase how many iterations they can get. But, like, how do you set the bar if there might be one team using AI

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And a bunch of leads and not like is it fair to have different

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goalposts for different teams, and that's usually how much are they using it. And, like, anyone thought of, like, is it fair to judge one team differently if they use AI, or do you judge the team not using AI so they're slower

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Again, someone who is using AI

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So one of my big takeaways from this is how I'm going to change my first assignment in the class. They're assigned a team the very first day of class. In the first week, they do an assignment called project understanding where they give their before they've met their industry partner, they've just read a couple of paragraphs

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What do you think this project build is going to be? And what is your role going to be, is basically what the assignment is. What I want to add to that now is, how do you propose to use AI in this project?

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What tool do you think you will use for that? And how do you... how will you protect the confidential information of your industry partner while using this tool

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And how will you verify and validate the output before incorporating it into your assignments and project

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And also in there, put our policy, our disclosure statement that we're expecting them to use, because I find they don't read the policy, but they do read assignments currently. So if I put the policy in the assignment, maybe they'll actually read it.

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All right, we're done with just a couple of minutes left here.

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Just some reflection on my part. I really appreciate everybody's input and especially our panelists that over here.

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To me, there's 3 things that really jump out. Number one, it is

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It's sort of reassuring to be in a room of people from all over the country that are all wrestling with this challenge in some capacity means I'm not alone in how I'm thinking about this. It's also interesting to see that, you know, based on the disciplines that y'all are

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computer science, mechanical engineering, so forth. The challenges are different even from discipline to discipline, which means maybe the answers are different from discipline to discipline as well. Not sure, but it's interesting to hear the different perspectives

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And that there may not be one single answer that's all-inclusive for everybody. The other thing is I am walking away from here with

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tangible ideas like that one of how I can start being proactive and using AI and capstone the things that I could do in the fall. I need to marinate on them what I want to do in my own class, and I hope that you're coming away with some ideas and thoughts about what you could do in your respective classes

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This fall or whenever you're ready to implement them. And as a result, to summarize, I think this has been a healthy, informative, and interesting discussion that for me personally has been very productive, and I hope that you all feel at least somewhat the same way about that. So once again, I want

08:00:08

Well, let's please thank our panelists

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And I thank you all the audience members as well. Almost everybody in here has had an opportunity to speak. Really appreciate that. And it's 10 o'clock. It's time for break. Thank you.