Mary Loder: Welcome to Core Stories, produced by the Instructional Design and New Media Team of EdPlus at Arizona State University. In this podcast, we tell an array of course design stories, alongside other ASU online designers and faculty. On today's core story ...

Ryan Muthe: We want to get all of these students that are in trouble and they're not asking for help, because a lot of them won't. To have the experience of what would normally be like us walking around a lab where you're looking over shoulders and you'd see a student that has like struggle face and you can tell the pressure is just about to, they're just about to snap, or about to give up. And you're like, "Oh, what you working on? What's going on here?"

Phil Miller: Nice.

Ryan Muthe: And you want to have that conversation and we want to have, That's part of the manifesto, right? Yeah. What would you do if they were sitting right here. So how do we get that in online?

Phil Miller: And I think it has this effect on students that maybe they feel less alone in the course once they know that someone can see what they're doing. And if someone's taking the time to look at what they're doing, that shows that someone cares.

Mary Loder: Hi, I'm Mary Loder, an instructional designer from ASU Online.

Ricardo Leone: I'm Ricardo Leone. I'm a media specialist at the same place.

Mary Loder: Yeah, we work together.

Ricardo Leone: Let's get on with the show.

Speaker 5: Okay.

Mary Loder: Oh my God, it's been so long.

Ricardo Leone: Wait, did you move the mic or something? Oh, did I? Can you scoot it a quick bit closer? There we go. Okay. Hi Mary.

Mary Loder: Hi Ricardo.

Ricardo Leone: How's it going?

Mary Loder: It's okay. Did you hear the news?

Ricardo Leone: What's the news?

Mary Loder: They're tearing down the vine.

Ricardo Leone: Oh yeah.

Mary Loder: I mean, but our last episode, we were at the Vine. It wasn't even that long ago and now they're just going to tear it down.

Ricardo Leone: Yeah, well, I mean the last time, our last episode of last season one, we also talked about all these big plans about doing interim episodes and we didn't do that.

Mary Loder: Okay, fair enough.

Ricardo Leone: I think if anything, it's our fault that the vine is being torn down.

Mary Loder: It's because we didn't follow through on the interim episodes?

Ricardo Leone: We didn't follow through on the interim episodes and we apologize to you listeners and how this has affected your lives as well.

Mary Loder: Gosh you were looking forward to it weren't you?

Us two. We'll get to it.

Ricardo Leone: So Mary, let's remind people what the show's all about.

Mary Loder: Oh guys, welcome. This is Course Stories. It's a podcast. That's what it is. And we talk about courses and the design of courses and we do that alongside the actual instructional designers, the faculty members, the media specialists, and give you a behind the scenes look at ASU online and the courses that we offer.

Ricardo Leone: Yeah, not only will we be doing that, but we'll also be interjecting with some info and other things. Even for this episode, we've got a whole separate interview with Jill Rotor that's going to be included in it.

Mary Loder: Oh, so happy she said that she would come do this with us.

Ricardo Leone: So Mary, what do we have to look forward to this season?

Mary Loder: Well, we definitely are going to have a different season than last season. So we will be talking to Alicia Montalvo later in the season around her course for fitness and flexibility. Very cool course, but also extremely cool design decisions that could be used anywhere. So highly recommend tuning back in for that. Also, we're going to be talking with Christie Raschke about misinformation and society. So that could be fun, I mean it is fun. I was in the recording and just time travel wise. I know it's fun guys. `.

Ricardo Leone: Right?

Mary Loder: Tune in. And then we're also going to be speaking with some people from GIS and probably going to be eating or drinking with some Italian professors and discussing food and how it's so important.

Ricardo Leone: The Mediterranean lifestyle.

Mary Loder: Yes. That's going to be my favorite episode, I'm pretty sure.

Ricardo Leone: I'm pretty sure too.

Mary Loder: And then who knows? But right now we are going to be talking with Ryan Muthe and Phil Miller about CSE 110, which is introduction to programming.

Ricardo Leone: So like computer programming.

Mary Loder: And this is the class that everybody has to take.

Ricardo Leone: Oh wow.

Mary Loder: This is the one that people call the weeder, the weeding class. You have to go through it and you need to know these concepts because everything else builds on them. And so you need to do well because everything else builds on these concepts. So it's kind of hard.

Ricardo Leone: So they have to make it kind of universally accessible to everyone.

Mary Loder: Yes and interactive because, I don't want to fall asleep reading tons of books, so it's completely interactive. It's really cool.

Ricardo Leone: We actually move this to be the first episode of the season because we wanted to have it as a big shining example. So let's get onto it. What do you think?

Mary Loder: I'm in?

Ricardo Leone: Let's do it.

Mary Loder: Okay. Well I'm Mary Loder and if you're listening to this, I hope you've listened to other episodes and you probably know that I'm one of the members of the instructional design and new media team at EdPlus and also the co-host of Core Stories with Ricardo Leone. And today I'm also the interviewer along with two amazing faculty out of SKAI, the School for Computing and Augmented Intelligence.

Phil Miller: Augmented Intelligence.

Mary Loder: Intelligence. Augmented intelligence. Thank you for closing that for me. Let's have you both introduce yourselves.

Ryan Muthe: My name is Ryan Muthe. I'm a senior lecturer in academic and student affairs and the sky, the School of Computing and augmented intelligence. I've been teaching for 13 years, mainly focused in freshman engineering and intro computer science and embedded systems.

Phil Miller: And I'm Phil Miller. I'm also a senior lecturer in Academic and Student Affairs in the Fulton Schools of Engineering. I've been teaching computer science courses for a little over 20 years now. Introducing computer science and programming to new students is my absolute passion.

Mary Loder: I know this to be true. It is not even a small statement. A true passion coming out of Phil and all elements of this course and you as well, Ryan, but let's be honest, Phil, you've got the passion cake.

Phil Miller: A Little maniacal maybe.

Mary Loder: I mean in the best way, but also boundaries are good. We're going to make sure that you'd have some self care when it comes to inscribe.

Phil Miller: Cool.

Mary Loder: Well I feel very lucky in multiple ways. One that you both said yes to coming to speak on the podcast today because I think the more faculty who you hear about your experience and your passion, the better. You two are exemplars in my book. I really have appreciated working with you over the last year and a half doing the redesign for this course and this course has been around for a long time, so we'll have a lot to talk about. But very cool that I get to interview you both and even cooler that I got to be a part of the project. So big shout out to Jill Rotor for Loop and me in when she was like, "Okay, I'm tapping out. I'm going to a different project, I'm going to tap you in", and I was like, Yes, put me in. Can't wait for so many reasons.

Ryan Muthe: Well, we're super excited to be here and talk about this class that we've been working on for a while. Six years, seven. Yeah, six years, something like that.

Mary Loder: A true passion project. Truly, it comes through in so many places. That's obvious to me and I'm sure to your students. So tell us about this course. What's the history of the course?

Ryan Muthe: So this is CSE 110 Principles of Programming and it's really an introduction to programming for people that have never taken a programming class before and an opening to a career in programming and just to make it sort of approachable for everybody.

Mary Loder: This is one of those required courses in the program, correct?

Ryan Muthe: For computer science majors and actually a lot of other disciplines around campus. It's a required course for a lot of upper level classes.

Mary Loder: Yeah, absolutely. And it lives in many spaces at ASU. So it lives at ASU online, that's why you're on the podcast today. But it also lives in our universal learner courses. That's a lot to say. Yeah, ULC, that's what we call it instead, it lives on campus in a hybrid form. Any other ways that this course lives out in the ethers?

Phil Miller: Right now? No. But in the future, yes. I mean this all fits with our long term goal of making this a high quality accessible course that gives an authentic college level experience. Introduction to computer science and programming for everyone. Right now that's everyone at ASU but in the future we'd like to expand it to the community colleges and high schools and anyone else who wants to use the course as well.

Mary Loder: This would be a great high school course for students who have that kind of mindset and want to get started before they come here. And I'm sure some actually do in our universal learner course design.

Ryan Muthe: We Had a whole high school class go through it. I think the last time that we ran it, the teacher was in the class with her 30 students.

Mary Loder: That's so cool.

Ryan Muthe: And they would send us little like Q and A things and say, "Hey, my student is struggling with this", and all kinds of stuff like that. So it's really awesome to see, even now they're just sort of adapting to it and trying it out and figuring out how it works for a lot of different populations.

Mary Loder: Well, a lot of different populations means this must take all of your time unless you have a strategy. So hopefully you'll share some of the strategies you've put into place because this course has lived for a very long time and gone through multiple iterations. It's currently under an iterative design using various specific tools and under unique partnerships. So feel free at any time to talk about those and the experiences of adopting new technology, because that's always a scary space for anybody and you both just jump right in.

Phil Miller: I would say we don't jump right in. We did when we first started on this course in what, 2016 and we were reaching for the sky and we were reaching for things that I think didn't exist yet. But the most recent iteration of this course, we've taken what we've learned in the years that we've tried to design a course that we've envisioned and we have settled on an existing set of technologies that we're using now. Let's see if I can enumerate them. It's Canvas as the LMS, inscribe as the online discussion, zyBooks as the online interactive textbook and the zyLabs as their online coding and auto grading utilities play positive for labs, play positive for labs, so we can make those videos interactive and I think that's the stack that we're trying to stick to right now. And we're trying to resist in

including any additional technologies because it does add a lot of complexity to the course. And we're trying to keep this simple, scalable and translatable to any other institutions that want to use this.

Mary Loder: So to give us some background on this course and it's history, the stories history, we have Jill Rotor, who is one of the managers over in our...

Jill Rotor: I'm actually principal instructional designer and I'm under IDNM.

Mary Loder: Well, I know you're under instructional design and new media team, the team that we're on, but it's so confusing. You do such cool projects that are out on the outer edges.

Jill Rotor: I'm currently working on the Dream Scape Learn virtual reality project for the biology curriculum.

Mary Loder: You are the archival specialist of CSE 110 on the instructional design and new media team. So we've invited you to give us your historical perspective also to gush about Ryan and Phil cause who wouldn't. And so I'll just kind of turn it over to you to tell us your involvement in this course and a little bit of the history.

Jill Rotor: Sure. We started working together, Ryan, Phil and I, and a bunch of other instructional designers and we'll get to who the cast and crew was in a minute. But this was back in 2016. It was the second course I believe that I had designed for the Global Freshman Academy, which was this open scale initiative and partnership with edX and ASU. The sheer magnitude of what an ambition of what we were trying to achieve and it being the second course that I was working on in my time at ASU. All of that taken together made for a very interesting experience in all of the best ways you could imagine. So we met Ryan and Phil. They came with an agenda to the meetings. We had our agenda, they came with theirs.

They were extremely well organized and they had a very clear vision for what they wanted to do and how they wanted to reach learners worldwide. All stripes, you name it. And really have that inclusivity in the discipline in terms of the types of learners that you would see and retention in mind. That was the first part of that working relationship. I would say the second part is that they embraced the fact that there were constraints in the learning management system, there were constraints in terms of budget. Originally they wanted to have this course be a year long. We compromised at 15 weeks.

Mary Loder: Oh, we've got it down to seven and a half weeks and five and a half weeks in the summer. I mean I don't know who that caters to, but it caters to somebody because the seats are filled and we offer the 15-week two and they still choose the five and seven weeks. So I don't know, feels torturous.

Jill Rotor: Impossible that's all I can say. I just remember the shortest distance between two places is to not go.

If you're thinking in those terms. And if you're thinking of a student who is enrolled a ASU versus the Global Freshman Academy where these were not matriculated students. They were either looking for transfer credit or they were looking for professional development or maybe they were looking for credit for whatever reason, but they weren't enrolled in Arizona State University. Their time was a little bit different. But the idea, like you're saying Mary, is that it's really difficult to compress all of this content and concepts into a five or seven and a half week period in a meaningful way. And that is a huge challenge I think, for the faculty to reconcile. And it's challenging for the students to keep the pace.

Mary Loder: It is. I think it's hard for everybody, but I also like that we offer the options so that if you are that kind of student and you have seven weeks, five weeks to hustle and get it all in, go for it. Or maybe previous coding experience and so that those baseline foundational concepts aren't as critical because you already have them. And so yeah, it's just choose your own adventure, which I appreciate and we didn't do anything accelerated in the Universal Learner co courses. Those are still 15 weeks. It's just the ASU online where you have additional options.

Jill Rotor: And I think that that's really important because everyone's coming at it from a different experience level with their own, bringing their own knowledge skills and abilities to the table and also their own drive.

Mary Loder: One thing I will say is it didn't change the course. The course is the course.

Jill Rotor: No, no.

Mary Loder: The contents, the content, The assignments are the assignments. Nothing's changed. If you join the seven week to the five week to the 15 week of them are the same, you just do it. Right.

Jill Rotor: When we first started working together in 2016, we quickly realized that we were going to have to mobilize the entire instructional design team and the web development team and the new media team. They were doing field shoots and we were figuring out, well, we can't send them to England to shoot at the museum there, but we can green screen and we had to mobilize a lot of resources. And given that Ryan and Phil's enthusiasm was so infectious people, they were on board, they didn't see it as work.

Mary Loder: Oh, that's because they do so much work. When you said they show up with an agenda, they don't only show up with an agenda, they show up with a list of things they had written for themselves to do and then how they did them all.

And now they have another list that they're working on, they just never stop. It's amazing how much passion they have.

Jill Rotor: There was no saying no to them. There might have been levels of yes, where it was not now necessarily, but just that sheer encouragement that they gave to us. We believe in you, we believe in the team. That was something for me, especially being so new at EdPlus it gave me the competence to say, all right, we're going to do this hands down, we're going to find a way to get it done. We've never done CSS in the open edit environment. We had someone on staff, Kristin Bushong, who was amazing and awesome and she was able to facilitate that piece of it. Someone else was responsible for making sure all of the readings got in, someone else handled the videos, everybody just banded together. And what we ended up having to do, and this is where I kind of came into it, or one of the ways I came into it, is it had to look like it was built by a single hand.

So I put my developmental and copy editing and instructional design caps and project manager caps on, and we had our meetings. We made sure that things, it was a well-oiled machine. Things were moving through the pipeline and that the course itself was as clean as possible. When students came into it looked like it had purpose in its design. It looked like the time was taken to really just get it all right. And you don't always have that latitude when you're designing courses. So it was really a unique situation. You might call it a perfect storm, but a lot of things came together and it was intense, but it wasn't, in my recollection, down to the wire where you were wondering if it was going to happen. We knew it would happen. We just were mobilizing to be able to make it so.

Mary Loder: Well, Jill, it's been my distinct pleasure to have worked on this project. So thank you for tipping me into the project and allowing me the opportunity. And thanks for sharing your perspective and the history.

Jill Rotor: Yeah, I was really happy to be a part of it and I'm really glad that the course is in your wonderful and capable hands and that the legacy in life of it is going to be carried on into the future. So thank you very much for including me.

Ryan Muthe: So when we first started designing this class, when we were asked to develop it, we were not entirely sold on online education at the time. So we kind of went into it with, if we're going to do this, we're going to do it differently and I don't know if we still have it, but we wrote a manifesto about what we wanted the experience to be like...

Jill Rotor: Amazing.

Ryan Muthe: And it was really like we started with what is the ideal student learning experience and it's me or Phil and a student sitting right next to us and how do we guide them through learning programming and then how do we get that

from, okay, we don't even approach that in a classroom. How do we approach that in an online format and make it highly interactive and stuff like that. And at the time, we didn't have built in tools in the platform we were using, which at the time was edX to do interactive coding exercises.

We didn't have Play Posit for making the videos interactive and all kinds of things like that. So we found some tools that were free and we built a bunch of stuff and JavaScript, Phil built a bunch of stuff in JavaScript, I didn't do any of that.

We contracted with some companies to build things custom and it was a huge endeavor and then a few years later we ended up working with a different company that had in parallel been building a lot of the tools that we wish we had had when it started. And probably if we looked a little bit closer, they would've been there but not at the right price. So things have converged, which has really been exciting to see and we've been trying stuff out the whole time. So we had used a different company for our auto grading and had tried a bunch of different things to do that. And really were always looking for whatever's the next big thing that's going to make the student experience better and the scalability and support for students and their learning outcomes better.

Mary Loder: And that is what zyBook book did. It sounds like that was where I came in was because I love zyBook and I've been promoting it across campus. It's one of those interactive textbooks that makes learning kind of fun and you get immediate feedback and everything you do is right there. And then you guys were like, Yes, it is all in the zyBook and we want to put all of our stuff in the zyBook too. And that was just a whole other level. So it was so cool to be included in that. Tell me, what are the highlights of using zyBook? We know it's an auto-graded interactive software, but what else does it do that it enables you to fulfill your manifesto?

Phil Miller: Well, they have a particular philosophy that they follow in the design of their learning activities. And what's the set of words that they use?

Ricardo Leone: Many small Programs?

Phil Miller: Well not just the many small programs but the Say, Show, Do. So they break the content down and this is just what they do with their normal interactive textbooks. They break the content down into these small topical chunks where they "Say" in a little bit of text what they're going to talk about next. Then they "Show" using some sort of interactive that the student can engage with. And then they ask the student to "Do" something that gives immediate formative feedback.

And if the students aren't demonstrating knowledge, they get immediate feedback and they can immediately go back and reengage the interactive or reengage the text. So we really liked that philosophy. They kind of built the tools

and showed us a proof of concept of what it was that we were trying to do when we wrote that manifesto of what would it be like to sit with a student one on one and walk them through piece by piece, topic by topic, demonstrate a topic to the student and ask the student to then you demonstrate your understanding of that topic.

So that's the number one thing that we really liked about it. But in addition to that, they made their textbooks really easy to edit and modify. So things like reordering chapters, reordering content within chapters, placing rich, I mean not necessarily interactive, but fairly rich instructor notes in line in the text, the ability to write custom content in their text. So we now have a textbook that we're using, which is a combination of their original text and about 40% of it is custom content that we ourselves wrote and it merges seamlessly. The students don't know when they're transitioning from content that was written by the zyBooks team to content that we wrote. And then the ability to inline all of our lectures.

The videos are in line and the readings are in line and the formative quizzes and assessments are in line and the coding assignments are in line. So the students don't have to jump from say, Canvas to a textbook, to a coding environment, to a submission system, which was what was happening before, we have a streamlined environment and a much more linear flow for the students to travel through the content of the course. So that was a huge set of concepts that zyBooks put together that was really compelling for us.

Ricardo Leone: Okay. Mary, I keep hearing this term Inline. What does that mean?

Mary Loder: Oh, you mean like the content In-line?

Ricardo Leone: Yeah.

Mary Loder: Oh, okay. So there's learning management systems. Canvas is the one that we primarily use and then there's often these other technology pieces that branch off the learning management system and that can get kind of confusing going back and forth and back and forth. You might miss something or not know what the order was because you jumped ahead when you went to a different spot. So because this is such a content-rich course, and it's really important that the students stay on the path, they've moved everything into the interactive textbook. So you go to the textbook and that's where your course lives for a couple of exceptions, but primarily it's all in the zyBook. So any of the lectures that they've made, any of the inter-activities that they've created, all of that, their instructor notes, little guides for the students, the support system. So Inscribe is another third party. They worked with zyBook and made sure that the students could access their discussion board inside the zyBook and that's not typical.

Ricardo Leone: So they're kind kind of become the source for all of these different third party apps. And the course in general,

Mary Loder: Absolutely cool one book to rule them all.

Ryan Muthe: We're able to assign the reading activities as an assignment and have them do participation grades for that. So rather than hoping and wishing that the students will go home and read the textbook in between classes, we can actually assign, "Hey, you need to do these activities", and the activities are formative.

So they're going to give you the answer eventually or lots of feedback so you can get it and then come to the in-person lab section for the hybrid one or do an interactive video for the online version of the class and then do the homework assignment independently. And we can grade all those things and see whether students are regularly engaging with it and they get credit for the time that they're putting in and get tons and tons of practice. There's hundreds of activities that the students are being asked to do, which is a lot of work, but we hope that they're getting this muscle memory for being able to write code and solve problems and work with these programming principles so that we're laying a strong foundation for the next class and their curriculum that follows so that they don't have any trouble picking up any of these new skills.

Mary Loder: So from my perspective, this sounds like a lot, right? There's this course lives everywhere across ASU, there's tons of students in these courses, there's tons of assignments within the course itself. There's got to be times where students have questions. How is this course able to manage the scale at which this runs and still fulfill your manifesto?

Ryan Muthe: So the support system was something that we wanted to purposely define from the get-go. When we first started, we just had the ATX discussions, which were really terrible. And the reason why is because a student would go and they would have a very poor search tool that would give them basically every article that's ever been written in the thing and not even when you typed in a whole bunch of stuff and then as instructors, we were getting the same question 20 times every day and students weren't searching for other answers from other students. So what we'd figured out was a tool called Inscribe, another third party tool that has a really strong community and threading system and it also has a suggestion system, which is the best thing ever. And we somehow, I'm not even sure how this ended up happening, but we got them to work with the zyBook company so that at the end of every page, at the end of every activity, there would be a link that says "Need help".

Students could click that, it would auto populate the topic, bring them to a suggested list of commonly used discussion threads. And then if they don't find the answer there, they can start a new discussion thread and as they're typing, it's giving a second round of suggestions and we went from having 30, 40, 50

questions per day to 10 or 15 and a whole order of magnitude, many more students in the class. So we're doing less work, students are still finding the answers and we're seeing in the analytics for the community, thousands, literally thousands of views per day, but only 10 or 12 questions per day.

Mary Loder: Super effective.

Ryan Muthe: Super effective.

Mary Loder: I mean just a huge thing to have those two partners come together and work that way. And I've seen it's all in line where you click the need help button, it takes you directly to the conversation about that assignment or that activity. It's already sorting the students so they really have to do very little work. It's amazing.

Ryan Muthe: And it makes us really easy to help these students and find who needs assistance, but it's a living document. So we're carrying the community between semesters and modality. So we've got the same community, the same giant discussion community is servicing our hybrid students, our online students and it's been running since last fall. So it's got this huge archive of questions and answers where Phil is putting in an incredible amount of work to curate them so that it's a quality community.

Mary Loder: True passion project by the way. That's a lot of work to do.

Ryan Muthe: It's an insane amount of work to do.

Phil Miller: But it'll pay off totally eventually when it's built up all the way, it's going to require very little additional effort.

Mary Loder: So true. Absolutely worth the time.

Phil Miller: I do think that Inscribe has probably been the most effective component of the help system that we built for the course. But I do think that you should also point out that the structure, the hierarchical help system that we sort of envisioned and that we've implemented started with this idea of level zero help, which is the assignments and the content should be self explanatory.

If students are coming to us and saying, I don't understand what this is asking me to do, then we should address that directly at the content level. And again, because the zyBook is editable by the instructors, we can do that. And we've done that in the middle of a semester. We've gotten feedback from students that this doesn't make sense and we can go in and make changes to the textbook live during the semester and only the first two students who had this problem see it as a problem and the rest of the students don't know it even existed.

So that level zero concept I think is something that we've leveraged effectively. After Inscribe, we also have what we call Study Hall. So we've leveraged graduate TAs and undergraduate TAs who hold what might be called office hours, but we call them study hall. And we strongly encourage the students to attend the study halls on a regular schedule and offer that as the place where you should be when you're doing your homework. If you don't need help, it's fine, you can just do your homework. But if you are working on your homework and you get stuck and you feel like you need help, it's nice to know that there's someone here right now who can help you. I don't have to necessarily engage the Inscribe community and hope somebody has posted a question that I can find the answer to or post a question and wait for a turnaround cycle.

You can get immediate help. And I think that's been pretty effective. We've collected some metrics on that. And then the long tail of that is the instructor office hours. There's always the opportunity to come to the instructors during office hours every week. And usually what I like to do in my instructor office hours is sort of push students beyond the content in the textbook, engage in concepts that maybe are a bit of a stretch based on the material that we're exploring in the course and aiming at what might be coming after a course like this.

Mary Loder: Lovely. So we got to the ticket system. Yes?

Phil Miller: No, we didn't talk about the ticket system.

Mary Loder: Well that's like my favorite part. Honestly, I wish that we could figure that out for everybody because this idea of the ticket, I'm going to let you guys talk about it. It's so rad.

Phil Miller: That's aiming at the future, right?

Mary Loder: Heck yeah.

Phil Miller: Yeah, that's the frontier.

Ryan Muthe: Yeah. So the ticketing system happened because the zyBook has so many activities and they allow us to look and see from a data dump what the current status of every student is in the class. So I can see if Susan has done activity three on page 12 in chapter four and see how long they spent on it, which is really unique in terms of tooling and data availability and stuff like that. And what we were doing is we found out very quickly when we first ran the class and we didn't anticipate this, that in a normal class, when a student asks for help, if they ask for help in an online forum, you have to bounce back and forth with them about what it is exactly that they're working on and what their current status is and stuff like that.

And often it's something like, Hey, I'm having trouble with problem four and I'm getting this error and usually it's a summary that's about as short as that. So they don't tell you what the error is or what the code is that they're doing or anything like that. So what we were doing is we would say, Okay, I'm going to look at, I'm going to take the student's name, I'm going to go into the zyBook, I'm going to look at their current submission, which is super cool and see exactly what they're working on. So rather than asking, I can just go and look, see what it is that their current status is and then shoot them an answer. So that was very successful, that was going great. Phil started going through and he would page through each of the assignments and look for the students that are incomplete and they've been spending some time on it and he would start sending proactive help to these students and saying, Hey, it looks like you're stuck on this thing and stuff like that.

So to make that easier, I set up a little server in my house that pulls the data from the zyBook every half hour and it looks at everybody's assignments and how much time they've spent on it. And if they spent than half an hour and if their score hasn't increased, then I know that they're stuck. And then I just say, I have it submit to a, have this little script that submits to a Google form and it is a little ticket that says, Hey, this student is stuck on this assignment, they've been stuck for this long and go and help them and then we just go, we watch the spreadsheet fill up and whenever we have free time, we go and email students and stuff like that. And this is a prototype for more proactive help system because your workflow was several minutes per student finding students figuring out the students.

Now it's being pushed to us and saying, "Hey, this student is in trouble and needs some help". It needs a lot of tweaking and it needs a lot of user help. And we want to get, instead of just me and Phil, but the entire support team of all of our TAs and stuff into this ticketing system and be really proactive about it and say we want to get all of these students that are in trouble and they're not asking for help because a lot of them to have the experience of what would normally be us walking around a lab where you're looking over shoulders and you'd see a student that has struggle face and that you can tell the pressure is just about to just snap or about to give up and you're like, Oh what you working on? What's going on here? Right.

Phil Miller: Nice.

Ryan Muthe: And you want to have that conversation. We want to have, that's part of the manifesto, right? However we do if they were sitting right here, so how do we get that in online? And this was kind of a surprise because we didn't plan for it to happen. It was just something that sort of emerged out of availability of tools.

Mary Loder: Absolutely and your innovation, truly. I like it, digital struggle face. Yeah, I think it's so cool and it's actually pretty good data too because in Canvas and

instructional designers, other faculty members who probably time on task, is it really true? Because if your browser's open, the time's not accurate. But Sam over at zyBook confirmed with us that it's like a 10 minute or something like that.

Ryan Muthe: Oh it's even shorter. It's 30 seconds. So when time out at 30 seconds of inactivity.

Mary Loder: Yeah, it's kind of amazing because of the level of interactivity in the book, they actually can measure that by click. So that's so amazing. I love them.

Phil Miller: I think that a system has had some interesting effects on the students as well. Students don't anticipate that we are proactively looking at what they're doing.

Mary Loder: They don't think you even notice or care cause they're this huge class.

Phil Miller: And because the hybrid version of this course is partly online and of course the online versions of this course are completely online and students expect to be sort of alone in an online course or in the online portions of the course. So when they get an email from an instructor saying, Hey, it looks like you're struggling on this assignment, we get some interesting feedback from some of those students Sometimes, occasionally we've gotten like, This is creepy, I didn't know that you were able to see the work that I'm working on when I'm working on it. And I'm not really sure how I feel about it. But your feedback was super helpful. Thank you.

And I think it has this effect on students that maybe they feel less alone in the course once they know that someone can see what they're doing. And if someone's taking the time to look at what they're doing, that shows that someone cares. And I think there's a lot of positive reinforcement going on here. It's anecdotal, we don't have a lot of data on that yet, but this is my suspicions. We'll figure out how to dig the data out at some point.

Mary Loder: Well qualitatively looking at your evaluations because you have shared your evaluations with us and they've been glowing for the most part. I mean there are some that have many things to say but overwhelmingly glowing in reference to the experience. For an online class to have so many connective type of statements. It's a really wonderful thing to see.

Ryan Muthe: Even the negative feedback is helpful, right? Because it's constructive and we totally want to know. It's always very challenging even in on ground class to know what the students are experiencing in their seats as opposed to on the side of the instructor table or things like that. And what their true experience is because you plan it and you design it and hope that they're going to have a certain experience and then getting the feedback at the end of the semester of helps you confirm or figure out where the holes are and stuff like that.

So it's always good to get even that negative feedback and hear what students need and one of the things we're doing this year in the hybrid class, the hybrid class is built so that it's basically kind of a online experience and then they come to an in-person lab. But that's run by a graduate teaching assistants. So they don't actually see us very often. At the beginning of the spring semester we did the first introduction lab that helped a little bit, but they're still more Phil and Ryan, we want to see more.

Mary Loder: I get it.

Ryan Muthe: So what we're going to try at this fall is a community day and optional big in-person lecture thing to try and close the loop on what students are struggling with right now as a community and do some enrichment and fun programming activity stuff. It's not going to be a lecture, it's more going to be puzzle day, muddiest points review, here's some programming news. We don't know what it's going to be, but it's going to be something that's more enriching than it is mandatory and I don't know what...

Mary Loder: Heavy cognitively, right? It's just meant to be fun and connective and...

Ryan Muthe: Yes, it's meant to be fun and connective and motivating rather than sit and listen to me for an hour and a half.

Mary Loder: Which is just not your personalities anyway. So I couldn't even imagine. Would that be streamed? Are you going to stream these events?

Ryan Muthe: Yeah, absolutely. So we're going to do them through a live Zoom session and record them and have a big, hopefully not a lecture hall, but more like a flat-pod-based-workshopy area sort of thing. We'll see what we can get and how big we can get it.

Phil Miller: And that's the hope too, that we can share this experience across modalities in the same way that we share the experience in the inscribe discussion. The community day is a community day for all instances of the course that are running now and hopefully online students will get a chance to meet on ground students and...

Mary Loder: Build relationships, make connections.

Ryan Muthe: And for a sense of scale, the on ground hybrid class is projected to be 2000 students. We'll have another 750 I think in the online classes sections and then probably another thousand in the ULC that is running. And they're all running under the same content, same structure, and they're all invited to community day and they're all in the same community online and all the support systems are shared and all kinds of stuff like that. So the idea is to capital letters teach programming at ASU to as many people as possible in a way that supports them to learn as effectively as possible.

Mary Loder: And it's a true international community based on who's taking these courses, who knows who's going to be in these classes, who would be in your community day. It's kind of a cool experience.

Ryan Muthe: Absolutely.

Mary Loder: Okay, so I'm going to tell you something funny, okay. There is this student who wrote Phil at the end of this last semester and Phil didn't even teach this year. So that tells you people know it's Phil, they love him, they reach out to him and he responds back, by the way. So anyway, Phil gets this email from a student and then is like gushing "I wasn't sure how I was going to do it was my first online course", all the things. This student had a great experience at the end of it and then he also threw in this little tidbit Easter egg. Phil has a varied size beard throughout the entire class. I mean it's epic to the point where another faculty member thought it was a different instructor, it was so cool. And it's like Zi-Zi top style. So enjoy the beard when you sign up. We all did we miss it.

Talk about, if you don't mind, the Maze Runner.

Ryan Muthe: So the Maze Runner came about because we wanted something, we wanted a hook for the class. So we wanted something where students during their first hour with the class will experience programming get hooked on it and then use that as of their motivation for what can sometimes be a slog through the rest of the class. We still wanted to be engaging, but we want them to say within that first hour, I can do this. I'm a programmer.

So what we ended up with was the Maze Runner activity and what the Maze Runner activity is a interactive web based, no code, programming tool where you write code that controls a little sparky, the devil robot that has to run a maze and get to his battery recharging station. And it's all drag drop programming. So you can pick it up in 30 seconds but the challenge is you get a point for every level you complete where you get the robot to the charging station, but you get double points. You get double points, your points are doubled, whatever you've earned so far doubled if you win the next challenge without changing your code. So the idea is to enforce...

Mary Loder: Building upon it. Yes.

Ryan Muthe: Idea is...

Phil Miller: Generalized algorithm.

Ryan Muthe: Yeah.

Mary Loder: Nice.

Ryan Muthe: Yeah, and it's really simple. I mean loops are built in all you have to do is make decisions and tell it to go left and forward and back and stuff like that. And you can just make a list of turn left, go forward, turn and pass the first one. But really it's about is there a wall in front of me then I should turn left and then I should go forward and stuff like that. And figuring out that decision process. This was built by ASU students, so this was something where in our computer science capstone program students are partnering with ASU faculty and industry and we had a team work for nine months to build this thing in a way that we could host it online and do that. So it's not only a thing that's helping our students themselves, but it's an example of a product of what you can do with the knowledge that you build from this class, which is so cool.

Phil Miller: Love to meta.

Mary Loder: It's so good. You mentioned that a lot of students from across the university take this class and it's part of many major maps. What are the specific skills students come out of this class with?

Phil Miller: So I would say that the most fundamental skill and probably the most valuable skill that they come out with is problem solving. So in order to be successful in a course like this and subsequent courses, you need to be able to take a problem specification written in plain English, break it down so that you can solve it in a series or a sequence of well defined simple steps. And while that sounds easy, it's actually a really challenging thing for people to learn. The ability to break a complex problem down into simple steps, list those simple steps in such a way that they can be followed reliably and repeatably to solve the problem. So I think that's the most fundamental skill and the most valuable skill that students get out of this course. Second to that is programming, the ability to do this. And the solution is a program for us that's written in the Java programming language.

So leveraging fundamental Java concepts like variables and data types and expressions in decisions and loops and methods and classes to define a solution to a problem in the form of an algorithm that can then be run on a computer and why do we want to run this on a computer? Well, because computers are fast, efficient, accurate, repeatable. And so for my own experience as a programmer, I try to apply these skills any time in life that I have something that I have to do multiple times and I don't want to keep doing it. So instead of doing it multiple times, I will spend a little extra time to design and write and test and debug a program that does it for me.

And I started doing this when I was in high school in algebra class. So in algebra class and many of you probably had the same experience. You get this assignment at the end of the day, do all the odd-numbered problems with these pages and they give the odd numbered problems because they even ones have the answers in the back of the book done. And what I learned quickly was like, it's like 40 problems and it's all basically the same problem. But they changed

the numbers. And so what I did after I did a few of these by hand, I was like, this is ridiculous. I'm just going to write a program to do my algebra homework for me.

And of course I had it printed out and I turned it in and my instructor was like, This is great that you print this out but I need to see your work. And so I went back home and I rewrote the program to show it's work.

Mary Loder: Oh my gosh, you're hysterical.

Phil Miller: And I did struggle for a while. Is this cheating? And I came to the conclusion that no, it's not cheating because you cannot write a program, you cannot design and write and debug and test a program to solve a problem if you can't understand and solve that problem yourself. Because writing a program is basically telling the machine how to solve the problem. So you kind of have to teach the computer how to do this thing and if you can teach algebra, then you must know algebra.

Mary Loder: Totally.

Phil Miller: That's awesome. So that's, in my opinion, that's the set of skills that you come out of this class with and I think that that is a powerful set of skills that you can apply for the rest of your life.

Mary Loder: Agreed. People will hire you as an efficiency coach.

Phil Miller: Even if you're not going to be a computer scientist program, you're going to be working with computers and the ability to program them to do what you want them to do rather than just to use the software that may be available to do what they can currently do is a huge step up.

Ryan Muthe: And that skill set really applies to almost so many jobs. Almost any job. I don't want to say any job, but

Mary Loder: monotony exists everywhere.

Ryan Muthe: Oh my God. Yeah. Yeah. There's a great website called Automate the Boring stuff in Python. And it's fabulous because it's all about how to make all these programs talk to each other using programming so it can get Excel. I can take a spreadsheet and run it through a script and it sends emails automatically and all kinds of stuff that is really hard to get them to do inside of their own tools but you just write 15 lines of code and it starts spitting out stuff that would've taken me two hours to do manually just through cut and paste. And that's is so common in so many work workplaces and things like that, even if it's not programming.

We had a student come back after our fall run and they said that they work for the library and they were doing a project to figure out what books to put on the shelves.

Phil Miller: And because it's limited shelf space.

Ryan Muthe: Because they have limited shelf space. Do you remember the details of what they were trying to do?

Phil Miller: I remember some of the details. And the library was under construction at the time and so they had specially limited shelf space and most of their books had to go into archives which weren't going to be directly accessible by students. So they were trying to figure out which books should we put on the limited shelf space that we have, which is a combinatorial optimization problem. So is very difficult problem. And with one semester of CSC 110, this student dove in and tackled this problem and actually solved it.

Mary Loder: Awesome.

Phil Miller: And wrote a program that pulled the user data and the student data on which books are most likely to be checked out and most likely to be requested. And how can we optimize the shelf space that we have. And.

Mary Loder: I love that.

Phil Miller: That was exciting.

Ryan Muthe: And we get a few of those stories from students every semester, which is always super exciting. Most of the time they're not computer science students, they're people that are taking the class either because it sounds interesting or because they're like civil engineers and it's a requirement because they end up using some other programming language later, but they're never going to do programming as a career. And they come back and say, this actually helped me do a thing I never would've expected before. And that's always incredibly satisfying.

Phil Miller: It may be the closest thing to superpowers that are available right now.

Mary Loder: Yeah.

Ryan Muthe: Yeah. It's a little in incantation that makes the machine work for you instead of you working for the machine.

Mary Loder: I love it. So this course story ends with you are now a magician. Students, take this class.

Phil Miller: Not far off.

Mary Loder: No, not far off at all. You guys are doing a lot of magic yourselves. I got to be honest, this has been an amazing experience to be part of this run with you. Thanks again, Jill, for allowing me to be part of the run. Thank you both so much and the whole team because this wasn't just us, This was partners at Inscribe, partners at zyBook, Partners within Fulton. We had so many supporters that were part of this and it's just going to be such a delight to see it continue to make the impact that it's already making.

Ryan Muthe: There was a huge team in the initial ULC-GFA development that did media production and Shandy did software development for us. And so many people that have had their hands in this. And it's been really absolute joy to work up absolutely everyone on all of these teams because it's really empowering to have so many resources and a vision and so many people that are committed to the same values of education and student outcomes. It's really exciting.

Mary Loder: And I love how you both see this as this living, breathing entity. It's not, you designed it, you're done with it, You just keep coming back to it. Your continued passion. It shows and it's infectious, it's catching. So it's just so lovely. Thank you both so much.

Phil Miller: Thank you for having us.

Ricardo Leone: Okay, let's wrap it up.

Well, that was a really interesting interview episode. Let me start that again. Well, that was great.

Mary Loder: They're amazing. Just the thought, the forward thinking, the reiteration, their availability, their innovation to support our students. It's amazing.

Ricardo Leone: Their enthusiasm.

Mary Loder: Their enthusiasm.

Ricardo Leone: Just having them in the room is just like, it's exciting. It's electric. How passionate they are for this specific course. And I can't imagine with some other courses that they teach, I don't know.

Mary Loder: Go back from exciting.

Ricardo Leone: It's exciting.

Mary Loder: You said. It's exciting.

Ricardo Leone: It's exciting. It's great. It's electrifying.

Mary Loder: We're going to get back to the [inaudible] days. Anyway they're wonderful. Yeah.

Ricardo Leone: Yeah. And so what do we want these listeners to do?

Mary Loder: Well, if you have not already, go to teach online Catch up. If you are new to this series, there's six other episodes for you to listen to. So catch up.

Ricardo Leone: A whole nother season...

Mary Loder: A whole other season. You don't have to be alone, you can be with us anytime.

Ricardo Leone: Is this a new feature of the show now? We really have improv through singing.

Mary Loder: I mean why not? We did talk about having a band last season. What was it?

Ricardo Leone: Cognitive sludge.

Mary Loder: God its so good, we need to make freaking stickers. But truly tune back in, we have so many neat conversations happening over the course of this next season, and we're really excited to share the stories from our faculty and our instructional designers. These guys are doing great work and the students are loving it and the faculty has a great time. And we want to make sure you all have great times in your design and in your classroom as well.

Ricardo Leone: And where can people listen to us Mary?

Mary Loder: SoundCloud? Everywhere, anywhere you have a podcast, we will be there.

Ricardo Leone: And if we're not, reach out to us and how can they reach out to us?

Mary Loder: They can reach out to us @corestoriesasu.edu.

Ricardo Leone: Let us know your thoughts, your dreams.

Mary Loder: We'll probably ignore a lot of it and I'm just kidding. We won't ignore.

Ricardo Leone: Tell us about our fluctuating beards.

Mary Loder: I don't, Oh, I do have a beard every once in a while. Just one hair. Is that a beard?

Ricardo Leone: No.

Mary Loder: That's just like, Well, I call it a witch hair.

Ricardo Leone: It's your it's how you want to interpret.

Mary Loder: It's whatever I want to be. I appreciate that.

Ricardo Leone: Core Stories is produced by the instructional design and new media team at EdPlus at Arizona State University. Core stories is available wherever you listen to podcasts. You can reach us at corestories@asu.edu. If you're an instructor at ASU online. Tell us your core story and we may feature it in a future episode. Thanks for listening.