Transcript - 2022 INCLUSIVE Summit: Disciplinary Matters Math Session

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KATI DOBECK: I did put the link in. OK. So this is a Google Doc, which means you can write whatever you like in there within reason. So I have some things prepared, but I don't want to be the only one sharing ideas. I certainly don't consider myself an all-knowing person. I have some ideas, but let me go ahead.

And I'll share so that we can at least see what that's looking at. But as I mentioned, you can go into the Google Doc and actually add your responses. And let's get rid of that and that and go here. OK. Is everybody able to see my screen?

PAT PATRICE: Yeah.

KATI DOBECK: OK. Perfect. So what I decided to focus on for this session is the idea of critical engagement. And prior to last year when I participated in the APLU Achieving the Dream communities of practice, I was a facilitator for that. This was a topic that we discussed at length in those sessions.

I like to start off by defining things just because maybe not everyone is familiar with this verbiage. But by critical engagement, we can mean a lot of different things. It includes helping students understand deep knowledge and the social importance of our discipline.

So I think of Derek being like, what's math? How can it get into social importance? It can actually, connecting course content to students' lived experiences and learning goals as part of critical engagement and encouraging students to make judgments, apply knowledge, and solve problems, rather than just going through that rote memorized process.

So we think of this as sort of critical thinking is kind of that part of it. So I thought we would start with a more narrow view and talk about what we can do as math faculty in our classroom to facilitate an individual level. And then we're going to take a step back before we're finished for the day and look on a broader scale.

So some of the ideas that I had focusing in on the learning goals part of critical engagement was starting off by surveying students at the beginning of the semester. I know a lot of us do this but actually have them set some goals for themselves and hold

themselves accountable for those learning goals by actually sharing it with someone. And obviously, we have limited time in our classroom. But this could be done in a discussion forum. This could be done very short with a partner or a small group, just letting someone in the classroom community know what the goal is for that student in being in the classroom. And they're making that connection. So I think that's probably a simple way to start the individual level.

Another thing that's actually one of my favorite things to talk about is this book called Living Proof-- Stories of Resilience Along the Mathematical Journey. This came out a few years ago from AMS and MAA. And it was such a game changer for me.

I am a very sensitive person. And it took me a long time-- I'm going into my 19th year as a professor. And it took me a very long time to grow into a confident person in front of the classroom. That I think comes easier for some people. And our students are the same way.

There are always going to be students in our classroom that are trying to hide. They maybe feel they don't belong. They maybe are first in their family to go to college. Maybe they don't look like the other students in the classroom and feel isolated that way.

But it's kind of nice when you can actually look at accomplished mathematicians of a very diverse group and read their story of them overcoming their own imposter syndrome. And so this is free. It's actually a PDF that if you go to the website, you can download it.

And the way I've incorporated this into my classroom-- I'm the statistics coordinator at my school. And we use a corequisite strategy. So we have a corequisite course. And oftentimes, there's maybe five minutes left at the end of that course. And so I'll have story time with them.

And I sit in my chair. It's a lot of fun. So we'll read the stories that connect to where the students are at that point in the semester if they're trying to just feel like they belong, or maybe they just had a really rough test. So there's different parts to the book with very short essays. I highly encourage that you all check it out.

The last idea that I had-- and then feel free. I left spaces for people. You can type while I'm talking if you have an idea that you'd like to share. But I'll go ahead and cover my last topic, and that is focusing on tapping into students' prior knowledge and then scaffolding the assignments from there.

So I do this in two different ways in my statistics classroom. The first way I actually just implemented for the first time last semester. I am doing an infographic project with the students. And that's where I have them picking their own topic. And I challenge them to find something that they're passionate about.

And that can range from social justice issues to-- I had a student who was a very intense gamer and collected all of his own data from these gaming tournaments for a game. I have no idea even what it is or how to play it. He really connected with the material that way.

And scaffolding the assignments, I used to give these more targeted disjoint project assignments. But here, I was able to go through a step-by-step process with deadlines along the way, culminating in a designed infographic presenting their statistical analysis and other findings from their research that are statistical in nature. We now have a beautiful display in my building for anybody who walks by that say, hey, they did that in a statistics class? That looks like a design or art class.

And then the other way I think you can really easily meet students where they are is through the use of adaptive courseware. If it's not something you've tried, I'd highly recommend just diving in and giving it a shot. I've worked with Knewton Alta, previously WileyPLUS adaptive practice. And I have used the adaptive assignments in a way where I'm trying to progressively lead the students up to that high stakes exam.

So they have a lesson that I do as a video, interactive video lesson. Then they work in a group in class on a targeted section level WileyPLUS assignment. And they do that for two chapters.

And so what was happening is it was going right from the section level assignment all the way up to a big two-chapter intense exam. And so there wasn't anything in between there. And what I was able to do was make adaptive quizzes at the chapter level so that they're checking in before they get to that high stakes exam and have the opportunity to fill in gaps.

And their grade continues to improve as they are doing so. So I think I've talked long enough. I don't see any other responses. But I'll go ahead and stop sharing for a minute so that we can all see each other. And what other ideas do you have? I see some in the-- oh my gosh. I'm behind on my chat, aren't I? [LAUGHS]

MyMathLab, sure, that's definitely student friendly. Give students and help outside of the classroom so that they can continue synthesizing the ideas from class. 38th year as a teacher. Lovely.

PARTICIPANT: The one thing I noticed that most students would tell me is I understand in class. But then I go home. I look at my notes and I don't have a clue. And so this is where MyLabMath really helps. And even if they're still struggling, they can still-- there's a button there where they can ask the instructors.

KATI DOBECK: Mhm.

PARTICIPANT: And then there's times where I may not be able to instruct them, so then we'll do a Zoom meeting.

KATI DOBECK: Perfect. Yes. And that is so common. I think that's where technology comes into play to facilitate that they're not alone when they leave the classroom, whether they can connect through a discussion forum with another student in class. The MyMathLab, the adaptive learning platform that I use will redirect them to lessons that go with the textbook based on what they're missing to fill in those gaps. So definitely. Smashboard project. Sue, do you want to tell us more about that?

SUE: So it's not one that I developed. I have a collection of quick math activities that people can do as in a long class or to get groups collaborating quickly inside of class. This was part of a catalog that I put together of other people's resources.

And so what it is is it's kind of a game board that takes students through a group process of working on a project-based learning type of activity, where they identify something-- they identify a problem and work on it from a stats point of view. So anyway, I thought I'd share it because it's probably not something that you see in higher ed. My background is K-12, even though I'm teaching adult upgrading at the college level right now. But I thought I'd put it in there because it's probably something that you don't see that often.

KATI DOBECK: Yeah, that's really-- I'm very bad at multitasking. I kind of took a glance at it, and I definitely want to look at that more after our session.

SUE: I have to say that what I think worked best for me in this particular thing that is really different from what I've done before but worked particularly effectively with adults is almost every decision I made, every assignment I put into the course, every change I made to what I was doing in terms of delivery was informed by the question, how will

this contribute to the learning? If it wasn't going-- if I couldn't give a good way that a decision would contribute to the learning, then I next it and went with something else.

That's a huge change from when I used to teach classroom math and high school math in class. Because so many of my decisions were informed because I thought it was good for the students. It wasn't necessarily good for the learning. And those are not necessarily the same thing.

And so things that I'm-- things that I'm struggling with now are really how to make small changes that are going to make something a big difference for different people and how to recognize that, particularly in math, when you get adult students from different parts of the world coming together, that they don't-- that their way of having been taught something when they were young isn't necessarily the way we present it in North America.

And so right now, I'm struggling with how to figure out a way to teach division by binomials and trinomials the European way. Because that was a sticking point for so many-- for North American students, that's one of the first places that we lose in grade school, that we lose kids. Kids who don't have the time tables can't do the long division, right?

And so what ends up happening is that then when they have to deal with long division in algebra 2 or in precalculus, they don't have the skills. And then you compound on top of that the fact that if you have students coming from another culture, they've learned long division in completely different way. So how do you make it accessible to them? I'm going to go off mute because my husband is working outside.

KATI DOBECK: Thank you so much. I totally agree with everything you just said. And I want to definitely tie into that with my next session. But I will say that we're doing the same thing, trying to pare down our courses to keep what we're doing in the classroom always tied to the learning objectives and outcomes. So I think there's a lot of that probably happening across the nation at this point. Anyone else want to add on the individual level?

OK, let me go ahead then. And since this is a good jumping off point to talk about how outcomes come into this, I'm going to go ahead and share my screen again. And let's see here. So the next thing I wanted to look at was question 2. What we, as math faculty, can do to facilitate an institutional level of critical engagement?

And so what do I mean by institutional level? Using data about what students are learning and the learners themselves to inform your classroom. And I know there's a lot of buzz about that right now and not necessarily a lot of instruction on how to do that. So I'm really curious to see what your thoughts will be on what the data that I can share with you.

So actually, just this last January on my campus, the big dashboard using Microsoft Power BI was released. And we have gotten all in on outcomes assessment, trying to capture data for all of our students and what outcomes they are learning in a meaningful way. We've been doing this for years. We've been doing it in a really crappy way.

I remember when I first came to the college, they had a literal piece of paper that we would write the outcome. And we would count on the paper exams how many met the outcome. And we would make a tally or something on this paper.

And so I went to do a program review. And they hand me this stack of about 300 papers that I'm supposed to find meaning out of. It was absurd. And so things have been gradual from that very slow starting point in 2004 to what I'm about to show you. So let's see here. How do I-- there we go.

So this is the dashboard that we have at my college. And perhaps your college or university is working on a similar thing. First of all, can everybody see it? Yes, OK.

So yes, this is the culmination of a lot of people's very hard work. And we're looking at data from the entire college. And since it's the first year, the numbers are still probably smaller than they'll be.

But what we're able to do is look at overall mastery rates for the outcomes. We can look at the Gen Ed outcomes that are all mapped to our course learning outcomes. And we also have these infused outcomes on my campus.

From there, we can drill down. So I can look at just for my division of science and math how does this look. And this is really big because what I never was able to do before this past year was see if there was a learning gap among different groups in my class.

So here, if we just look at the entire division of science and math, you'll see there's various tabs along here. So I can look at outcome searches. If there's one particular learning outcome that I want to see how students did, I can narrow in on that. I can look based on different modalities. So were the students who learned in person doing better than those who learned online asynchronously or online live through Webex?

And this is, of course, the entire division. So we see quite a lot going on there. But the Equity tab, this is a game changer. I never had a way of looking at my class results from an assessment instrument and breaking down. How did the non-Pell eligible students do compared to the Pell eligible students?

I can do that now. And that is important, and I'm not sure what to do with it just yet. But let's go ahead and look just since we're all math people. That's what we really want to look at. So here's the math equity data.

So we can look by race and ethnicity. We can look first generation or not. We don't know that about our students otherwise, unless we have them fill out some sort of survey and really do the legwork to track that level of data. If you are, hooray for you. I'm not there yet. So this is really helpful for me.

We can look at gender and how the students in the local high schools are doing compared to those who are actually on our campus 24 and younger versus 25 and older. So again, a level of data that I had never had before. And as the coordinator for statistics, that's this course here, I can look at how is my assessment method-- what does it showing? Is it showing a gap in a way that I don't want it to? And I think we can see the answer is yes. It is showing an equity gap.

JULIA CHADWICK: And Kati, we have a question in the chat from Dr. Ellis asking, does your school collect this data? I guess, how is this data collected?

KATI DOBECK: Yes.

JULIA CHADWICK: Perfect.

KATI DOBECK: So it is all collected through Canvas. And that's actually what I was going to show you next, so good jumping off point. Oh, where did I put that? No. There we go. So we are all doing it in a slightly different way. Some people are actually using paper exams and tallying it all up. Since I'm a coordinator of a high enrollment course, I wanted something a little bit more automatic.

And so the data has been calculated. I wanted it to all be measured the same. Because for me, I wanted to see the big picture. I wanted to see everybody measuring success the same way. Otherwise, when you go to put the data together, it's a little bit meaningless.

So I created this common final, and it has a proctored paper in person portion. Some of the questions for assessment are there. And we fill out a survey whether the student

met the outcome or not in a Canvas assignment. This is the more-- the online portion is done at home. It's timed. And every stat student takes both parts. So how do I hold students accountable to not cheat would be an excellent question. And the way we have done this on my campus is through question groups, which I know you're not all Canvas institutions. But a question group in Canvas allows you to put together questions that all cover the same outcome.

So here, this is outcome 8. And it's tied to chapter 1. CAP stands for Course Assessment-- what's the P? Program? And what I've done is I've put in 1, 2, 3, 4 different questions there that are all very similar in nature.

Canvas is going to randomly select one so that that outcome is being measured. And everybody has a slightly different exam to keep this legitimate or as legitimate as it can be. And so an outcome is not just one question. I can put multiple questions.

So here, you'll see this is still outcome 8. I'm putting more questions about that outcome. This time, there's 1, 2, 3, 4, 5, 6 questions all targeting that same outcome number 8. And I'm asking Canvas to pick three of them randomly to give to my students.

This takes forever to write. This came about during the pandemic when we didn't have a good solution for testing. So we kind of scrambled. And this is the solution we came up with at the time.

And I thought, hey, that would be pretty cool for collecting data. So everybody gives this same instrument. It's all connected to the outcomes. And now I can see a good measurement, at least a consistent measurement.

I have to go back and edit this. But yeah, math got lots of kudos because of our huge numbers of assessment records at the college. A lot of other subjects did not have that.

So the way it looks when you preview is just like a regular exam. The students don't see all those codes. Those codes are for me to know how I mapped it. But it just looks like a regular Canvas quiz when the students go to take it. So that's where all of this data is coming from for stats. And you can see that I'm going to need to make some changes.

I'm curious of a couple things. So I'm going to go ahead and stop sharing so that you are more welcome to-- I'll stop sharing here-- to voice your own ideas. The things I'm curious about is one, do you have a similar thing at your institution to get that level of data about your students? And two, what are you going to do with it? Or what are you already doing with it to inform changes in your teaching? When I see Sue--

PARTICIPANT: We're just starting with Canvas. And the way that the person who is behind the scenes of our Canvas, we have to use a rubric. So are you using a rubric for each of those questions?

KATI DOBECK: No, only on the paper portion. If any of those questions are open response and we're using those for assessment, then there's a Canvas rubric we go through and fill out. But it's just a met the outcome or didn't meet the outcome rubric. This data is all captured. It's a quiz that has-- they were all multiple choice questions, which doesn't always work, which is why we have the paper short answer portion as well. But yeah, that's all collected automatically. So it's really easy for an adjunct faculty member then to jump on board with some pretty sophisticated assessment that is at least more meaningful than what we were doing in the past, where everybody is grading based on different expectations.

I know people who grade math problems where it's full credit, half credit, no credit. And that's how they grade all the time. Maybe a small mistake is a minus 1. Well, I don't grade like that at all. I grade depending on the style of question, how far did they get. If they made a mistake early on, I try and figure out were they correct from there on out? And how many steps does that equate to? So grading takes forever for me. But if you're trying to put those things together, it really muddies the water.

And I was a little bit afraid how the institution would use this data. If I'm being very careful and making sure I'm being consistent in my grading and somebody else is saying, well, they wrote some stuff. I'll just take off two. I don't want people to be like, wow, they're doing a great job. What's going on in your class, Kati?

So this way, we're all using at least the same standard. And we developed the exam together so people can raise concerns. If they're like, that question is no good. Can we switch that out? Then I'll go ahead and do that.

That was a very long winded answer, wasn't it? So what else? How many of you-- is anybody doing anything at this level campus wide with that assessment data that you know of? I'm getting a no.

PARTICIPANT: We used to have Tk20. And that really was nice.

KATI DOBECK: What's that? I'm not familiar.

PARTICIPANT: It does assessments, and it does exactly what Canvas is doing. But like I said with the person behind the scenes, she's telling me to do a rubric instead. So we're

doing rubrics on work problems is what we're basically doing. The question I have for people out there, do you have dual credit?
KATI DOBECK: Yes.
PARTICIPANT: OK.
KATI DOBECK: So some of that data in the dashboard I could see how the students taking the course at the high schools are doing, which we're really trying to make sure that that course is truly our course that they're getting credit for. When they don't come to campus, it's hard. You got to keep that communication open and keep the level college level, and make sure it's not dipping down. But as you can see, the dual enrollment students were far outperforming our students. So good for them.
PARTICIPANT: I think it's because they have their top students in the dual credit. And then the ones who come to the community college are the ones that were like middle of the road. OK? Weren't quite ready for that dual credit course.
KATI DOBECK: Yeah. That absolutely could be. It reassures me that they are learning what they're supposed to be learning. That's what really ties me back to what Sue was saying earlier. Once you're designing a course-- and of course, I'm only building this with a common final for collecting data. I could do this for lots of things in the course.
But the only common assignment we give is that final. We don't give common exams across the board. But it really makes me start to think about how would I design course activities that didn't meet the outcomes in some way?
Or better question is, why would I? And so it's really helped keep the focus on the outcomes and not just, oh, I think this topic is fun. Let's do that today, which I definitely was guilty of like many others.
If you don't have this-- and let me go ahead and share again. If you don't have anything like this at your college, chances are maybe they're working on it or in the early stages. I would start a conversation with your institutional research department.
That would be the person to talk to and find out if they are using any kind of dashboard to collect assessment data. You can also contact APLU if you're having trouble getting data at your institution. They can provide resources there as well. So then how do we use this data to inform changes?

New analytics is a starting point. Sure. The only thing is-- I mean, we could get data, right? That's not a problem. We can get lots of data through all kinds of means. But what we don't see is that equity piece.

It's not always clear that a student is from an underrepresented group. That they're Hispanic, for instance, or from a Pell eligible group versus not, like I said. You're not going to get that. And I think we need to. I think this whole day has been about knowing how our students are doing and serving all of our students.

Sometimes I like to play devil's advocate. And that's how I really got on board with this is why we need to put in all of this work for assessment. And we are getting something meaningful out of it. It might not be what we want to see. But you can't solve a problem until you know what the problem is you're solving.

And now I can look and be like, this is not good. So actually, I'm hoping to scale up my infographic project, for instance, because I think that might be a piece in addressing that equity gap in student performance in the class. If they can connect to their life or something they care about, maybe the rest of it will mean more and stick a little bit more.

JULIA CHADWICK: We have about five minutes left, but I did see Sue unmuted. So Sue, go ahead.

SUE: I think your data is telling you that there is a problem. It's not telling you what the problem is. That to me is that that's the fine level that you're trying to get to. When you work with upgrading students like I do, you have to assume that they're all coming in with a history of having struggled in math.

When I began from that assumption, then what I looked at is-- well, because it was a small class, I could look at on an individual basis where the struggle came from and how I could handle that inside the class without bumping the student down to a remedial level. That is typically what happened is that a student who's come into-- they're mostly students, for example, who want to go into nursing or medical type of professions. And so they have to have this course to get through.

I mean, if they don't get it and they don't get through, and if they don't get a good enough mark, they don't get to the top of the waiting list when they're going to the next level. And so it had to do with trying to figure out how to take a student, for example, who couldn't solve fractions and not say to him, well, you have to go back and learn fractions before you could do this. How I could figure out-- how I could give him a way to learn

just the stuff that he needed to know about fractions in order to be able to do the precalculus.

And for another student, what she had to learn was how to be more self-managing so that if I put three options for a homework assignment into something, she didn't automatically feel she had to do everything in order to be perfect. It has to do with, I think, student personas. And this comes from learning experience design.

I think you have to be moved from your data to getting a sense of who the personas are in there, where their problems are coming from. And they'll be different depending on combination of individual, cultural, and life former teaching kinds of factors. And I think once you look at user experience design or learning experience design to get to a sense of personas, then you can begin to develop, well, these kinds of students I'm going to tend to deal with this way. And these kinds of students I can work with this way and so forth.

That gets you a little closer to the individual level. It doesn't solve every individual problem, but it gets you to a sense of now I have these statistics. Now what are the problems for-- they're not going to be the same for every person from a particular cultural group.

They're going to be different. So how can I put together these math background learning personas so that I have a sense of who that student is, where their problems came from? And how can I simultaneously remediate a missing skill and keep them on track in the course at the same time?

KATI DOBECK: Beautifully said. Can you just travel in my back pocket? Yes, there's not a magic bullet. You're exactly right. And what's going to work for one student isn't necessarily going to work for another.

And we've known this. There's going to be best practices. So part of what you were talking about was the remediation. We've seen great improvements on our campus with the corequisite course, where they are-- that's been a big part of it for sure.

SUE: But there is a space between we have to solve each individual's problems, and we can begin to cluster them into groups. Because when you work with math students over-- remedial math students over a long enough time, you begin to get a sense of where did their problems probably emanate? What particular areas are they going to need help in order to be successful in my course? And where did some of the-- why do they have some-- where did the problems come from?

And not only that, the other piece of the persona is how have they incorporated those problems? Have they simply become people who don't think that they can do math, but this is their last hope? I mean, and um... and those are the students who came to my class-- who come to my class. This is their last hope at a solid job and something that's going to feed their families and give them security and a pension.

And this is the one thing they have to do to get through. I mean, it's huge on the life-changing level. So I have to get to understand them on a math-phobic scale. Where are they in there? And what's been their learning trajectory?

And so you can develop these personas. And if you look at the user experience literature-- user experience design literature and the learner experience design literature and look up personas, you'll get a sense of that's where you need to go from your data. And from there, you're going to get to-- then you begin to make individual decisions. But you can get groups, and they're pretty solid in math. I mean, my--

JULIA CHADWICK: Sue, I hate to-- I hate to cut you off. We are out of time, unfortunately. So I typed my email in the chat. Sorry. And Kati has a critical appointment, so I promised I would help her get there on time.

But I typed my email in the chat. And I think this idea of really the personas and knowing those groups and understanding them and using that as a development to really help and really looking at some of that not quite emotional trauma. That might be a strong word. But it's the first to come to mind. So feel free to send me anything that you would like to include because I know folks have stayed on this whole time, so thank you so much.

But feel free to send me those resources. I'll include them in our follow-up. But thank you so much, Kati, for sharing this resource for guiding our conversation. Thank you all for being active participants. Camera ons or off, we really appreciate you all joining us today.

And we do have one last session before the end of the day that will transition to in just a moment. So thank you, Kati. Feel free to hop off. I will post the Zoom link for our next meeting on "Designing for Equity and Digital Learning with Digital Technologies-- excuse me, Educational Technologies."

So thank you all. And I'm happy to stay on just if anyone else has closing comments. So if you wanted to share those closing thoughts with the rest of the group, again, happy to

have you. And I just wanted to make sure Kati was able to get to her appointment. So thank you all again.

SUE: No, I think is that over a long-- I think the thing is that people think if we cluster students according to personas, that that's a form of labeling. It really isn't. It's a form of getting a grasp of where that type of student who has experienced that type of problem is going to need a certain type of remediation.

And so it gives you a starting place. Clearly, there are outliers for every group. I think once you begin to take a look at what causes the fundamental problems in math, and where are they coming from, and life issues and that sort of thing, then you get these profiles.

And you have a little bit of a sense of a way to recognize, oh, that student's going there. She might be in this profile. I need to investigate further. It just gives you a way to understand a little bit, especially in a large class who you're dealing with. And a starting place is all I'm going to say.

JULIA CHADWICK: No, I think that's incredibly valuable. To your point, especially in those large classes when you're dealing with the gateway courses of a hundred plus students with tools like adaptive learning, but even in other settings, you can track, to Kati's point, those learning outcomes on assessments. But even before then, seeing where those problems are coming from if you're looking at those paper assignments, kind of seeing the steps.

And then it's helpful to know, OK, this student might be coming from here, like you mentioned, how we learn division, and how that can just impact the rest of your learning for truly the remainder of your life and going from there. So thank you for sharing that wisdom and that experience.

And making a point about that user experience, user design is so critical because it is personal. It is personalized. It's just a starting ground. You have your basket, your bucket that you can then pull from.

So that is time. We will just about to hop into the other meeting. But any last closing remarks, Pat? Sue? I see you're both still here. Pat, you are on mute.

PAT PATRICE: Well, I was saying I enjoyed the meeting and the presentation.

JULIA CHADWICK: Excellent. Well, we're very happy to have you. And I will end our meeting now so you can join the next session if you are. And if not, enjoy the rest of your day.

PAT PATRICE: Thank you.

PARTICIPANT: Thank you.