

13:58:41  
13:58:43 >> No, you're fine. We haven't started yet.  
13:58:46 [Captioner standing by]  
13:58:46 So while I'm here, I wanted to invite  
13:58:49 people who are on zoom to know that they  
13:58:52 could  
13:58:57 abuse them to the community by, there's  
13:59:05 a feature where if you hover your name  
13:59:10 in zoom, and perhaps Cathy Fernandez can  
13:59:10 say.  
13:59:11 So you can rename yourself.  
13:59:15 So Blake Bullard, the full name is  
13:59:15 there.  
13:59:17 It would be wonderful if everyone  
13:59:19 would put their full name so we know who you are.  
13:59:23 But you could also add your campus if  
13:59:27 you wanted to, whether it's a CSU campus  
13:59:29 or community college colleagues who  
13:59:30 might join us today as well.  
13:59:33 Do you know how to give out those instructions?  
13:59:36  
13:59:38

13:59:41 >> I just right-click over the top of  
13:59:45 my name, and there's a rename menu option.  
13:59:45

13:59:46 >> Thanks, Cathy.  
13:59:48 I thought you would here and you would  
13:59:50 have the quick clear instructions.  
13:59:53  
14:00:11 I'm going to mute people just so we  
14:00:13 don't have any background noise.  
14:00:16  
14:00:40 If you want to turn on your camera and  
14:00:42 say, "Hi" to your colleagues as well,  
14:00:44 it's definitely not a requirement.  
14:00:48 So it is right at 2 o'clock, we've got  
14:00:49 a pretty good group here.  
14:00:52 Not quite as many people registered.  
14:00:55 So, hopefully, more people will join  
14:00:56 on with us.  
14:00:58 I'm going to go ahead and hit the  
14:00:59 record button so I don't forget to do  
14:01:00 that.  
14:01:02 And I want to welcome everyone.  
14:01:05 Another thing that I might suggest is  
14:01:07 that if you have a cell phone with a  
14:01:09 camera that you want to keep handy, we  
14:01:11 will have some breakout discussions.

14:01:13 And you might want to take a picture  
14:01:16 of the breakout questions, because once  
14:01:18 you go into breakout groups, the  
14:01:19 questions disappear.  
14:01:22 And, so, you might find it handy to  
14:01:24 have those questions recorded.  
14:01:26 So if you just have your phone nearby  
14:01:29 and have that camera fired up and ready  
14:01:29 to go.  
14:01:31

14:01:32 >> AUDIENCE MEMBER: Okay.  
14:01:34

14:01:35 >> So welcome, everyone.  
14:01:39 I'm going to go ahead here and share  
14:01:39 my screen.  
14:01:42  
14:01:45

14:01:47 >> Connie, can you hear me?  
14:01:48

14:01:49 >> I can.  
14:01:50

14:01:52 >> Can I just address the group?  
14:01:52 Okay.  
14:01:53 I'm sorry.

14:01:54 >> No, no.  
14:01:55

14:01:56 >> Good afternoon, everyone.  
14:01:59 This is Fred from the chancellor's office.  
14:02:02 So on behalf of the center for  
14:02:04 advancement of instruction in  
14:02:05 quantitative reasoning, the Department  
14:02:09 of Academic includes excellence and for  
14:02:10 teaching and learning.  
14:02:13 I like to welcome you to today's  
14:02:15 webcast on how do we ensure rigor in the  
14:02:18 first year mathematic courses.  
14:02:20 Last year there were at least 18  
14:02:23 webcast presented by the CEO and faculty  
14:02:25 covering course design effective  
14:02:26 instruction and assessment strategies.  
14:02:30 This fall, we offer another series of  
14:02:31 webcast of student's success in  
14:02:32 mathematics QR.

14:02:36 On one webcast, each month was planned  
14:02:39 on topics related to the success of  
14:02:41 students learning, growth mindset, and  
14:02:41 setting rigor.  
14:02:45 This is the last one for fall 2018,  
14:02:47 and as we move into the next term, we  
14:02:53 plan to again have faculty led  
14:02:55 webinar which we'll share the success.  
14:02:58 This web that are continues the  
14:02:59 conversation that we began last year as  
14:03:02 you were offering to provide mathematics  
14:03:04 and quantitative reasoning courses.  
14:03:06 As we now implement policies that face  
14:03:09 all incoming freshman into college level  
14:03:12 first level courses, we have the  
14:03:13 opportunity to examine the structures,  
14:03:16 processes, and strategies that provide  
14:03:19 the level of academic support that  
14:03:20 students need when they need it.  
14:03:22 We're delighted to have Connie  
14:03:27 Richardson from  
14:03:29 Charles A Dana center today.  
14:03:32 They're going to perform quantity day  
14:03:34 of the reasoning courses and use the  
14:03:37 information to improve the teaching and  
14:03:39 learning experience for the student and  
14:03:39 the instructor.  
14:03:42 During today's webcast, we're going to  
14:03:44 ask you to collaborate in virtual  
14:03:45 breakout rooms with your peers from  
14:03:46 across the system.  
14:03:51 Although we sometimes ask campus  
14:03:53 people to meet together, these breakout  
14:03:55 work best if you're in a working  
14:03:57 computer with a working microphone and camera.  
14:04:00 And please don't forget to fill out  
14:04:03 the  
14:04:04 evaluation.  
14:04:07 This webcast and all webcast series  
14:04:16 will be recorded and this will be in the  
14:04:16 calendar listing archive at [www.](http://www.calstate.edu)  
14:04:16 .  
14:04:16 [CalState.edu](http://CalState.edu).  
14:04:19 We encourage you to review this  
14:04:20 information from the webinar today.  
14:04:23 Connie and Joanne, I would like to  
14:04:25 thank you for putting together this  
14:04:26 webcast.  
14:04:28 I'm going to move off camera and let  
14:04:28 you begin.

14:04:29 Thank you.

14:04:34

>> Thank you.

14:04:37 So welcome, everyone, from Joan and myself as well.

14:04:40 And as Fred mentioned, this is

14:04:42 definitely intended to be an interactive

14:04:44 web that are where we want you to share

14:04:45 with each other and us.

14:04:49 So that we can make sure that we meet

14:04:51 your needs, answer your questions,

14:04:53 connect you with the appropriate

14:04:53 resources.

14:04:55 And, so, there will be several

14:04:58 opportunities to do that, in fact.

14:05:01

14:05:03 To introduce Joan and myself a little

14:05:06 bit, we are from the Charles A Dana

14:05:08 Center in UT Austin.

14:05:11 And we both work on curricular design

14:05:14 and development, including for support

14:05:14 courses.

14:05:18 And, so, we also support the

14:05:19 professional learning offerings for the

14:05:20 Dana center.

14:05:24 And in that area of work, we also have

14:05:25 done a lot of support around support

14:05:26 courses.

14:05:30 So, that is part of the reason that we

14:05:34 are here today to facilitate the webinar.

14:05:40 So as we think about accelerating

14:05:43 students, as you've done in California

14:05:46 this past year, naturally questions

14:05:51 arise about ensuring rigor and these

14:05:52 acceleration strategies have really

14:05:54 taken hold across the country.

14:05:55 And we hear these concerns about rigor

14:05:59 and how do we ensure rigor, just about

14:05:59 every place we go.

14:06:04 So, you know, we hope that some of

14:06:06 these tips and resources that we've

14:06:10 collected during this webinar and some

14:06:12 of these discussions will resonate with

14:06:14 you whatever concern it is you brought

14:06:15 to the webinar.

14:06:17 And, so, we will in just a few

14:06:19 minutes, we'll kind of collect some of

14:06:20 those concerns from you.

14:06:25 So, our intent is that during this

14:06:28 session, we will explore the meaning of

14:06:29 rigor in mathematics.

14:06:31 There's really a lot of different ways  
14:06:34 to interpret that and what is the  
14:06:35 current thinking around that.  
14:06:39 Discuss some ways to promote rigor,  
14:06:42 and to engage with some resources that  
14:06:44 we've collected both from the field and  
14:06:46 from the professional associations.  
14:06:54 And that includes sort of research  
14:06:56 resources as well as classroom tips.  
14:06:58 And, hopefully, you'll find some of  
14:07:01 those useful that you will want to take  
14:07:02 away and try in your classroom.  
14:07:05 I do want to say, speaking of your  
14:07:07 classrooms, how glad we are to see so  
14:07:09 many people join us today when we know  
14:07:11 how many millions of things you have to  
14:07:13 do to wrap-up the semester and prepare  
14:07:15 for the holidays and next semester.  
14:07:19 So thanks very much for joining us today.  
14:07:22  
14:07:25 So here are the few things we hear  
14:07:27 about rigor concerns.  
14:07:29 I want to give you a minute to read  
14:07:29 through those.  
14:07:32  
14:08:08 So maybe one of those questions, or one  
14:08:11 of those comments are reason you joined  
14:08:13 us today or something different.  
14:08:15 So we want to figure out for sure,  
14:08:17 just exactly who we have in the room and  
14:08:21 what the concerns are  
14:08:24 . And, so, we've had some issues with  
14:08:26 our polling feature, so we're going old  
14:08:27 school with our poll here today.  
14:08:31 And we put together this poll about  
14:08:32 concerns about rigor.  
14:08:34 And whether you've had any of these  
14:08:36 discussions come up in your departmental  
14:08:38 meetings or your chats that you have in  
14:08:41 the hall with your colleagues, or at  
14:08:44 conferences, and, so, we've got four  
14:08:48 reasons, concerns listed.  
14:08:50 Maybe one of those concerns is the  
14:08:51 reason you joined us today.  
14:08:56 Or maybe it's for another reason.  
14:08:58 Or maybe you haven't heard any  
14:09:01 concerns about rigor, but you were just  
14:09:02 interested in the webinar topic.  
14:09:06 So if you will enter into the chat  
14:09:09 box, either 1, 2, 3, 4, or 5.

14:09:12 Or you can enter more than one if you  
14:09:13 like.  
14:09:15 And Joan will keep an eye on that.  
14:09:17 And that way, we can sort of get a  
14:09:18 feel for is everybody kind of here  
14:09:19 thinking about No.  
14:09:19 1?  
14:09:21 Or really everybody is thinking about No.  
14:09:22 3?  
14:09:24 If you put No.  
14:09:27 4, if you go ahead and explain what the  
14:09:31 other rigor concern is that you have.  
14:09:33 So I'm going to give you a minute or  
14:09:35 so to think about that and to enter one  
14:09:36 of those into the chat box.  
14:09:39  
14:10:01 This is very helpful.  
14:10:03 Thank you.  
14:10:04 And everyone keep going.  
14:10:07  
14:10:34 Okay.  
14:10:38 So after initial flurry, we seem to  
14:10:40 have slowed down.  
14:10:41 Thanks, Kyle.  
14:10:44 If you do think of something that you  
14:10:46 want to enter, I can give you a second  
14:10:48 to take a picture of this if you like  
14:10:50 and come back to it later.  
14:10:53 But we will come back to the results  
14:10:54 here shortly.  
14:10:57 In the meantime though, we do want to  
14:10:59 get everybody involved in the discussion.  
14:11:02 And, so, what we're going to do here  
14:11:06 is go into breakout.  
14:11:11 And I am -- we are just having all  
14:11:12 kinds of trouble today.  
14:11:16 We're going to go into breakout and  
14:11:18 discuss what concerns related to rigor  
14:11:23 have come up during your  
14:11:24 departmental discussion.  
14:11:25 So you might have chosen one of the  
14:11:28 numbers from the poll, but you might  
14:11:30 want to expand on it a little bit and  
14:11:31 add some detail to that.  
14:11:33 Or another way to approach this  
14:11:34 question is what interests you about the  
14:11:37 conversation around rigor?  
14:11:41 And  
14:11:44 just way to think about that is what  
14:11:45 motivated you to join the webinar.

14:11:48 So you can approach this question from  
14:11:50 any of the perspectives, whichever one  
14:11:52 that seems to make the most logical  
14:11:53 sense to you.  
14:11:56 So we're going to go into breakouts  
14:11:56 here.  
14:11:58 Go ahead if take a picture of this  
14:12:00 slide so you have the 3 different  
14:12:02 perspectives in front of you.  
14:12:06  
14:12:17 And fair warning.  
14:12:19 I'm about to send you to breakout.  
14:12:21 You'll get a warning when you have one  
14:12:23 minute to come back to the main room.  
14:12:25 And here we go.  
14:12:29  
14:13:04 Okay.  
14:13:07 Stephen might be in one by himself.  
14:13:10  
14:13:17 It looks like we have Blake and Coffey.  
14:13:20 You might want to pause the recording  
14:13:21 real fast.  
14:13:23 So you might be able to, I think you  
14:13:25 can move Blake to a new room.  
14:13:28 Sorry, whoever was on their own.  
14:13:28 Stephen?  
14:13:32 I'll move Stephen.  
14:13:35  
14:16:17 [Breakout session]  
14:17:23  
  
14:17:27 >> JOAN: 4 minutes before the 1 minute  
14:17:27 call back.  
14:17:29  
14:21:35  
  
14:21:36 >> Starting to come back.  
14:21:38 We're at 30 seconds.  
14:21:42 Couple of our groups are very engaged  
14:21:43 in their discussion.  
14:21:46  
14:21:56 10 seconds.  
14:22:02 I'm going to go ahead and start the recording.  
14:22:05  
14:22:08 All right.  
14:22:10 So I think that everyone is back now.  
14:22:14 We're going to do a share out.  
14:22:15 And what I'm going to do is call on  
14:22:17 one person from each of the groups.  
14:22:21 But I do want to encourage as well

14:22:25 that each of you can go ahead if feel  
14:22:27 comfortable jumping in and flushing out  
14:22:28 what the group discussion was.

14:22:32 And also feel comfortable to share in  
14:22:33 the chat box if that's what you would  
14:22:34 rather do.

14:22:37 So from the first group, if I could  
14:22:41 ask Kathy, Kathy would you report from  
14:22:41 your group?

14:22:43

>> Sure.

14:22:49 So we represented humble Pomona and Northridge.

14:22:53 And Humboldt is teaching 3 classes now  
14:22:55 and 4 in the spring with support courses.

14:23:00 If 2 of them, the liberal studies and  
14:23:03 Laurie should talk to them, hers were  
14:23:06 most of the times discussing those.

14:23:11 So I'm going to ask Laurie to speak to  
14:23:15 the Humboldt and how that applied to the  
14:23:16 Northridge and Pomona.

14:23:17

14:23:20 >> I'll be brief, but essentially the  
14:23:25 statistics and math were liberty  
14:23:26 liberal arts.

14:23:30 And instructors were modifying the  
14:23:34 content, so they they felt like it was  
14:23:36 fine and catch student's, really explain  
14:23:39 what was needed at the moment.

14:23:42 Whereas, in the college Algebra class,  
14:23:45 the instructors had the sense that  
14:23:47 students, since students have to get to  
14:23:50 a certain place in term of the content,  
14:23:52 they were really concerned about some of  
14:23:55 the students who in spite of putting  
14:23:58 forward all the effort probably weren't  
14:23:59 going to be successful.

14:24:02 So this is making us think about what  
14:24:04 changes we need to make and the  
14:24:07 structures, and how we structure  
14:24:09 instruction for the category for  
14:24:10 students and what kind of additional  
14:24:12 support we need to institute.

14:24:14 So that was part of the discussion.

14:24:19 And then we all shared that it seems  
14:24:22 like there's a really wide range of  
14:24:25 ability levels in the students who come  
14:24:28 to the supported classes and that makes  
14:24:30 it difficult to know the right level to  
14:24:30 teach.



14:24:32

14:24:33 >> Umm-hmm.

14:24:33 Okay.

14:24:34 Thank you.

14:24:37 And anything else from Group 1?

14:24:40

14:24:48 I would say it's encouraging to hear,

14:24:52 you said you've got students putting

14:24:54 forth the effort but concerned about

14:24:55 them not making it.

14:24:56 So that's a great start.

14:25:00 And now how to get them into perhaps

14:25:04 more effective strategies and that sort

14:25:05 of thing.

14:25:08 So that's something we can discuss a

14:25:08 little bit later.

14:25:13 And, so, I guess that's why earlier it

14:25:15 was when we did the pollinger it was

14:25:17 more around the support course and the

14:25:23 Algebra were the two choices that were

14:25:24 trickling up to the top.

14:25:25 Let's see.

14:25:30 Kyle, can you report for Group 2,

14:25:30 please?

14:25:32 And then other people jump in as well?

14:25:35

14:25:39

14:25:41 >> I think what we were discussing a

14:25:45 lot of is how you assess rigor in a

14:25:46 stretch course.

14:25:49 And how is that different than how you

14:25:53 might assess rigor in a non-stretch course.

14:25:55 But I think all of us were in the

14:25:57 stretch model, so that's where we were

14:25:58 having our conversation.

14:26:02 And then just maybe some of the types

14:26:06 of assessments questions and the

14:26:07 formatting of those assessments

14:26:07 questions.

14:26:11 And how those might be appropriate for

14:26:14 or without that stretch model.

14:26:15

14:26:15 >> Okay.

14:26:20 So, is the stretch model you're doing

14:26:27 pretty much that the supports are really

14:26:28 interwoven throughout each class meeting?

14:26:29

14:26:30 >> Yeah, we don't have that just in  
14:26:31 time mediation going on.  
14:26:36 A lot of the content is interspersed  
14:26:39 and weaved throughout.  
14:26:40

14:26:40 >> Okay.  
14:26:40 Great.  
14:26:41 Thank you.  
14:26:45 Anybody else from Group 2 want to jump  
14:26:45 in?  
14:26:48  
14:26:56

14:27:00 >> I think Kyle summed it up pretty well.  
14:27:00

14:27:01 >> Thank you, Sean.  
14:27:03

14:27:04 >> Group 3.  
14:27:06 Chris, can you report for Group 3?  
14:27:06

14:27:09 >> Yes, hi, I'm Chris.  
14:27:11 We had a difficulty with technology.  
14:27:14 We weren't able to -- we actually did  
14:27:16 a combination of chat and video, but I  
14:27:21 think what we were able to discuss was,  
14:27:24 in San Jose college here is dealing with  
14:27:28 [Indiscernible] talking about transfer  
14:27:31 students being enrolled in AD and  
14:27:32 General Ed courses without having the  
14:27:34 pre-requisites through the courses.  
14:27:37 If then thinking went Cal State  
14:27:41 universities, we're dealing with  
14:27:44 Executive Order 1110 and GE math courses.  
14:27:49 And they need extra support and the  
14:27:50 prerequisite for those courses.  
14:27:52 As much as we got into the  
14:27:52 conversation.  
14:27:55  
14:27:56

14:27:56 >> Okay.  
14:28:04 And we have a chat from hum bolt.  
14:28:07  
14:28:09 Okay, great, thanks for sharing.  
14:28:13 Anything else from Group 3?

14:28:16  
14:28:23 Okay.  
14:28:26 So let's see if we can address some of  
14:28:32 those issues about really how to figure  
14:28:35 out what rigor means, and how do we  
14:28:36 uphold it?  
14:28:38 How do we, you know, what is  
14:28:41 assessment look like when you've  
14:28:44 accelerated students, and what does it  
14:28:47 mean to get to this certain level of  
14:28:47 rigor?  
14:28:50 So we have a few thing prepared.  
14:28:52 But we definitely want this to meet  
14:28:53 your needs.  
14:28:56 And, so, we'll pause couple of times  
14:29:00 for you to jump in and let us know if  
14:29:02 we're headed in the right direction or not.  
14:29:08 So, this question has been coming up,  
14:29:10 like I've mentioned earlier, as we've  
14:29:13 gone around the country, and talk to  
14:29:13 different people.  
14:29:18 Both about math pathways and what it  
14:29:20 means to have rigor in different pathways.  
14:29:23 So we thought that was interesting  
14:29:26 group, one, talking about the stat and  
14:29:29 the math for liberal arts, not the  
14:29:31 concerns there, but definitely concerns  
14:29:34 if students have a follow on course.  
14:29:36 And, of course, we would hope that  
14:29:38 students, that more and more students  
14:29:40 would take a follow on math course.  
14:29:42 If so we definitely want to prepare them.  
14:29:45 But the college Algebra, or  
14:29:48 pre-calculus courses definitely have I  
14:29:50 guess the most at-risk there.  
14:29:53 And we've got to make sure we get  
14:29:54 students to a certain point.  
14:29:59 I will say, you know, it's a balance  
14:30:01 about covering content versus making  
14:30:05 sure the content we cover is at a deep  
14:30:07 enough level that the students are  
14:30:08 actually going to be able to take it  
14:30:10 with them as they move on.  
14:30:12 We can cover a lot of content, but  
14:30:14 that doesn't mean the students would be  
14:30:15 able to use it later on.  
14:30:17 And, so, striking that balance of  
14:30:22 going deep versus wide, and where that  
14:30:24 balance is is always a big question.  
14:30:27

14:30:32 So we started doing at the Dana Center,  
14:30:36 a really deep dive into what the  
14:30:38 literature says about rigor and mathematics.  
14:30:40 What does that mean when you're  
14:30:41 looking at different types of math courses?  
14:30:45 And as part of that, we also did bunch  
14:30:45 of interviews.  
14:30:49 And we have a publication that's in  
14:30:51 press right now.  
14:30:54 We hope to have it released shortly  
14:30:55 after the new year.  
14:31:00 That kind of documents the work we did  
14:31:02 in surveying the field and surveying the  
14:31:04 literature around this idea of rigor.  
14:31:07 And, basically, we kind of were able  
14:31:09 to boil it down to one main idea.  
14:31:14 Which is that rigor and mathematics is  
14:31:17 a set of skills that centers around  
14:31:19 communication and the use of  
14:31:19 mathematical language.  
14:31:22 I'm going to give you a minute to  
14:31:24 think about that and see what stands out  
14:31:27 to you about that, and what questions you have.  
14:31:30  
14:31:46 So, anybody want to jump in or enter  
14:31:47 something in the chat box?  
14:31:49 What does this make you think when you  
14:31:50 see this statement.  
14:31:52 Obviously, this is not the publication.  
14:31:54 We're not going to publish one  
14:31:54 sentence.  
14:31:56 But there's a lot of language around  
14:31:57 this.  
14:32:02 But if we just boil it all down, what  
14:32:03 do you think about this statement?  
14:32:06  
14:32:22 Any thoughts?  
14:32:25  
14:32:29 Okay.  
14:32:30 Then I will move on.  
14:32:36 So, I will say that  
14:32:42 we want to make sure that it's clear,  
14:32:44 that this is where we want students to  
14:32:44 get.  
14:32:49 So, for example, this is not saying  
14:32:54 that rigor is focused on students being  
14:33:00 able to do procedure and define  
14:33:00 vocabulary.  
14:33:04 Being able to do procedure is  
14:33:07 important, being able to define

14:33:10 vocabulary is important, but it's a  
14:33:13 result of the work that comes before it.  
14:33:17 So we've got a chat from Kyle about  
14:33:20 the concepts of active learning,  
14:33:23 conversational language.  
14:33:24 Yes, yes.  
14:33:27 So the research clearly shows that  
14:33:31 students need to approach or be exposed  
14:33:35 to new content with a concerning to  
14:33:38 their prior experiences and their prior  
14:33:38 knowledge.  
14:33:42 And, so, if a new concept is being  
14:33:47 introduced, students need to be able to  
14:33:50 touch it and taste it, and hold it with  
14:33:54 their own language, describe how it  
14:33:57 makes sense to them, or what doesn't  
14:33:58 make sense to them.  
14:34:01 But over time, we move them to the  
14:34:03 point to where they are able to  
14:34:06 communicate and use the appropriate  
14:34:09 language both verbal language and  
14:34:13 methodical notation language.  
14:34:14 So I do want to clarify that  
14:34:17 mathematical language, just talking both  
14:34:18 about words and notation.  
14:34:27 And, so, we need students to get to  
14:34:29 that point where they're able to justify  
14:34:31 their work.  
14:34:33 And justify it to a level of clarity  
14:34:37 and precision as to when does this  
14:34:37 procedure work?  
14:34:40 Why did you choose this procedure?  
14:34:41 Does it work all the time?  
14:34:42 When does it work?  
14:34:45 Be able to put those parameters on it.  
14:34:50 So, for example, thinking about do you  
14:34:56 know when to use the quadratic formula?  
14:34:59 Knowing how is important, but knowing  
14:35:01 when is more important.  
14:35:06 And also can you then interpret your  
14:35:07 results?  
14:35:12 So oftentimes we have problems that  
14:35:17 just asks students to get to a numerical  
14:35:20 or algebraic result that they don't then  
14:35:21 have to explain.  
14:35:26 And, so, taking them all the way back  
14:35:28 to what was the original scenario that  
14:35:31 this came from, and what does this  
14:35:33 result mean in terms of that scenario?  
14:35:39 So that's a little bit of discussion

14:35:43 about what this definition of rigor  
14:35:43 represents.  
14:35:48 If we look at it kind of  
14:35:52 expanded a little bit, here's are some  
14:35:54 of the bullet points that came out of  
14:35:56 those discussions that we had in the  
14:35:57 field.  
14:36:00  
14:36:37 So we have a question about the  
14:36:38 definition.  
14:36:44 So, yeah, the communication of  
14:36:48 mathematical language, to be able to  
14:36:53 communicate mathematically, both with, I  
14:36:53 guess English words and mathematical  
14:36:53 notation.  
14:36:54 Yeah.  
14:36:57  
14:37:07 If anyone has something specific they  
14:37:10 want to comment on these bullet points,  
14:37:11 go ahead and enter in the chat box.  
14:37:12 And we'll come back to it.  
14:37:15 I want to focus on bullet point No.  
14:37:16 4 for a minute.  
14:37:22 Because it's got -- there's a lot  
14:37:26 going on in bullet point No.  
14:37:30 4 and I want to focus on few of the things.  
14:37:31 One, it talks about math departments  
14:37:33 should play an essential role in  
14:37:34 determining the content of their  
14:37:35 introductory courses.  
14:37:38 And really focus in on that idea of  
14:37:40 the department working together.  
14:37:45 I think, especially, if your  
14:37:48 institution has a lot of adjunct  
14:37:51 faculty, oftentimes adjunct faculty tell  
14:37:54 us how disconnected they feel, how  
14:37:56 isolated they feel from their department.  
14:38:01 And, so, you know, one way in which  
14:38:04 that can be addressed is that the  
14:38:08 department's working together on content.  
14:38:10 Rather than just selecting a common  
14:38:13 book, for example, actually talking  
14:38:16 about  
14:38:19 which successes should be covered in a course.  
14:38:21 Particularly, this concern that you  
14:38:23 have about college Algebra if college  
14:38:25 Algebra needs to get to a certain point.  
14:38:28 Really, the entire department and the  
14:38:31 entire algebraic sequence should  
14:38:31 understand, right?

14:38:34 What's going on in that college  
14:38:41 Algebra course so that the next course,  
14:38:47 trig, pre-calc 2 and calculus and, so,  
14:38:48 on and everybody in the department knows  
14:38:50 what happened at each step of the game.  
14:38:54 And, so, having those math department  
14:38:57 discussions about what happens, that's  
14:39:03 not to say that everybody is, like,  
14:39:07 robots that have to do exactly the same thing.  
14:39:09 People are obviously going to bring  
14:39:11 their own style to the class, they're  
14:39:14 going to bring their own applications.  
14:39:17 But that of any should understand  
14:39:21 which procedures are being taught,  
14:39:22 whether there is a focus on  
14:39:23 communication.  
14:39:25 If everyone in the department can  
14:39:28 agree on a focus on communication, then  
14:39:31 just think about how well students would  
14:39:33 be able to communicate mathematically  
14:39:37 two or three or four courses down the road.  
14:39:41 It can make the calculus work so much  
14:39:43 easier if the students already knew how  
14:39:45 to have those mathematical discussions  
14:39:50 and written explanations from earlier  
14:39:52 experiences in college Algebra, for example.  
14:40:00 Another piece of this is the  
14:40:06 working in conjunction with the  
14:40:07 professional associations.  
14:40:10 And the needs of the program of  
14:40:10 studies.  
14:40:14 And the professional associations have  
14:40:16 publications that talk about things like  
14:40:19 the communication that should take place  
14:40:20 within math courses.  
14:40:24 The programs that are served by these  
14:40:27 courses can tell you what sort of  
14:40:28 mathematical needs the students have.  
14:40:34 So that the math course becomes useful  
14:40:36 within the student's program rather than  
14:40:40 just a check box on their degree plan.  
14:40:42 That they're actually learning some  
14:40:44 mathematics, particularly in the math  
14:40:46 liberal arts or statistical courses.  
14:40:49 Make sure that the concepts are being  
14:40:51 covered in those course that is really  
14:40:53 do serve the programs.  
14:40:55 But the math department then has to  
14:41:00 make that, make it all coherent, right?  
14:41:03 A department might know some isolated

14:41:05 skills that are needed, but the math  
14:41:07 department is the one that knows how to  
14:41:11 make the coherent sequence out of those  
14:41:11 isolated skills.  
14:41:13 Synthesizing what comes from several  
14:41:16 different departments and making a  
14:41:21 coherent semester out of it so students  
14:41:23 know how to use the math once they get  
14:41:24 into the program.  
14:41:27 We've got another comment about  
14:41:27 precise.  
14:41:30 Yes, as you progress through more and  
14:41:34 more courses, and get to go more  
14:41:36 precision with the language, the further  
14:41:38 you get into the courses.  
14:41:38 Definitely.  
14:41:40 That's a great point, Sean.  
14:41:40 Thank you.  
14:41:44 And that's probably something the math  
14:41:46 department needs to discuss.  
14:41:49 Because like what level of precision  
14:41:51 is expected.  
14:41:54 What level of language precision is  
14:41:58 expected at the end of each of the  
14:42:00 course that is occur in the sequence.  
14:42:01 That's a great point.  
14:42:04  
14:42:05 Okay.  
14:42:07 Other comments?  
14:42:09 Anybody want to jump in with that?  
14:42:11 Or any of the bullet points here.  
14:42:14  
14:42:33 Okay, so I'm going to go on to our  
14:42:37 first classroom tip, which is as we  
14:42:39 think about this, that students need to  
14:42:42 know which procedure.  
14:42:45 Sometimes we actually end up feeding  
14:42:50 into this learning of procedure but not  
14:42:51 knowing when to do it.  
14:42:55 If I spend a particular day on a  
14:42:57 particular topic, then the students know  
14:43:01 what they're supposed to do when they to  
14:43:03 home to do that homework.  
14:43:07 Today, we did the quadratic formula,  
14:43:10 so I bet the homework is about the  
14:43:10 quadratic formula.  
14:43:13 So I would say a classroom tip would  
14:43:15 be that we mix it up some.  
14:43:19 In your homework, throw in a few  
14:43:22 problems that



14:43:24 use some of the old strategies.  
14:43:26 If you provide an exam study guide,  
14:43:28 don't have the problems in the opposeder  
14:43:31 of the chapter, but mix them all up, and  
14:43:33 the students have to then look at the  
14:43:36 chapter more as a whole and figure out  
14:43:38 what is the appropriate strategy.  
14:43:41 So they're having to not just practice  
14:43:43 strategies that practice selecting  
14:43:44 strategies as well.  
14:43:48 And I know before I started mixing up  
14:43:54 my study guides, my students were always  
14:43:55 getting stuck on that.  
14:43:57 I don't know what to do when.  
14:44:00 I knew how to do it on the homework,  
14:44:02 but I don't know how to do it on the review.  
14:44:04 Because they were remembering what we  
14:44:05 did that day.  
14:44:09 And once I started mixing them up on  
14:44:12 my study guide, it made a difference.  
14:44:14 It didn't always solve the problem,  
14:44:15 but it did make a difference.  
14:44:18  
14:44:27 Okay, this definition of rigor goes on  
14:44:30 more than  
14:44:32 definition.  
14:44:35 This is a way for us to know if the  
14:44:37 student has reached a level of rigor.  
14:44:39 If they can get to this point of  
14:44:42 justifying their work, why they I  
14:44:43 couldn't find a procedure, that sort of  
14:44:46 thing, then it's starting to reach that  
14:44:46 point of rigor.  
14:44:48 But what happens in the classroom that  
14:44:49 gets them to that point?  
14:44:54 So we have a graphic that represents that.  
14:45:01 That it's really a combination of  
14:45:06 conceptual understanding, procedural  
14:45:09 fluency, and application.  
14:45:11 And the conceptual understanding and  
14:45:14 application are on the bottom, because  
14:45:17 they're the foundation that leads to  
14:45:18 procedural fluency.  
14:45:23 We often kind of focus on procedural  
14:45:25 fluency, because it's easy to assess.  
14:45:32 But it should be the end result, not  
14:45:32 the beginning point.  
14:45:36 Students don't develop conceptual  
14:45:40 understanding from doing a procedure  
14:45:41 multiple times.

14:45:43 They become better at a procedure when  
14:45:45 they understand the procedure.  
14:45:50 So, the research on how students learn  
14:45:53 and how students learn mathematics is  
14:45:57 clear on the foundational role that  
14:46:00 conceptual understanding and the work  
14:46:04 being embedded in application plays in  
14:46:06 reaching that point of procedural  
14:46:07 fluency.  
14:46:11 The application, the students being  
14:46:15 able to tie each part of the procedure  
14:46:19 to something real that they understand  
14:46:22 leads to them being more fluent with  
14:46:23 their procedures.  
14:46:26 And then all of that is tied into  
14:46:26 communication.  
14:46:29 That if they can communicate with  
14:46:32 other students, that deepens they are  
14:46:34 conceptual understanding, which then  
14:46:39 feeds into this improved procedural fluency.  
14:46:42  
14:46:49 Sean says should you provide a study  
14:46:49 guide?  
14:46:51 I know there's a lot of discussion  
14:46:52 about that.  
14:46:56 Some people feel like a study guide  
14:46:59 can be  
14:47:01 too enabling or something?  
14:47:03 I'm not sure I'm thinking of the right  
14:47:03 word.  
14:47:09 Yeah, and a distinction between the  
14:47:11 study guide and practice exam,  
14:47:12 definitely important.  
14:47:17 If you're giving students an exam, a  
14:47:19 study guide that look like your exam,  
14:47:21 and your exam is just going to be  
14:47:24 different numbers, then, you know, some  
14:47:26 people would say, I want my students to  
14:47:28 know how I'm going to assess them.  
14:47:31 And other people would say, all  
14:47:33 they're doing is memorizing the  
14:47:36 procedure, what to do when, and they  
14:47:37 won't remember next week.  
14:47:43 So there definitely is a tension there  
14:47:45 between a study guide and a practice  
14:47:45 exam.  
14:47:46 And approximate I'll skip back over  
14:47:50 here and say that bullet 4, math  
14:47:52 departments should play an essentially  
14:47:58 role in determining the content of their

14:48:03 introductory courses.

14:48:05 These are great things for departments

14:48:05 to discuss.

14:48:09 And try to come to some sort of

14:48:15 agreement on how much, what kinds of

14:48:17 support, and how much support are we

14:48:18 going to give?

14:48:20

14:48:21 >> May I add something to that?

14:48:22

14:48:26 >> You have definitely welcome, Joan.

14:48:26

14:48:28 >> It might be worth looking into the

14:48:28 research.

14:48:31 I have research that both supports the

14:48:33 use of a study guide of some sort and

14:48:35 research that maybe indicates there's

14:48:38 some study guides that are not useful,

14:48:41 because they can focus students

14:48:43 attention only on the things that in the

14:48:45 study guide and therefore, they forget

14:48:46 anything else that might have been

14:48:47 mentioned in class.

14:48:49 So there's some education research out

14:48:52 there than can be useful as you're

14:48:57 trying to identify the parameters of if

14:48:59 you give a study guide, what would be

14:49:00 most useful for students and their

14:49:02 overall retention and understanding.

14:49:03

14:49:05 >> Can I add something?

14:49:05

14:49:08 >> Thanks, Judith, sure.

14:49:08

14:49:10 >> Well, I found out that even better

14:49:14 than a study guide is to actually spend

14:49:18 a class session, having student groups

14:49:20 come up with the big ideas that they

14:49:22 have learned so far.

14:49:26 And then brainstorm that and agree on

14:49:27 a class of big ideas.

14:49:31 And then I assign the groups to come

14:49:35 up with an example of each of those

14:49:36 ideas they need to revisit and rework.

14:49:40 So they actually, this turns the idea  
14:49:42 of review around backwards.  
14:49:45 So they have to identify the big  
14:49:48 ideas, and then go back and find the  
14:49:49 detailed problems that fit those.  
14:49:52 And that adds a dimension to their  
14:49:52 learning.  
14:49:55  
14:49:55

14:49:56 >> That's great.  
14:49:57 Yes, it does.  
14:50:01 And it's exactly what you would want  
14:50:03 students to do if you didn't provide  
14:50:05 them a study guide, right?  
14:50:09 So you're training them in learner  
14:50:09 strategies.  
14:50:17 So Sean mentions what expectations  
14:50:19 student might be bringing from high  
14:50:19 school.  
14:50:21 And when they get to college, we  
14:50:24 expect them to be more of a self-starter.  
14:50:25 But they often don't have the skills  
14:50:26 to do that.  
14:50:28 They don't know those strategies.  
14:50:36 And, so, what Judy  
14:50:39 Id is scribing what we hope they would do.  
14:50:41 So go ahead, somewhere along the line,  
14:50:43 they have to learn that and that's a  
14:50:48 great way to provide, and in those  
14:50:50 introductory, Gateway courses, freshman  
14:50:53 year, set aside that class time that  
14:50:55 maybe you would have normally spent  
14:50:58 reviewing with them, set aside the time  
14:51:00 they work together to identify what are  
14:51:03 those big ideas?  
14:51:05 What are the thing that we need to  
14:51:05 practice?  
14:51:08 Go find some problems and practice  
14:51:08 them.  
14:51:11 It's exactly what we would expect the  
14:51:13 older students to do somewhere along the  
14:51:16 line, they need to figure it out, and  
14:51:18 they need help in figuring that out.  
14:51:19 That's great.  
14:51:20 Thank you.  
14:51:22 Other thoughts?  
14:51:25  
14:51:35 So, kind of adding to this graphic and  
14:51:38 focusing on the bottom right-hand side

14:51:42 now, the application, you know, a lot of  
14:51:42 times.  
14:51:44 Application comes in at the end.  
14:51:47 But we would advocate the application  
14:51:48 should come at the beginning.  
14:51:53 At a students need to see what  
14:51:56 -- that these are things that are  
14:51:57 useful in the real world.  
14:52:02 And students think that word problems  
14:52:02 confuse them.  
14:52:07 And I'm sure some of their experiences  
14:52:08 with word problems have confused them.  
14:52:14 But in actuality, if the word problems  
14:52:17 are well-chosen, it can add to the  
14:52:19 student's understanding because they can  
14:52:21 attach meaning to what they're doing.  
14:52:23 And, so, our second classroom tip  
14:52:27 would be that we introduce new concepts  
14:52:28 with an application problem.  
14:52:32 Rather than starting from the  
14:52:35 procedure and then moving to what it's  
14:52:37 good for, start with the application  
14:52:41 problem, break it down, and then explore  
14:52:43 what the procedures are, the strategies  
14:52:44 are.  
14:52:48 And then wrap-up the problem by  
14:52:51 writing the answer in a sentence or a  
14:52:53 paragraph that thoroughly answers the question.  
14:52:58 And that can be, students don't know  
14:53:02 how to do that instinctively, in fact,  
14:53:04 they usually don't know each though what  
14:53:06 that numerical or algebraic number  
14:53:07 represents, right?  
14:53:10 I started out asking my students, you  
14:53:12 know, making my students put the units.  
14:53:16 And then I started making my students  
14:53:17 write a sentence.  
14:53:21 And that the sentences were nonsense  
14:53:22 at the beginning.  
14:53:24 They really had no idea what that  
14:53:25 answer represented.  
14:53:28 And, so, we started practicing writing  
14:53:29 sentences together.  
14:53:33 So you can ask the student, you know,  
14:53:35 somebody give me the units on this answer.  
14:53:37 And if we put the units on the board.  
14:53:38 You know?  
14:53:40 25 cards.  
14:53:41 Whatever.  
14:53:46 And then okay, what about these 25 cards?

14:53:48     Somebody give me more detail.  
14:53:49     And you get a little bit more detail  
14:53:51 and you add to the sentence.  
14:53:53     Add a little bit more detail and add  
14:53:55 to the sentence, until finally by the  
14:53:58 time we're finished, the student can say  
14:54:02 that, you know, the production line  
14:54:04 worked for 8 hours and produced 25 cars.  
14:54:06     Something like that.  
14:54:11     And once you do a few practice  
14:54:15 problems with them, they  
14:54:17 will get better and better at it.  
14:54:20     And they will know what they have done  
14:54:22 at the end, and they're more likely to  
14:54:24 know whether or not their answer is  
14:54:26 reasonable when they put that answer  
14:54:27 within a complete sentence.  
14:54:31     We've all seen those horrific answers  
14:54:32 that make no reasonable sense.  
14:54:35     And the student would have known that  
14:54:40 if they had written a thorough word  
14:54:42 response that would tell them that it  
14:54:43 didn't make any sense.  
14:54:46  
14:54:49     Other thoughts?  
14:54:52  
14:55:02     So it seemed to us from the discussion  
14:55:05 and from the poll that there really  
14:55:09 wasn't a lot of concern about statistics  
14:55:12 or math liberal arts.  
14:55:14     But really the concern is around  
14:55:18 support forces and especially for the  
14:55:18 algebraic path.  
14:55:21     So we're going to skip on over a  
14:55:21 little bit.  
14:55:24     And I'm going to turn it over to Joan  
14:55:29 to look at some in class actions and  
14:55:33 problems that are part of a rigorous  
14:55:34 classroom.  
14:55:36     So in the next few slides, Joan has  
14:55:39 some common classroom behaviors and  
14:55:42 statements, and she's going to take you  
14:55:43 through a discussion about those  
14:55:44 behaviors and statements.  
14:55:45  
  
14:55:47             >> So if all of you can go ahead and  
14:55:49 click on the bottom of your page where  
14:55:51 it says participants.  
14:55:53     The whole participants list will come

14:55:54 up.  
14:55:56 And on the bottom of the page, there  
14:55:58 is a button that says, yes and button  
14:56:00 that says, no you can click on to kind  
14:56:02 of vote for which answer you think is  
14:56:02 appropriate.  
14:56:04 So it's a little green checkmark.  
14:56:06 And a little red X.  
14:56:08 Can people see that?  
14:56:09 You can nod your heads.  
14:56:10 Awesome.  
14:56:12 So we're going to go through a few  
14:56:14 kind of concrete examples of thing that  
14:56:17 might happen inside a class, thing you  
14:56:19 might observe if you were watching a  
14:56:21 class or designing a class in advance to  
14:56:24 prepare for future semesters.  
14:56:26 And we're going to talk about whether  
14:56:29 or not these seem to be characteristic  
14:56:33 of a class we consider to be rigorous.  
14:56:35 And if not, what we want to do  
14:56:37 differently to make that class rigorous.  
14:56:38 So here's our first one.  
14:56:41 And we're going to try that voting.  
14:56:44 If you feel like this is an aspect of  
14:56:47 a rigorous course, please vote yes.  
14:56:48 Otherwise, please vote no.  
14:56:50 Ooh, I have two votes.  
14:56:50 Three.  
14:56:52 This is very exciting.  
14:56:54 I've never used this feature before.  
14:56:57  
14:57:07 So we have a number of votes in at this point.  
14:57:08 Not everybody, but it seems like it  
14:57:09 slowed down a lot.  
14:57:12 General consensus seems to be yes.  
14:57:15 And, indeed, that's what I would go as well.  
14:57:16 This is a low-hanging fruit because  
14:57:18 this is what we've been talking about in  
14:57:20 the whole session is having these  
14:57:20 concernings.  
14:57:24 But we would expect in a rigorous  
14:57:25 course, that students would be able to  
14:57:27 recognize and make connections between  
14:57:28 the different ideas we're discussing.  
14:57:31 And we will actually talk about this  
14:57:34 aspect of a rigorous course in further  
14:57:36 detail in terms of what connections we  
14:57:38 might be looking for, and ways that we  
14:57:40 can foster those in our classes.

14:57:45 So I'm going to clear all your votes  
14:57:45 and I'm going to move on to the next one.

14:57:48

14:57:51 Again you're going to vote on whether  
14:57:53 you feel like this would be a  
14:57:54 characteristics of a rigorous course.

14:57:57

14:58:09 So this one we're getting some  
14:58:11 difference of opinions.

14:58:14 Some people are saying various things.

14:58:15

14:58:19

14:58:24 >> I think people might wish it was  
14:58:25 different question.

14:58:25

14:58:30 >> People might be leaning towards  
14:58:30 another option.

14:58:33 So simply as written, that the answer  
14:58:35 here is that this is not strictly  
14:58:38 characteristic of a rigorous course,  
14:58:40 because this is a very cut and dry  
14:58:40 statement.

14:58:42 It says you have to memorize things  
14:58:44 and use a specific procedure.

14:58:48 While memorization is an important  
14:58:49 part of learning things and knowing how  
14:58:53 to, you know, having those various  
14:58:56 procedures learned in such a way that  
14:58:59 you can use them consistent and  
14:59:00 accurately every time.

14:59:03 We could say this could be improved  
14:59:05 upon to make the course even more rigorous.

14:59:10 Does anybody have any idea how we  
14:59:10 might change this descriptor in order to  
14:59:13 make it lead to a more rigorous course?

14:59:16

14:59:20 Either enter in the chat or unmute  
14:59:20 yourself and share verbally.

14:59:24

14:59:36 So Kyle is saying remove the word  
14:59:36 "Required."

14:59:39 " So there's memorization but not  
14:59:39 something we test on.

14:59:44 Any other thoughts on how we might  
14:59:46 modify this statement to make it a more  
14:59:47 rigorous statement?

14:59:49 Okay.

14:59:54 So Kathy is sharing that application



14:59:58 might be a better use as more advanced  
15:00:00 use of Bloom's taxonomy.  
15:00:03  
15:00:10 The other thing I would say rather than  
15:00:14 requiring students to memorize this,  
15:00:16 have they happen explore more strategies  
15:00:18 until they find something that make more  
15:00:23 sense to them they can use  
15:00:24 accurately most of the time.  
15:00:26 This would also then help students  
15:00:28 identify there's not just one way to do  
15:00:28 a problem.  
15:00:31 I think that's a common misconception  
15:00:32 with a lot of our students, well, this  
15:00:35 is the one way to do it, well, if I  
15:00:38 don't do it this way, it can't be right.  
15:00:39 So allowing for that intellectual  
15:00:41 flexibility in the classroom where  
15:00:43 students are allowed to explore and try  
15:00:44 different strategies.  
15:00:47  
15:00:48 Here's a third one.  
15:00:54 And I know we don't have that eh,  
15:00:57 answer so go with your greater than 50% answer.  
15:01:00  
15:01:17 So I find this is one to be interesting.  
15:01:22 Mostly we're getting no votes, which  
15:01:22 is indeed I would agree with as far as  
15:01:25 this being a characteristic of a rigorous course.  
15:01:26 But I would also think back on most of  
15:01:29 the courses I took as a student, even  
15:01:33 ones that felt pretty darn rigorous when  
15:01:35 I was in them, there was some component  
15:01:37 of teachers doing some work while  
15:01:38 students watched.  
15:01:41 I think the question is when does that  
15:01:41 occur?  
15:01:43 Is it as an introduction where the  
15:01:46 teacher shows a procedure if then the  
15:01:48 students really mimic that procedure?  
15:01:51 Or is it perhaps in an instance where  
15:01:53 students have constructed their  
15:01:54 understanding and then the teacher is  
15:01:57 showing them a mathematically correct  
15:01:58 and efficient way to do that?  
15:02:01 So I think there's absolutely, I mean,  
15:02:04 time for teachers to do work in a classroom.  
15:02:07 But we want to think about the balance  
15:02:09 of that work as we're trying to design  
15:02:12 our classes in a rigorous way, so that

15:02:15 it's not simply I do one, do you one, I  
15:02:19 do one, do you one pattern that is so  
15:02:21 traditionally thought of as being the  
15:02:22 way math is taught.  
15:02:25 Any comments that anyone would like to  
15:02:26 make about this one?  
15:02:29 Either in text or out loud?  
15:02:32  
15:02:37 Okay.  
15:02:38 Let's see here.  
15:02:43 So Kyle, let me see if I  
15:02:45 can translate this.  
15:02:47 Students doing the work while  
15:02:48 teachers, no, that can't be right.  
15:02:50 While teachers engage?  
15:02:53  
15:02:55 That is what you intended?  
15:02:58  
15:03:04 So good lecture may have both parties  
15:03:04 in material.  
15:03:05 That's true.  
15:03:08 It's an interesting -- and some skills  
15:03:10 can be learned by watching others.  
15:03:17 It's an interesting thing to think  
15:03:18 about in our lives.  
15:03:22 I think about the times I tried to  
15:03:25 learn how to ski, and my partner is a  
15:03:27 spectacular skier and it's wonderful to  
15:03:30 watch him ski, and then I fall down a lot.  
15:03:35 And while it is not a physical  
15:03:37 activity in the same way skiing is, but  
15:03:38 I think there's a place for both.  
15:03:40 Not just watching, but maybe watching  
15:03:43 once we tried something as a way to see  
15:03:45 how to correct any mistakes that we've  
15:03:47 been making as learners and students.  
15:03:52 And lecture can, indeed, be engaging  
15:03:53 for both parties.  
15:03:54 But it's important to pay attention to  
15:03:57 who is being engaged and how much.  
15:04:01 And there's some interesting research  
15:04:04 out there that talks about accounting  
15:04:04 interactions.  
15:04:07 And, so, the teach had a very  
15:04:09 interactive class because they  
15:04:10 interacted on every single question.  
15:04:14 But the part that interacted with were  
15:04:15 3 people in a class of 30.  
15:04:18 So 27 students of those students were  
15:04:20 not having an interactive or learning

15:04:21 experience.  
15:04:24 So it may feel interactive from one  
15:04:26 experience, we have to make sure it's  
15:04:28 interactive from all perspectives in the  
15:04:29 classroom.  
15:04:29

15:04:33 >> I know, I always started out  
15:04:37 feeling like I had to demonstrate every  
15:04:39 possible scenario that could happen.  
15:04:42 You know, every little twist to the problem.  
15:04:45  
15:04:48 And that didn't leave any time for the  
15:04:49 students to be doing the work.  
15:04:54 And, so, once I let go of that and  
15:04:56 realized if I could get the students  
15:04:58 started, and then give them the chance  
15:05:01 to experience the issues of the  
15:05:03 different configurations, that it was  
15:05:07 much more worthwhile.  
15:05:07

15:05:10 >> Right.  
15:05:10 Last scenario.  
15:05:11  
15:05:21 And you could reframe this list for  
15:05:22 whatever course you were thinking of.  
15:05:25 This would probably be a college  
15:05:25 Algebra class.  
15:05:29  
15:05:37 So I've got one vote in so far.  
15:05:39 I think this might be a bit of a harder  
15:05:41 addition to make.  
15:05:44  
15:06:01 So voting is much slower on this  
15:06:02 particular problem.  
15:06:02 Right?  
15:06:04 It's not so black and white.  
15:06:04 Right?  
15:06:07 This yes or no question is a little  
15:06:07 bit of a challenge.  
15:06:13 And, so, this is actually prompting  
15:06:15 some wonderful conversations without me  
15:06:17 even moving on to the highlighting the  
15:06:19 no in red.  
15:06:22 Which is there's questions we need to  
15:06:23 ask, right?  
15:06:25 Are they ever going to use these  
15:06:28 skills in their future, professional, or  
15:06:31 academic lives and if not, then maybe

15:06:33 there are other skills that are as  
15:06:35 mathematically relevant and challenging  
15:06:37 that would be more appropriate for those  
15:06:37 students.  
15:06:40 So that's certainly a thing to  
15:06:40 consider.  
15:06:43 Another part that's left out about  
15:06:46 this statement is whether they  
15:06:48 understand when to perform these  
15:06:51 algebraic tasks.  
15:06:55 Or whether they understand the  
15:06:56 underlying principles behind any of  
15:06:57 these tasks.  
15:07:00 So that would also be something to  
15:07:03 consider as we're looking at a  
15:07:04 characteristics of a rigorous course.  
15:07:07 But so often we go to meetings and we  
15:07:09 talk about either removing or adding  
15:07:12 topics, if there's this concern of well,  
15:07:14 if we take out this topic, the class  
15:07:16 will no longer be rigorous.  
15:07:22 And, so, we want to move beyond a  
15:07:24 laundry list of concepts for rigor,  
15:07:27 we're making sure it's a holistic  
15:07:30 concept and not just a coverage list  
15:07:32 that forces to be rigorous.  
15:07:36 Are there any comments anybody would  
15:07:37 like to make about this one?  
15:07:40  
15:07:48 So these are just four examples.  
15:07:52 We have a side-by-side comparison now  
15:07:54 of things we would expect in a rigorous  
15:07:57 course versus thing that would not be as  
15:07:59 rigorous as we would like that we want  
15:08:00 to move away from.  
15:08:03 So I want to give you a moment to read  
15:08:06 through these and see if this sparks any  
15:08:07 thoughts you would like to share.  
15:08:10  
15:08:44 So for me one of the ones on this page  
15:08:46 that took me a while to make my piece  
15:08:50 with was the quantity versus quality.  
15:08:55 I was going to get through that list  
15:08:59 of topics, you know, I don't care if it  
15:09:02 snowed, we were going to get through everything.  
15:09:04 And I found switching to making sure  
15:09:08 that some of the higher level topic were  
15:09:11 covered with more depth and conceptual  
15:09:12 understanding, students were able to  
15:09:15 pick up the nuances of those topics

15:09:16 without necessarily having to spend  
15:09:23 class time explicitly discussing them  
15:09:25 because of the general concept that  
15:09:27 those subtopics fell under.  
15:09:30 So, this is, again, why it's so  
15:09:32 important to have discussions with the  
15:09:33 whole department, because you have to  
15:09:36 find the balance between how do we get  
15:09:39 that deep conceptual understanding while  
15:09:44 not sacrificing some of the nuances but  
15:09:48 which of the nuances could we have  
15:09:50 students pick up later once they have a  
15:09:51 more deep understanding?  
15:09:54  
15:09:57 Any comments about these four  
15:09:57 comparisons?  
15:10:01  
15:10:14 Okay, we have couple more on the next  
15:10:14 page.  
15:10:15 So, again, side-by-side comparison if  
15:10:17 these are more related to the four we  
15:10:18 talked about.  
15:10:20 So we're going to spend less time on  
15:10:21 this page.  
15:10:23 But, again, things we want to strive  
15:10:26 for as we design and teach our courses  
15:10:28 are the thing that are on the left-hand  
15:10:29 side of this list.  
15:10:31 We want to make sure that our  
15:10:33 students, regardless of what level  
15:10:36 they're in are exposed to rich  
15:10:38 mathematical concepts that are applied,  
15:10:40 and whether given the opportunity to  
15:10:42 explore and be flexible about the time  
15:10:43 of mathematics they're using.  
15:10:46  
15:10:55 So we're going to do another poll next.  
15:10:58 And, again, this is going to have,  
15:11:00 because our polling feature is not  
15:11:02 working quite right today, we're going  
15:11:07 to have you Type I, 2, 3, 4 or 5, I  
15:11:11 believe in the chat to answer this poll.  
15:11:12 And if you answer 5, please go ahead  
15:11:15 and elaborate on that.  
15:11:18 So as you think about your classes and  
15:11:20 the side-by-side comparisons that we  
15:11:24 have just looked at, what are your --  
15:11:26 what do you identify as being the  
15:11:28 biggest challenges to ensuring that your  
15:11:31 Gateway math courses are rigorous?

15:11:32 That's the whole point of today's  
15:11:35 session is to talk about how do we  
15:11:37 maintain rigor in our first year courses?  
15:11:39 Which of these challenges are the one  
15:11:44 that gives you the most, seems like the  
15:11:45 biggest hurdle to you?  
15:11:48  
15:12:03 So we're starting to get some answers.  
15:12:05  
15:12:12 So it looks like you're responding to  
15:12:15 me privately, if you can go into the  
15:12:17 chat for everyone, that we everyone can  
15:12:18 see your response.  
15:12:21  
15:12:30 I'm seeing a lot of 3s and 4s.  
15:12:33  
15:12:47 And I think these are, let me --  
15:12:47 all right.  
15:12:50 Finding those authentic problem is  
15:12:51 also a challenge.  
15:12:57 Azar When you go to the chat where it  
15:12:59 says 2, where it says my name.  
15:13:01 When you click on that, you should be  
15:13:04 able to pull down that says everyone  
15:13:05 instead.  
15:13:07 There we go.  
15:13:10  
15:13:15 So seems like a lot of the challenges  
15:13:18 are around this idea the how we get  
15:13:21 students to take control of their own  
15:13:25 learning, how we encourage them to learn  
15:13:30 effective and get something out of their  
15:13:33 collaborative work  
15:13:34 and develop their own strategies.  
15:13:37 Does that seem like an appropriate  
15:13:39 summary of what I'm seeing?  
15:13:42  
15:13:44 So the next thing we're going to talk  
15:13:47 about here then is how we can design  
15:13:50 activities and assignments that get at  
15:13:52 these questions of helping students  
15:13:54 develop their own strategies, helping  
15:13:56 them take control of their own learning,  
15:14:00 and making sure they actually have  
15:14:00 takeaways from those experiences.  
15:14:03  
15:14:08 So as part of our research into rigor.  
15:14:10 We have identified several  
15:14:13 characteristics that  
15:14:15 of activities if assignments that

15:14:17 promote a rigorous learning experience.  
15:14:20 And, so, I'd like you to read through  
15:14:23 these and see if any of them  
15:14:26 particularly stand out, or if you like  
15:14:28 clarification on any of them.  
15:14:31  
15:15:07 At the moment, it looks like I'm seeing  
15:15:08 a lot of reading.  
15:15:10 So if anybody would like to share any  
15:15:13 comments or share verbally in the chat box.  
15:15:16  
15:15:32 So this is a challenging list of things  
15:15:34 that we want our activities to do.  
15:15:36 And you wouldn't necessarily try to  
15:15:38 make an activity do all of these at the same time.  
15:15:42 You would try perhaps to have an  
15:15:45 activity that meets some of these  
15:15:46 expectations and then another activity  
15:15:48 that meets some other expectations.  
15:15:51 But these are all things we're hoping  
15:15:54 throughout the course of a coverage of a  
15:15:56 topic, you would help students see these  
15:15:58 different aspects of the topic.  
15:16:03 And looking  
15:16:05 at this third one about making  
15:16:07 connections, I mentioned it's really  
15:16:09 important for students to make  
15:16:12 connections as they're working through  
15:16:13 the different, through the material.  
15:16:17 And, so, I want to talk about  
15:16:20 different types of connections we're  
15:16:21 thinking about when we look at that.  
15:16:23 So these are what we consider to be  
15:16:25 the five aspects of connected learning.  
15:16:28 This is based out of the research  
15:16:28 we've done.  
15:16:31  
15:16:46 Sorry, Shawn asked me to elaborate on  
15:16:47 bullet 5.  
15:16:50 1  
15:16:54 so demonstrating the premise of the  
15:16:55 course is solidly based.  
15:16:58 My understanding is that we want to  
15:17:00 make sure we want the students to  
15:17:02 recognize that the course content is  
15:17:03 based in the real world.  
15:17:04 We're not just making this up.  
15:17:08 You know, it's we're not talking  
15:17:10 necessarily about a Universe in which  
15:17:14 more than 360-degrees make a circle.

15:17:15 Although that's a fun conversation to have.  
15:17:17 We're talking about things you can  
15:17:19 find and identify in the real world.  
15:17:21 And that's why math becomes the basis  
15:17:24 of so many other studies, it's because  
15:17:26 everything in the course is based in  
15:17:30 real-world applications and realities.  
15:17:33 Connie, do you want to add to that at  
15:17:33 all?  
15:17:34

15:17:37 >> And I would say, too, just the  
15:17:39 connections between the concepts.  
15:17:42  
15:17:45 That  
15:17:47 students can demonstrate the  
15:17:48 connections between concepts.  
15:17:53 And one thing that that makes me think  
15:17:57 of is back up to bullet 3.  
15:17:59 It's the multiple representations.  
15:18:10 So I used to kind of do a graphical  
15:18:16 representation of a quadratic and  
15:18:20 algebraic he did it  
15:18:25 interpretation of quad  
15:18:29 ratic and intercepts and students were  
15:18:31 understanding, and they really weren't.  
15:18:34 You have to get deep into  
15:18:36 understanding why, for example, if one  
15:18:43 of the factor is  $X - 3$ , then why is  
15:18:45  $x$ -intercept 3 rather than negative 3?  
15:18:52 Students latch on to, you changede  
15:18:55 the sign kind of thing.  
15:18:57 And rather than having the  
15:19:04 understanding of  $X$  minus 3 is intercept 3.  
15:19:08 So solidly connecting the  
15:19:11 premise of different concepts.  
15:19:11

15:19:13 >> Did that answer your question?  
15:19:16 Okay, coming back to the connected  
15:19:20 learning, there's multiple  
15:19:21 representations which is the brown  
15:19:23 circle on the bottom right, that's one  
15:19:26 the aspects of connected learning which  
15:19:26 is important.  
15:19:28 But there's other aspects as well.  
15:19:31 So the ones that programs come up in  
15:19:33 our conversation already are connections  
15:19:35 to prior knowledge and connections to  
15:19:36 the real world.



15:19:38 But it's also important to pay  
15:19:39 attention to making connections between  
15:19:41 the students.  
15:19:43 Kyle mentioned active learning earlier,  
15:19:45 and making sure that students feel like  
15:19:47 they are connected to each other, that  
15:19:49 they belong in the classroom, and that  
15:19:51 can be fostered through active learning  
15:19:52 and then also connections to technology.  
15:19:56 This is something that is sometimes  
15:19:59 met with reluctance with certain  
15:20:02 departments, the use of technology.  
15:20:03 And acknowledging that sometimes  
15:20:05 technology can illustrate things for  
15:20:09 students in a way that helps them draw  
15:20:12 those connections rather than is simply  
15:20:13 being used as a crutch.  
15:20:15 So all of these aspects of connected  
15:20:18 learning are things to think about as we  
15:20:20 are trying to develop our rigorous  
15:20:20 coursework.  
15:20:27 So our next classroom tip is to  
15:20:28 actually think about these five  
15:20:30 components of connections as we're  
15:20:31 looking at our application problems.  
15:20:34 And Bori mentioned this, I believe  
15:20:37 this concern about how do we find  
15:20:39 authentic application problems and not  
15:20:41 just cookbook application problems that  
15:20:45 are where the application is kind of  
15:20:45 coincidental.  
15:20:48 It's a scenario that happens to have  
15:20:50 those numbers and require that skill,  
15:20:51 but isn't very realistic.  
15:20:54 I mean, how often do we have 40 coins  
15:20:57 in our pocket and need to know how many  
15:21:00 of them are nickels and dimes and know  
15:21:01 how much they're worth?  
15:21:02 Nobody does that.  
15:21:04 Those type of applications.  
15:21:07 And think about the 5 aspects of  
15:21:08 connected learning, sometimes this  
15:21:10 allows us to take application problems  
15:21:12 that are not particularly effective, or  
15:21:15 create our own application problem, but  
15:21:18 then start to make more connection and  
15:21:19 become authentic.  
15:21:24 Any questions about the connected  
15:21:27 learning before we move into the next  
15:21:27 segment?

15:21:30

15:21:39 All right.

15:21:44 So we want to tie this back into the  
15:21:46 K12 standard, the Common Core standards  
15:21:47 we're looking at.

15:21:48 And the reason why this is important  
15:21:50 to refer back to those periodically is  
15:21:52 that our students are increasingly going  
15:21:57 to be coming from classrooms that have  
15:21:59 embraced or incorporated these standards.

15:22:04 So the Common Core has Common Core  
15:22:04 standards and practice standards.

15:22:07 And these are based, or the practice  
15:22:09 standards as we're going to see on the  
15:22:12 next slide are closely related to the  
15:22:13 characteristics of a rigorous classroom.

15:22:15 That's in large part where they came  
15:22:16 from.

15:22:20 Regardless of how we might feel about  
15:22:22 how they're being implemented or  
15:22:22 anything like that.

15:22:25 These are standards that our students  
15:22:27 are starting to encounter earlier and  
15:22:28 earlier in their education.

15:22:32 And both the content standards and the  
15:22:34 practice standards, if they are  
15:22:38 implemented well lead to two inevitable changes.

15:22:40 First is changes to the task and we're  
15:22:43 asking students now to perform not just  
15:22:46 rote repetition tasks, but we're asking  
15:22:49 them to perform more mathematically  
15:22:50 challenging and deep tasks.

15:22:53 But then also it's necessary in many  
15:22:56 cases for many instructors to actually  
15:22:58 change their teaching practices in order  
15:23:00 to meet these standards.

15:23:02 A traditional class where the  
15:23:04 instructor lectures and then sends  
15:23:07 students home to do homework may not  
15:23:10 meet some of those practice standards  
15:23:13 that we're aiming for, and it may  
15:23:15 require more conversation with students,  
15:23:19 more incorporation of group work.

15:23:21 Just different strategies that we can  
15:23:24 use to ensure that those standards of  
15:23:25 rigor are being met.

15:23:28 And all of this really comes down to  
15:23:30 establishing an effective culture in  
15:23:33 your classroom and a climate that  
15:23:35 supports that student collaboration and

15:23:37 student construction of knowledge.  
15:23:41 So just to reinforce what those  
15:23:43 practice standards are, these are the  
15:23:45 practice standards from Common Core.  
15:23:47 And I think you'll notice that they  
15:23:50 look very similar to some of the  
15:23:52 statements that we made about rigorous  
15:23:53 course.  
15:23:56  
15:23:58 I'll let you read through these.  
15:24:02  
15:24:22 So when I read through these, they all  
15:24:22 seem very reasonable.  
15:24:25 They seem like a component of a  
15:24:25 rigorous course.  
15:24:28 But they do lead me to the question of  
15:24:31 how do I actually design something that  
15:24:35 teaches and fosters these practices and  
15:24:41 are aspects of rigor that we're looking for?  
15:24:43 So that's what we're going to focus on  
15:24:46 the next few slides.  
15:24:48 Designing those activities and  
15:24:51 structure so they actually meet those  
15:24:51 riggers and practice standards.  
15:24:54 Before I move on, I want to check if  
15:24:55 see if there's any questions.  
15:24:57 I'm going to scroll through my list of  
15:25:00 faces that I can see and look for any  
15:25:01 indication of questions.  
15:25:04  
15:25:09 Okay.  
15:25:14 So the tasks that promote rigor are  
15:25:16 what we would call rich mathematical  
15:25:16 tasks.  
15:25:19 And these are some of the criteria of  
15:25:20 these tasks.  
15:25:22 It's going to look very similar to our  
15:25:24 previous slide where we were discussing  
15:25:27 the activities, the assignments that  
15:25:27 promote rigor.  
15:25:30  
15:25:35 Again, this is very student-centered.  
15:25:37 We want to focus on students being the  
15:25:39 ones that are constructing their  
15:25:41 understanding, promoting that discussion  
15:25:44 and collaboration between students.  
15:25:47 And the part that often ends up being  
15:25:50 challenging for me at least is having  
15:25:51 the multiple entry points so students  
15:25:53 who are coming to the class with

15:25:55 different backgrounds still have access  
15:25:55 to the problem.

15:25:58 If this is something that came up in  
15:25:59 our earlier discussion, which is as  
15:26:01 we've got our students coming into these  
15:26:03 classes who are maybe just slightly  
15:26:07 below placing into college level versus  
15:26:13 students who indicate they have a low, a  
15:26:15 less extensive math background.

15:26:19 How do we ensure our activities are  
15:26:20 accessible for all students so they can  
15:26:22 all learn and develop the skills that  
15:26:23 they need in those courses?

15:26:28 And, so, all three of these  
15:26:29 considerations have to come into  
15:26:30 creating these tasks.

15:26:32 We need to think about the content and  
15:26:34 what content is important for that  
15:26:34 course.

15:26:37 We need to think about the process  
15:26:37 standards that we're looking for.

15:26:40 And we need to think about making sure  
15:26:41 those tasks promote rigor.

15:26:44

15:26:49 So I've been talking for a while.

15:26:54 And rich tasks are rich topic for discussion.

15:26:56 So we're going to send you into  
15:26:58 another breakout where we like you to  
15:27:00 think about in your courses where you  
15:27:03 have this perhaps wide variety of  
15:27:06 students, what support would you need in  
15:27:10 order to effectively create or implement  
15:27:12 rich tasks in your classes?

15:27:16 So we're going to send you for  
15:27:18 breakouts for 10 minutes to think about  
15:27:23 with this goal, using more rich tach  
15:27:26 tasks, what do you need to make it  
15:27:27 happen.

15:27:33 And Azar's microphone is not working,  
15:27:37 so he has asked Mott  
15:27:39 not to be sent to a group.

15:27:43 So  
15:27:49 Azar, you probably  
15:27:52 have to decline the invitation.

15:27:53 Here we go.  
15:27:56

15:28:15 Okay.

15:28:17 So I'm going to move Bori.

15:28:20

15:28:35 Did you get an invitation to join a group?

15:28:41 So we've got a whole group here that  
15:28:42 hasn't joined.  
15:28:44

15:28:45 >> Look at the bottom of your screen.  
15:28:48 There should be a little decal that  
15:28:51 has four boxes that says breakout.  
15:28:54 If you click on that, it should resend  
15:28:57 you your  
15:29:01 invitation to join.  
15:29:04  
15:29:28

15:29:32 [Breakout session]  
15:35:58

15:36:01  
15:36:28

15:36:30 >> Okay, I think everyone is back.  
15:36:31 Welcome back, everyone.  
15:36:34 Let me just make sure.  
15:36:38 So it looks like we had two groups.  
15:36:40 First group was actually group No.  
15:36:41 2.  
15:36:43 And Chris, would you start off the  
15:36:45 conversation if anyone else from your  
15:36:48 group who love to chime in, we love to  
15:36:50 hear from them as well.  
15:36:50

15:36:52 >> Yes, we were able to start  
15:36:55 discussing just how our different  
15:37:00 campuses provide, our  
15:37:03 they're they're pursuing with that.  
15:37:05 And one of the things we were  
15:37:06 discussing is what is needed to be able  
15:37:09 to do the task that's ahead of us.  
15:37:13 It's more release time and more  
15:37:14 resources for the courses.  
15:37:14

15:37:16 >> Yeah, absolutely.  
15:37:18 Rich tasks are challenge to create.  
15:37:20 And time is absolutely necessary for  
15:37:21 that.  
15:37:24 Is there anything else your group  
15:37:26 discussed that anyone would like to  
15:37:26 share out?  
15:37:26

15:37:29 >> One thing we discussed was the  
15:37:31 implementation of supplemental  
15:37:33 instruction in those courses.  
15:37:36 Realizing that SI leaders in want  
15:37:39 courses do model the behavior that we  
15:37:39 need from the students.  
15:37:42 And being able to be that bridge and  
15:37:45 the gap between those faculties, I'm  
15:37:46 sorry, the curriculum and the students.  
15:37:46

15:37:49 >> So your institution, the SI  
15:37:52 instructors advanced students or  
15:37:52 part-time faculty?  
15:37:54 Who are the SI instructors?  
15:37:55

15:37:59 >> Our supplementary instructors  
15:38:00 leaders are undergrad students from the  
15:38:01 math department.  
15:38:06 And some of them are also from the  
15:38:07 business education as well.

15:38:08 >> Okay.  
15:38:09 Okay.  
15:38:09 Great.  
15:38:16 Anyone else from that group they would  
15:38:17 like for to us share?  
15:38:20

15:38:22 >> No, you did a great job.  
15:38:22

15:38:23 >> I'm sorry.  
15:38:25 I didn't hear what was said.  
15:38:26

15:38:28 >> He did a great job summing it up.  
15:38:28

15:38:29 >> Okay.  
15:38:29 Thank you.  
15:38:32 And the other group, which is named  
15:38:32 Group 3.  
15:38:35 Bori, would you start us off from the  
15:38:37 reporting out on your conversation?  
15:38:40  
15:38:41

15:38:43 >> Yes, so we kind of went off topic  
15:38:45 quite a bit actually.  
15:38:45

15:38:46 >> Okay.

15:38:47 >> So I don't know if you still want  
15:38:48 me to --

15:38:49 >> Please.  
15:38:50

15:38:52 >> So we talked about the structure of  
15:38:54 the courses that we have for the  
15:38:55 students.

15:38:59 And kind of share.

15:39:02 So I shared what the Humboldt model  
15:39:04 was which I described earlier.

15:39:08 And then I forget what campus you guys  
15:39:10 were on, but they were making the  
15:39:14 transition from quarter to semesters,  
15:39:18 and, so, they actually have not remade  
15:39:19 their curriculum.

15:39:22 And one of their biggest challenge is  
15:39:26 that they have a college Algebra class  
15:39:29 that a lot of students who don't need  
15:39:33 math in their majors after this class  
15:39:33 they're taking.

15:39:36 So they kind of feel like students  
15:39:39 tend to be pretty disengaged, because  
15:39:40 it's not really the math they're  
15:39:42 learning is not really that useful.

15:39:45 So they're talking about courses that  
15:39:46 they're going to be developing.

15:39:48 And maybe I should turn it over to them.

15:39:51 But it sounded like they were going to  
15:39:53 do a modeling class they were hoping  
15:39:54 would be more relevant.

15:39:57 You should let them describe the  
15:39:59 curriculum that they're thinking about.

15:40:02

15:40:03

15:40:06 >> Who wants to speak up from that group?  
15:40:07

15:40:09 >> I suppose I could.

15:40:14 Yeah, I think it was, it sounded off  
15:40:15 topic, because it's hard to create these  
15:40:19 classes when we're in such turmoil right

15:40:19 now.  
15:40:21 And, so, we're doing our best.  
15:40:23 We did restructure our college Algebra  
15:40:29 class to its active learning, we're  
15:40:34 using pathway to calculus which work  
15:40:35 well for our S.T.  
15:40:37 E.M.  
15:40:37 majors.  
15:40:40 So there's rich tasks in the  
15:40:41 curriculum.  
15:40:44 But still, for those students for who  
15:40:47 this is a terminal course, they're still  
15:40:49 disinterested in the problem, right?  
15:40:49

15:40:51 >> Is there another option?  
15:40:51

15:40:54 >> Well the problem is that this is  
15:40:58 our second -- all of our programs for  
15:40:59 semesters were due this year.  
15:41:03 And, so, you'll  
15:41:06 all of our efforts were in developing  
15:41:11 these programs for our students, but  
15:41:11 currently the major they're in is  
15:41:12 requesting college Algebra, even though  
15:41:15 we don't think it's best for them.  
15:41:18 Because we do have a math for liberal  
15:41:18 arts.  
15:41:20 And we can't change what's required.  
15:41:22 So the students are in our courses,  
15:41:23 they will have different courses.  
15:41:27 We've done all that discussion before  
15:41:30 E0 1110 with the major departments and  
15:41:31 tried to develop course that is serve  
15:41:33 those departments well.  
15:41:36 But that doesn't happen until 2020.  
15:41:41 And there's no, we don't really have  
15:41:43 the infrastructure to even make anything  
15:41:46 else before then.  
15:41:48 So we're all running pretty thin at  
15:41:48 this point.  
15:41:48

15:41:49 >> Yeah.  
15:41:49 Yeah.  
15:41:50

15:41:53 >> Well, the timing was poor for us.  
15:41:53



15:41:56 >> Yeah, I think it's fair to say that  
15:41:59 all of these changes require a lot of  
15:42:03 energy and mental space, and, you know,  
15:42:06 sometimes there's just not the capacity  
15:42:06 to do that.  
15:42:08 So, for sure.  
15:42:08

15:42:11 >> And we'll say don't worry about off  
15:42:12 topic.  
15:42:15 Because the  
15:42:18 whole point is about what supports you  
15:42:20 need and what will be helpful.  
15:42:24 After every one of these, the teaching  
15:42:26 and learning folks ask us, you know,  
15:42:28 what we heard and what people need, and,  
15:42:30 so, that's what we need for you to talk about.  
15:42:31 So that was perfect.  
15:42:34

15:42:37 >> It is a little bit on topic if you  
15:42:40 don't mind me adding in one of the  
15:42:42 things that is working well.  
15:42:44 So one of the things we did, because  
15:42:45 of this, because we're doing both thing  
15:42:48 at the same time, we did get funding for  
15:42:51 professional development for our TA's,  
15:42:56 our part-time faculty for them those  
15:42:57 faculty who feature our courses, because  
15:43:00 the teaching model is non-traditional  
15:43:01 and there's a lot of active learning.  
15:43:04 And pathways, the pathway curriculum  
15:43:05 is designed for that.  
15:43:09 And I think, and Stephen can probably  
15:43:10 speak to this.  
15:43:13 I think all the professional  
15:43:15 development if coordinating the courses  
15:43:18 has made it good as we can make it now  
15:43:20 and we'll continue that model into the  
15:43:20 future.  
15:43:22 So that has been extremely useful.  
15:43:24 And brought together a community, I  
15:43:27 think, between our part-time faculty and  
15:43:30 our TA's and our full-time faculty.

15:43:31 >> Great.  
15:43:35 If we look at that connected learning  
15:43:37 diagram, maybe something missing is  
15:43:40 between the faculty and you found a good

15:43:41 way to foster that within your  
15:43:42 department.  
15:43:43 So that's really exciting.  
15:43:44

15:43:45 >> In the interest of time, I'm going  
15:43:48 to skip over the next couple of slides  
15:43:52 which are some examples of things,  
15:43:55 classroom activities that may be or  
15:43:58 maybe are a not rigorous.  
15:44:02 But what I want to jump into, because  
15:44:05 it was brought up as a concern, how do  
15:44:08 we design just in time supports if U.S.  
15:44:16 support and other supports that are rigorous.  
15:44:18 So you see these cited on the bottom  
15:44:19 of the page.  
15:44:21 And I want to give you a chance to  
15:44:22 read through these.  
15:44:25  
15:44:44 So would I would claim the second two  
15:44:47 points here are very much in line with  
15:44:51 rigorous thus far we want students to  
15:44:52 construct the knowledge and have a  
15:44:54 chance to struggle and develop their understanding.  
15:44:58 But the one I feel is very important  
15:45:01 that doesn't necessarily always get  
15:45:04 attend  
15:45:09 ed to is this idea that college outline  
15:45:09 in the course.  
15:45:12 The research  
15:45:15 strongly indicates the more students  
15:45:16 see the importance what they're getting  
15:45:18 in the support course showing up in  
15:45:21 their college level course, the more  
15:45:23 likely they are to pay attention to and  
15:45:25 come to their support course, but also  
15:45:27 retain that material and become leaders  
15:45:29 in the college level course as well,  
15:45:31 because they will have seen those  
15:45:34 concepts more recently than the peers  
15:45:37 who are not in the support course.  
15:45:38 And if you have your students in a  
15:45:41 cohort model, it simply reinforces the  
15:45:43 relevance of the content they're getting  
15:45:44 in their support course.  
15:45:47 Now, this doesn't necessarily have to  
15:45:49 be a case where the courses are distinct  
15:45:51 from each other, but the more closely  
15:45:53 align all of the content is, whether  
15:45:56 you're thinking of it as support or

15:45:58 otherwise, the more likely students are  
15:46:02 to retain and grow from that content.  
15:46:05 So I just want to show couple of  
15:46:07 examples of how this content can be  
15:46:07 align.  
15:46:13 So this is a week's worth or a little  
15:46:14 bit more of some course planning that  
15:46:17 actually comes from  
15:46:20 quantitative reasoning course.  
15:46:22 And, so, the way this was designed was  
15:46:23 through a back mapping process.  
15:46:26 And, so, if we look at this particular  
15:46:28 outcome for the college level course,  
15:46:33 using weighted averages to analyze data  
15:46:35 and draw conclusions, it would be  
15:46:37 necessary to think about perhaps a  
15:46:38 student who's under prepared, what  
15:46:41 skills they would need in order to be  
15:46:43 successful during this college course  
15:46:43 activity?  
15:46:45 And, so, the skills identified there  
15:46:48 are this particular lesson whether they  
15:46:50 needed to learn to understand percentage  
15:46:52 as a whole and how to calculate  
15:46:53 percentages with a spreadsheet.  
15:46:55 For instance using weighted average is  
15:46:59 something that was done with a spreadsheet.  
15:47:01 So this type of process of looking  
15:47:04 through the content and doing a back  
15:47:06 mapping process, whether the support  
15:47:10 course is integrated with the regular  
15:47:11 course or otherwise, gives us a chance  
15:47:13 to ensure that everything is very  
15:47:17 closely integrated and allows for some  
15:47:22 of those rich tasks to be even more  
15:47:26 rigorous because of not having to  
15:47:27 backtrack and getting all the way  
15:47:28 through the activity.  
15:47:32 Here's another example from statistics.  
15:47:35 So if we wanted students to be able to  
15:47:38 predict the value of a response variable  
15:47:40 using both the graph of the line and its  
15:47:43 equation, then the support for that  
15:47:46 would include understanding how to use  
15:47:48 linear relationships to make predictions.  
15:47:51 That's not necessarily all that the  
15:47:52 students would need, but some of the  
15:47:57 other previous skills even before using  
15:47:58 linear relationships to make predictions  
15:48:02 would have been incorporated in previous

15:48:05 support conversations.  
15:48:08 So it could be a rolling ball where  
15:48:10 students can pick up throughout the term  
15:48:12 that's more align with their college  
15:48:13 course content.  
15:48:17 Any questions about those two schedules?  
15:48:20  
15:48:27 So one thing, another classroom tip  
15:48:29 that can correlate very well with the  
15:48:32 support course, whether it's a separate  
15:48:35 support course or something that's  
15:48:36 integrated into your college level  
15:48:39 course is providing closure for your students.  
15:48:42 One way to do is something called a  
15:48:43 minute paper.  
15:48:45 Where at the end of class is you do  
15:48:46 any number of things.  
15:48:49 You ask the students to summarize the  
15:48:51 concept they used that day using correct  
15:48:55 terminology and also using their own words.  
15:49:00 And this can act as a warm-up for the  
15:49:04 next class where they review  
15:49:05 for the next class.  
15:49:07 This is a bridge between the support  
15:49:09 course and college level course if  
15:49:09 they're separate.  
15:49:12 So students can be shown that explicit  
15:49:14 connection between the work they have  
15:49:17 done previously and the work they're  
15:49:18 about to engage in.  
15:49:21 Another way this can be used is by  
15:49:23 asking students to write down any last  
15:49:24 questions they have at the end of the  
15:49:24 class period.  
15:49:27 This then provides the instructor with  
15:49:29 an opportunity to make sure that those  
15:49:31 questions are addressed at the beginning  
15:49:33 of the next class so they don't linger  
15:49:36 and cause ongoing misconceptions.  
15:49:40 There's other ways to use this as well.  
15:49:45 But this is a quick and easy strategy  
15:49:47 for ensuring students reach that closure  
15:49:50 at the end of the day, have kind of a  
15:49:51 book end to the lesson.  
15:49:55 And also can provide you with a way to  
15:49:56 connect lessons between each other.  
15:49:59  
15:50:04 So we talked about a lot.  
15:50:07 And we want to make sure that you have  
15:50:09 a chance to process this a bit, and

15:50:12 think about what your next steps are  
15:50:12 going to be.  
15:50:14 So we're doing to have another  
15:50:14 breakout.  
15:50:17 We won't take the full 10 minutes,  
15:50:21 because it's already 1:50 and your time  
15:50:23 is up 2 o'clock.  
15:50:25 So we're going to probably give you 3  
15:50:27 to 5 minutes to have this reflection.  
15:50:31 If think about based off of all this  
15:50:32 discussion we've had, the information  
15:50:35 that we've shared, what is a short-term  
15:50:37 action and a long-term action that you  
15:50:41 can personally pursue or pursue within  
15:50:42 your department to ensure that your  
15:50:45 first year mathematics courses are rigorous?  
15:50:48  
15:50:50 So Connie, if you would send us away.  
15:50:52

15:50:52 >> I'm ready.  
15:50:54 I just want to make sure everybody had  
15:50:55 a chance to read the prompt.  
15:50:58 So action items related to rigor.  
15:50:59 And here we go.  
15:51:02  
15:51:13 if there's anyone I didn't send an  
15:51:16 invitation to and you want to go to a  
15:51:17 breakout, let me know.  
15:51:20  
15:51:22

15:51:26 [Breakout session]  
15:54:12

15:54:15 >> Welcome back, everyone, we like to  
15:54:18 ask you, well couple of things in the  
15:54:18 chat box.  
15:54:21 If you would record in the chat box an  
15:54:24 action item that you're going to  
15:54:26 follow-up on in the next couple of weeks  
15:54:28 since I know you don't have anything  
15:54:30 else to do in the next couple of weeks,  
15:54:32 but as you think about getting ready for  
15:54:34 next semester, what is one action item?  
15:54:37 So if we can get everyone to share in  
15:54:37 the chat box.  
15:54:39 And when you take a look at the chat  
15:54:44 box, you'll see that the survey  
15:54:46 evaluation, evaluation survey for this

15:54:47 session.  
15:54:49 There's a link that Joan has posted there.  
15:54:52 We would  
15:54:55 appreciate it if you would give some  
15:54:58 feedback on the session today and let us  
15:55:00 know if you found it useful.  
15:55:03  
15:55:05 So we do want to thank you for your time.  
15:55:09 We remind you that  
15:55:12 that you have your collaboration spaces.  
15:55:15 And, so, be sure and make use of those.  
15:55:18 This record, and this PowerPoint will  
15:55:21 be posted on the collaboration space.  
15:55:27 We'll send it on to the  
15:55:31 and learning folks as soon as we get  
15:55:32 off the webinar.  
15:55:34 And remember their contact  
15:55:35 information, if you have any comments  
15:55:35 for them.  
15:55:41 And our contact information, we're  
15:55:44 happy to answer questions as well.  
15:55:45 If there's anything we said that you  
15:55:48 would like to follow-up on, we'd be  
15:55:49 happy to help out.  
15:55:52 I do want to point out that there are  
15:55:55 a few slides at the end that we just put  
15:55:59 in here some key finding on how students  
15:55:59 learn.  
15:56:02 And, so, there's about 3 slides at the  
15:56:04 end that has some more of that  
15:56:06 background information on learning.  
15:56:09 And in particular, as it relates to mathematics.  
15:56:13 So we thank you, all, for taking time  
15:56:14 out of your busy day.  
15:56:16 We hope you have a great wrap-up to  
15:56:18 the semester and some great holidays.  
15:56:21 And we'll probably see you back in the  
15:56:21 spring.  
15:56:29 And Shawn has shared, there aware of  
15:56:31 many of the items, but problems  
15:56:32 communicating ideas to the department.  
15:56:35 And I had kind of passed along to the  
15:56:38 teaching and learning center few days  
15:56:40 ago, some support around the  
15:56:42 departmental meetings could be really  
15:56:43 helpful.  
15:56:47 And  
15:56:49 , so, yeah.  
15:56:50 Coordinating.  
15:56:51 Yep.

15:56:53 Coordinating courses.  
15:56:55 Yes, all of that can be very helpful  
15:56:57 and help with sharing ideas.  
15:56:59 Meeting with the T arcs.  
15:57:00 Yes.  
15:57:03 And I wanted to say, I wanted to add  
15:57:06 on to that point earlier about orienting  
15:57:09 the tutors and the T A's to these  
15:57:11 changes are so important.  
15:57:13 If the students are in one of these  
15:57:19 more kind of a modernized course,  
15:57:22 and they go into a traditional typical  
15:57:25 tutoring situation where the tutors are  
15:57:26 demonstrating problems instead of  
15:57:27 understanding how things have switched  
15:57:29 up in the classroom, it's really  
15:57:31 important to do that orientation with  
15:57:32 tutors and TA's.  
15:57:34 So that was a great point.  
15:57:34 Thank you.  
15:57:40 And, so, Jude  
15:57:43 ith says, yep, we need to do that.  
15:57:46 Embedding tutoring next quarter.  
15:57:46 All right.  
15:57:47 Great.  
15:57:51 Thank you, all, for sharing and for  
15:57:51 coming today.  
15:57:54 Let us know how we can help.  
15:57:57  
15:58:00

15:58:05 [End of session]  
15:58:12 And Fred says don't forget to complete  
15:58:12 the evaluation.  
15:58:16 So scroll back up and find that link,  
15:58:17 please.  
15:58:18 And there it is again.  
15:58:21  
15:58:26

15:58:30 [End of session]  
15:58:40 All right, thanks, everyone!