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Carol Subiño Sullivan: Welcome to this episode of the Teaching and Learning Buzz, a podcast by the Georgia Tech Center for Teaching and Learning. We're hosts, Carol and Rebecca. As remote instruction becomes the main learning platform for our courses for the rest of spring 2020, CTL will regularly be posting new resources, advice posts from Georgia Tech faculty members, and timely episodes of the Buzz to support our faculty and students in this unprecedented time. One big question on everyone's minds is what to do about lab classes when students don't have access to the lab, to the materials, or to the equipment needed for that hands-on learning portion of the courses? In this episode, we're talking with 3 faculty members who run lab programs at Georgia Tech. They're all at different stages of moving their labs online and are here to share with us what they've learned so far.

Rebecca Pope-Ruark: Great, so we would like to welcome our 3 guests. First, we have Dr. Mike Evans from the Department of Chemistry and Mike is the 1st year chemistry lab coordinator. We're also joined by Dr. Ben Galfond who runs the labs in the school of chemical and of biomolecular engineering and finally we're joined by Dr. Himani Sharma who is with us. She runs the junior and senior lab programs in the school of Materials Science and Engineering. Welcome to the Buzz, Mike, Ben, and Himani.

[00:01:40]

Mike Evans: Hello, thank you.

Ben Galfond: Thanks.

Himani Sharma: thank you

Carol: All right. So I wonder if each of you could start off by telling us a little bit about the lab programs that you run in your schools. Mike, why don't we start with you.

Mike: Sure! Hi everyone, this is Mike. So as Rebecca said, I'm the 1st year chemistry lab coordinator so I coordinate 3 introductory chemistry courses that are primarily taken by 1st year students, although we have a few upper level students, and the laboratory courses are combined with the lecture so each course is a 4 credit course, kind of 3 credits for lecture, one for lab type deal and students ordinarily under normal circumstances meet for about 2 hours and 45 minutes once per week with the graduate TA.

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Mike: As the lab coordinator, I design, implement, write the experimental protocols and assignments. I train teaching assistants and I'm in the lab sporadically helping students, helping teaching assistants managing issues that arise and that sort of thing. So the bulk of the work for students really centers on developing technique, collecting data, analyzing data, and I kind of have slightly different philosophies for the 3 different courses there's a 2-semester sequence for really anyone who's going to go in and take more chemistry. Those courses focus a little more on to developing good technique, precision, accuracy, that kind of thing whereas 1310 is a one semester course for anyone who wants to take chemistry as a lab science or for engineering majors that only need one semester—civil, environmental, that kind of

thing--and there I try to focus a little more on kind of generalizable data analysis-type things. So the post lab assignments are a little bit less intense in terms of you know, developing technical writing skills with chemistry in that kind of thing. So yeah, so it's you know it's definitely a full-time job. The courses are large in terms of that only we have anywhere between, you know, 1,000 and 1800 students across all 3 courses per semester.

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Mike: Anything else you would like to know that I haven't mentioned yet?

Carol: Yeah, I think that's good response to get us started. I'm sure we'll get into more things as we go along. So Himani, can you tell us about the program that you run?

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Himani: Hello, everybody. My name is Himani Sharma and I lecture in School of Material Science and Engineering. MSE has got several lab courses, spanning from introductory course to senior design and I am responsible for the junior and senior labs and both of these labs are heavily hands-on and. MSE puts a lot of emphasis on this one model they have or relationship building which is a relationship between materials, processing, and their structures and each lab course is focusing on either one of those aspects. I'm responsible for you know the properties lab and also the processing lab. When they start and as 1st years, when they're being introduced to all different kind of characterization techniques and they build upon learning about properties of the materials and ultimately processing them and stitching everything together that's how the labs in the designed.

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Himani: Like Mike already mentioned, these are fairly large courses. Chemistry is not as large as MSE. There are about 6200 students per semester per course. So they're only offered once in spring or once in fall and they have similar format as the one in chemistry so they have a lecture for an hour in a week and about 2 hours 45 minutes of lab time where they meet with the TA and I just move in and out whenever it's needed. So having to, you know, do something like this over a span of 4 years between students is quite, you know, progressive because they start with something just introducing different techniques that are out there for materials and then they learn how they will put the structure of materials in place and use the techniques that they learned last semester. So to make sure that the students retain information from the last semester and bring it forward is the critical aspect in that all these labs and ultimately when they're ready for senior design, they should remember everything that they learned during their 2nd semester all the way to the final and that could be a challenge and I think the goal of MSE lab programs is to make sure that it is easy and we have some tools to retain information and knowledge that we want students to gain, I think.

Carol: Thank you, Himani. And Ben, would you mind sharing your program with us?

[00:07:25]

Ben: Sure. Hello, I'm Ben Galfond. I'm an associate academic professional in Chemical and Biomolecular Engineering. We actually have 2 different programs. Both of them are primarily seniors with some juniors mixed in there. The 1st is a one credit process control so that's mostly looking at things like a traditional lab would do where they come in and, you know, they'll perform an experiment, they'll do a lab report. It's a one credit class so it's only having a limited number of in-lab sessions and there's not a large emphasis on the technical communication side. The other course is an operations lab, which if you're not familiar with that type of work, it's essentially enforcing the hands-on application of everything that they've learned so far, so heat exchangers, distillation columns, fire reactors all those kinds of things.

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Ben: That's a much more involved class and it's also our technical communication requirement and so there's a very heavy emphasis on both report writing and also presentation of your results so oral presentations or group presentations. Generally, these are seniors; neither of those classes are prerequisites for anything else so we have a wide variety of experiments that students can perform in these, not all students will perform all the experiments. So we don't have the same kind of pressures and needs in that we have everybody covering the exact same material because it's going to come up in a later course. We obviously still want to make sure that everyone gets you know their required learning objectives out of this but there's not the same, you know, very hard baseline that needs to be covered.

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Carol: Thanks! You know, I think it's a great range of types of lab courses; who the students are, where they are in their career is, how it fits into the rest of their major as well as thinking about how it fits more broadly to the course of study that students are pursuing and so I think there's definitely a lot for us to think about over the course of this episode.

Rebecca: Definitely. So obviously what is happening in this semester, spring 2020, there's no way we could have expected it and there's no way we could know that this would happen, no way we could know[laughing] how to do this very quickly. So what would you say are some of the things that you kind of really had to wrap your head around before you could start thinking about how to potentially move some of this work online for your students?

Ben: So I can start. I was just going to say one of the things that really gets me when I'm thinking about the lab classes is that a lot of times I'll have students that are so incredibly well-versed in the theoretical aspect of whatever it is that they're going to be learning in the lab. For example, they can come in and tell me all about valid coefficients or how pressure drops at certain floor rates and all kinds of things like that. And then I'll tell them to go open the valve and they'll be like, "I don't know which way is open." So this is an important thing we should be covering with you. And when you're moving into a limo teaching obviously that's a much more difficult thing to kind of get, you know, general practice knowledge that you're not sure you know who is going to need or who might, you know, have known this for 20 years

and who might have never heard of this before. So I think that the initial thought that I had when this is happening was, “this is not going to be possible, how are we going to do this?”

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Ben: And I think that you really just have to readjust what your expectations are, kind of look back what the objectives of the course need to be and it's maybe you're not able to get that full experience but I think, with some planning, you can still get a lot of the material across.

Carol: And yeah, I wonder if anybody else had that feeling as well at 1st like, “oh gosh I just can't do this,” have been and what has your process been for coming back from that?

Mike: Yeah, I definitely had that same feeling when I 1st started with this. And you know it was...it was fairly daunting and, for me, it was like... you know, in our labs I've tried recently to get students to kind of bridge the divide between lab and lecture on some level bridge, this divide between theory and what's actually happening in the lab space and I’ve kind of had to rethink how that looks now that there are, you know, there is no in-lab experience on a couple of levels.

Mike: Shifting gears a little bit, just for me, working through a large number of graduate TA's has also been very challenging because normally I would work with the graduate students and actually do the experiments with them in weekly TA meetings. Now that that option is unavailable, I'm really relying on the graduate students to familiarize themselves with the experiments kind of on their own time and really offer kind of a different kind of support to graduate TAs so that's been really daunting for me, just making sure that you know each and every group of grad students that I work with has you know the all of the information, “did I send this to this person,” and managing all of that kind of information flow without the in-person pressure. I realize how much I rely on that pressure of like a TA tells me, “I need this,” and it goes on my to-do list right away and gets done right away. Now that's gone away that's been a challenge for me.

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Himani: Yeah, I can relate to that [Ben laughing]. I can totally relate to that. My current course has got 12 technical TAs and 3 writing TAs so it's a class, you know, dealing with that.

Mike: Yes.

Himani: Right, so I totally get, you know, how not having them at your back, you know. Sometimes you feel like, “I wish they were there to tell me.” I try to do more BlueJeans sessions with them but it's not the same as doing the experiments with them in the lab.

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Himani: But the most challenging thing that I faced when I was, you know, when you're all thrown into this was like, “Oh my God, I spent the last 3 semesters trying to make my labs more hands-on and I'm doing just the opposite now.” [group laughter] I'm now supposed to, you know, think about doing all

this virtually. That was challenging, just the fact that when you compare your mindset in the way that you would like to give every student more experience of doing individual you know touch- feel sense, use all 4 senses to be in the lab and get the information that you need and not and thinking that kind of just the opposite, more demonstrations now.

Himani: So, I had to take time convincing myself to figure out, you know, interesting ways to do so. And again, when Ben was mentioning about the students who are so technically smart and have got hesitations about doing actual hands-on work. I had the same experience but at the same time I felt it would probably be a good idea for students who are, socially, not very comfortable stepping out and actually do the labs hands-on or take initiative to run the tests themselves but when they are put in a situation where they're doing everything virtually, they could probably, I think, they might thrive better because now they have the access but not the social pressure, not the peer pressure.

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Himani: We will be giving them all the demonstrations using the videos or other, you know, other ways and probably talk about in our next session but I think those were some of my like bright sides looking at things and say maybe it's not going to be all this bad for everybody around and we can find a body of students to learn from a situation of virtual learning in lab and needing to rely more on technology more videos and more maybe face-to-face conferencing. Also, and I probably will keep it for later discussion, but there are actually some virtual experiments that can be done. All these times are situations when you would start looking into those.

Rebecca: So it's a lot of different kinds of thinking, right? When you've been, like you said Himani, been perfecting the labs and making them more hands-on over every time and then having 2 weeks to kind of figure out what that looks like in a different model and, Mike, you really wrote a great blog post for us talking about how you were already doing some videos and some demonstrations in your lab so can you talk a little bit about how you kind of extended that?

Mike: Sure, yeah so you know the motivations behind those when students were in the lab for me was kind of related to 2 things; so one was lowering the intimidation factor for students who had really never been in a chemistry lab before. I wanted to kind of show them the lab space, show them what they would be doing you know give them an introduction to what different techniques are going to look like when they're actually in our lab space, kind of you know flipping everything on its head right relative to where we are now. And then the other thing was to kind of help students, again, bridge lab and lecture so help the brain there lecture mental models into the lab space by. Kind of putting the 2 things side by side on video so had some theoretical stuff combined with me doing operations in the lab space.

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Mike: When campus closed, those resources all of a sudden became super critical. They're really now kind of a center piece and a lot of them were very kind of modular and I didn't have videos that were just me doing, say, an entire experiment so I had to kind of expand the video library along that direction

of me kind of just doing the entire experiment, collecting some data and that, you know I can talk about this later, but the data that's collected that is related to the data that students use to do put post lab assignments, essentially lab reports, so I kind of tried to beef up that library with things that would make the remote experience as analogous to in-lab experience as I possibly could. You know, it's not going to be perfect, it's not going to be the same, but, you know, it's gone from lowering that intimidation factor to “this is your exposure” and that presents a whole ‘nother set of challenges, right? Because if I forget to do something, which has happened a couple of times, if I forget to do something in an experiment video, it raises a lot of questions because students will see it in a procedure but not in the video so I've had to kind of resolve some of those issues through things like course forms, Piazza, canvas announcements, things like this.

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Mike: So yeah, it's been a challenge, but it's been fun. One of the things I talked about in the blog post was I realized how many of those resources that were already available are now becoming the centerpiece of a remote learning courses so I'm very glad that I went to those lengths, you know, mainly from accessibility perspective, I guess, originally. It's paying off now which is nice.

Carol: And Ben and Himani, have you also found that videos have been an important tool as you've made this switch?

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Himani: I can start. Yes, definitely. I had also done some of the demonstrations. Some of the instruments that MSE uses are very large and they're quite expensive and we have one unit and we have 100 students that need to go through them, so obviously not everybody has access to the instrument all of times. So these making short videos are very helpful and I kind of made 10--you know, my goal was to keep them short, less than 10 minutes, just the demonstration of the experiment and talked through what the process is going to look like--but not run the entire experiment but give them a little familiarity to the tool before they come into the lab and do it and safety was a big concern and because we have you know a limited amount of time per lab session. We just want to make sure that students are sure and not making any you know mistakes we do deemphasized you know safety aspect and some operational, you know, just standard operating procedure about the instruments.

Himani: But still these tools-- because I had done this last semester, this wasn’t like, “Oh my God, I have to do all of this, all of that, now in 2 weeks of time,” so that kind of helped and not that the that instrument that I was about to run this part of the semester were already done and ready. The idea that we had done earlier and taught about this and made it accessible for the students made it a tad bit easier for me to pick it up and quickly do it for the next, “All right I don't have it for TSC, I don't have it for TJA,” but you know how long it's going to take for me to get myself up and running and to doing this was not that hard. So yes definitely, having thought about these technologies earlier ahead of time not really thinking into remote lab teaching, but just giving more and more of these tools available to students who couldn't be in the lab for any personal reason, whatever it may be, they don't lose every aspect of the lab.

Ben: Yeah, I know one thing for us is, again, we also have very large instruments and very expensive ones that you know require us to only have one at a time so the groups are rotating through so we can't do just one presentation on “this is a dislocation problem” because some groups might not see that for another three month. So one thing we’ve gotten to do in the past couple of years is we've made videos for all these experiments where they can kind of walk through, conceptually, how it's going to be run and then a lot of the more difficult to explain lab manual kind of things, like “this is where the millimeter is, this is how we’re reading it”, you know, “this is where the power switch is behind the parameter”, that kind of thing.

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Ben: And those have been really helpful. The particular circumstances for us this semester have been really required us to move to video labs or anything like that. So we’ve been kind of fortunate but it's nice that we kind of had that experience as we're looking going forward to all the different possibilities for what might happen in the future.

Carol: Himani, you...I had a follow-up, Rebecca, is that okay? I saw you about to jump in. You mentioned safety while you were sharing about you--the types of things that you have to think about, and I wonder if everybody might weigh in about that too. I know lab safety is often a major component of most lab courses. It seems like in some ways that might have gotten easier but what are some things that you're still thinking about in terms of the type of learning that you want students to do around lab safety?

Mike: So for me, this was a fascinating area. A lot of our safety education happens in the lab space actually by design right because I want students to be thinking about it like as a prime thing when they're in the lab space. So we, for example, had prepared some PowerPoint slides for our TA's to use as part of their kind of pre-lab introductions. I don't have the luxury of doing a lab lecture so, again, that that's kind of filtered through TAs, but now that's gone.

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Mike: And then the other thing was safety was actually a component of the course grade. There's a technique and safety score for each experiment that's awarded based on students’ technique and safe practice in the lab space, so I had to kind of totally redo how I thought about that technique in safety score and converted it into different types of assignments that relate to the safety aspects of the experiment or the technique aspects of the experiment. And so, for example, we have one lab that uses a number of flammable solvents and in the lab space, they're not near any open flames or anything like this but it's one aspect of safety that's really important think about and so I have students kind of assess the flammability of the different solvents used and put a graph together that sort of correlates flammability with their boiling points and various things like this.

Mike: I've had to convert that to, you know, work that can be done at home and it's actually... it's a bit dicey on some level right because I got a bit of pushback from students that these are, you know, new assignments, added assignments on top of everything else they have going on and that's been a bit tricky to navigate. I've tried to make them as straightforward as possible and I would argue that it's an important enough aspect of the course and it would have been assessed in the lab space anyway; this is just converting it to a form that students can complete more independently. But that's been a bit of a

tricky line to walk but yeah, for me it's been a challenge converting that score, that education that was deliberately designed to be in the lab space to something that really makes an impact outside of lab.

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Ben: So, one way that we've been working safety into our curriculum, that started about a year ago, it actually came through the Exxon Mobile House program partner academic labs. Before students actually come in to do the experiment, they'll have met with a TA ahead of time in the lab to go over the background and the basics to make sure they're prepared for it. And one of the things that they have to produce for that meeting is a job basics analysis form where they're going to step through each step of the experiment and look for any potential hazards and look for any kind of controls that they need to do. So the next thing about that is that that's done simply based off of the pre-lab videos they're watching and the lab manuals they're reading so it's not a requirement for them to do in the lab; it's something that we want done before they show up actually. So even if we're moving into remote instruction, that's something that we can kind of still carry forward and then we also, you know, still use some lecture time to cover lab safety and it's also going to be a component in their lab report grades and their final exam—sorry, lab practicum.

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Himani: Yeah, we didn't have any in-built safety, like a practicum that both Ben and Mike talked about, but we try to...most of these are instrument operations that we're learning in the labs and for them to make sure that they're handling the tool right, to make sure that they're conscious about the gas that's being hooked onto it and stuff like that. What I'm trying to do is still have them in there so one thing that was done was the report is now replaced by shorter assignments, they will be small, shorter assignments that the students will be writing. So in those assignments, we kind of put a few questions in about safety, you know, "what are the manual operator errors that can happen and that would be a challenge?" So those kind of things are the only ones that I see in the immediate future that can be introduced. But, again, to have more thorough video demonstrations of things that could have gone wrong with examples would probably be looked at for future.

Carol: I was thinking something similar. Ben, also when you were talking about, you know, in the past you know that all students don't know how to open a valve, you know, leveraging all of your experience of, "Ok I know this is a common thing that students might not know about" and how you might kind of weave that in almost artificially to force students to confront it and think about it.

Rebecca: Right, so one thing I'm curious about--we've all kind of touched on this a little bit-- is and we've only been doing this not even a whole week at right so we're still very early and in this process, but how have students been reacting to this? Mike, you said you've kind of heard them thinking that they have more assignments than they need now or you know they're just a stressed out as we are sure more and so in a lot of ways. So how are students reacting and has maybe anything about their reaction surprised you or been an advantage for learning?

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Mike: So I mean I would say that the students have been reacting pretty well. Obviously, you know, this is an incredibly stressful time for them as well as us, but they've been handling the transition well. They've been, you know, pretty receptive to everything, being removed remote to Blue Jeans. One thing that I notice is before this whole COVID issue came up, I had a certain group of students that I would see you know in office hours more regularly asking me questions and coming to me in lab with questions and now that we've moved to remote, we have seen a different group of students much more frequently and I think it's kind of been a hint to me that, you know--obviously, I always have my e-mails as an available contact, we have Piazza and Canvas and stuff like that but maybe I should be looking at other kinds of more remote and online communication just because that seems to be a preference for a lot of students so maybe even moving forward, after all this is returned to normal, that some of these techniques are something that we should look at keeping in our curriculum at some point.

Ben: Yeah, I would agree with that I think a lot of the lessons learned from this are going to, for me, resonate through later incarnations of the courses. One thing I have learned is that communication is key and sometimes it's just a matter of doing it right. It's not so much what you say, it's just saying something, Not sure if you all have this experience but I had--really spring break right was kind of, for me, like the freak out week where I was like, "What am I going to do, how am I going to do this?" And, you know, kind of the way I like to do things sometimes is take some time, meditate on it, develop a plan, and then push forward, you know.

Ben: Don't dive in right away and start doing stuff that you're going to regret doing later so I had this week where there was basically radio silence from the 1st year chemistry labs because I was figuring out what to do and I realized that in that in that time, you know, I didn't really hear from students either but I think it elevated students' stress levels not hearing from me. And since I developed a plan that pushed it forward, it's been a matter of communicating with students as much as I can, as new things happen. I had some lab quizzes that were sitting around on my desk that you know needed to be scanned in for grading, let students know when those are posted, any time a new resource is posted, I've let students know.

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Ben: And I found that just the increased communication—now, you know, that that is their lifeline really and so I worry less about annoying students with large numbers of announcements and emails and try to focus on informing students as best I can and I found that helps a lot with the perception of how things are going. And, you know, that I've tried to be frank about the workload, you know, recognizing it's a lot, recognizing we all have a lot going on, and just trying to humanize what we're all going through as much as possible and I think that's been beneficial.

Rebecca: Right, and that's what a lot of the advice tells us right: over communicate with your students.

Ben: Yeah, right.

Rebecca: And then also you know let them know that you are human and they are human [chuckling] who are all kind of in this together. Even in the fact we're doing something like this; they could see our rooms, they can see our houses and suddenly we're real people to them in a very different way so

acknowledging that and over communicating it is really part of the best practices in this kind of situation.

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Himani: And I've had this nod in this same kind of ballpark but similar reaction from the students. For the initial phase, it was really silent. I didn't hear much from anywhere and I think it was probably because they were moving off the campus and trying to find housing and get back home in time. Around the same time, one of their assignments was due, just earlier this week it was due. And I suddenly got like floods on emails about “hey, this questions about when to submit it” or technical questions regarding something that was covered and asked in the report. And that's when sensed the stress that they were going through. They were like, “my internet is not working and I don't have a proper housing and I'm sick, I'm scared and I have nowhere to go” and all of that was when I realized communicating is the key, but when I heard--there were a couple of students in the class that told me that they’re not receiving anything and why is that so. Some of them were like the notifications weren’t on so they were getting probably 100 emails from every single course for every single time anything was being uploaded or announcements were sent out and they kind of lost track of it and they're like “I'm losing it, the information I need to, so how do I communicate?” So that's...when it comes to just the, you know, the crisis that we are in, we all recognize it is very dire and everybody is scared of that.

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Himani: But as far as taking inputs if they are in a situation that's calmer and they feel secure and safe but it's home or anywhere else, they are doing very good job and tracking themselves into every course and they know where to look for information and they're using Piazza or they’re using Canvas discussion mode to talk among themselves so I think they're doing their best and getting as much help from each other—that's something they're missing, right? They used to sit in groups and work together and work on lab reports and assess the data and now they have nobody. If they have a question and they are hesitant to ask, they don't know where to be so what we're doing is a lot more office hours and then trying to consciously stay away from them just to make sure that they don't feel like intimidated in any way or feeling judged in any way. And we're doing 3 times office hours and we're doing lecture so we're leaving this open for them to use it as much as they can but we all know that everybody's dealing to the best of their, you know, capability but it's still kind of tricky.

Carol: That's such a helpful perspective that your students are telling you about, that so much is coming through them via email and, for me, it makes me think about, you know, how important then really relying on the Canvas tools so that at least everything is grouped by class just to help them sort through it all when we're thinking about how important communication is.

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Carol: I can think of so many other questions that we didn't even get to touch yet, like I'd love to get more into the group work aspect. Ben, you mentioned that too as being really important and we mentioned TAs a lot and I feel like there's still so much more to explore, but we’re already are coming

short on time so I wonder we could just give each of you the opportunity something that we haven't talked about yet that you really wanted to share with faculty before we end the conversation.

[00:39:55]

Ben: For me, I kind of—what I would share is kind of like a perspective on the past, the present, and the future, I guess, so for faculty: don't forget about the resources you used in the past. I talked about this in my blog post but something that maybe it was a one-off thing for a situation that happens, you know, a long time ago that's sitting in an obscure folder on your computer could become the centerpiece of your remote course in the present and then we touched on this earlier but the, you know, new ways of communicating the new resources--don't throw those away when the crisis is over because those are going to just represent increased accessibility for your students In the future. Yeah if I had to kind of encapsulate my advice it would be that. As far as course materials go, I think there's a lot happening right now that I find really sort of exciting and I think it has the potential to really improve how we do lab instruction down the line which is exciting for me.

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Mike: So kind of along those lines, one thing that has been a real asset for me is reaching out to other faculty members. We have a brocading crop of faculty that go through all these labs and having their inputs and their thoughts and ideas has been just totally invaluable for moving forward this semester started but you know me time and future. And, you know, definitely we want to make sure that our students know that they're not on an island and that they can reach out and that they have other resources and I think it's important that faculty know the same thing, that there's a lot of support out there.

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Himani: Yeah and I would concur the fact and say that...we...I think the times that we are in is forcing us to look into other possibilities, you know, make the best of the virtual technologies out there, thinking about some experiments that are very dangerous, you know, nobody wants to be near nuclear material and if you want to test it there are some labs that that that run the experiment where instead of having 5 people in the lab and exposing themselves to the risk, they could you know have one person load the sample and just walk out and the machine is be monitored and operated completely through somebody who is virtually, you know, spaced very far away. And this whole position kind of helps me think of such a portion of these that we can build in to make the labs better for assessing not only when the student is physically present but also even if they have not been able to do what is needed in the lab. I think just making the best of the opportunity. And then talk to your faculty members and getting the help and their inputs to what they are changing. I think taking input from everybody and then taking some of the things that you have previously and putting them together is what we can all strive to do.

Carol: I love where we ended up. We started off talking about all the challenges and "oh my gosh, how am I going to do this?" and then ending up here, really, with seeing the opportunities in this moment and even dreaming big to getting to try things out that we couldn't have done in any other way. Thank you so much for thinking through those and taking us through your journey so far.

[00:44:16]

Rebecca: And I really appreciate the humanity in the community that came out of your kind of final responses, right? Building better relationships or stronger relationships, connecting more with your students because we have more opportunity now online to kind of maybe touch more of them then we would necessarily. And then Ben, talking about really building strong community with your peers, reaching out to each other and connection is one of the things that's going to help us all get through this, right? Compassion, a little bit of courage in what you're trying out, and connection with others is what's going to be successful in helping us get through this together so thank you so much for all of your perspectives. Thanks for joining us today on The Buzz and for sharing your expertise and thank you listeners for joining us as well. The transcript and show notes for the episode can be found at ctl.gatech.edu/tlbuzz. You'll also find there are episodes on rapid transitions to remote teaching with Drs David Joyner and Vincent Spezzo. Be sure to bookmark the buzz page as we'll be adding new episodes just to support faculty in this time of disruption. Stay well everyone!

[00:45:41]

Carol: Thanks for listening to this episode of the *Teaching and Learning Buzz*, the podcast of the Center for Teaching and Learning at Georgia Tech. Show notes and a transcript are available at ctl.gatech.edu/tlbuzz.

Rebecca: Check back regularly for new episodes, bonus clips, and more resources. If you have a topic or question that you would like us to explore, we'd love to hear from you. You can reach us at ctlhelp@gatech.edu.