

3QTL: Three Questions About Teaching and Learning

Episode 2: How Do We Become Creative?

Guest: Laleh Behjat

Description:

How do we become creative people in the world, as both students and learners? For Dr. Laleh Behjat, PhD, professor of Electrical and Software Engineering at the University of Calgary's Schulich School, creativity both necessitates and fosters courageous, caring, and collaborative approaches to teaching and learning. In our conversation, Dr. Behjat shares how she and her colleagues renewed the engineering curricula during COVID-19 and offers examples of how she cultivates community in her classrooms. Join us as Dr. Behjat describes how we might eliminate exams and draw inspiration from karate to reimagine "cheating" as a form of collaboration.

Bio:

Dr. Laleh Behjat is a professor at the Department of Electrical and Software Engineering at the Schulich School of Engineering, University of Calgary and the NSERC Chair for Women in Science and Engineering - Prairies. Her research focuses on developing mathematical techniques and software tools for automating the design of digital integrated circuits. Dr. Behjat acted as an academic advisor for Google Technical Development Guide and was a member of Google's Council on Computer Science Education.

References:

Fink, L. Dee. "A Self-Directed Guide to Designing Courses for Significant Learning." Office of Teaching & Learning - University of Denver. Accessed September 26, 2023.

https://otl.du.edu/wp-content/uploads/2020/05/Taxonomy_of_Significant_Learning.pdf.

Loiro, Carina, Hélio Castro, Paulo Ávila, Maria Manuela Cruz-Cunha, Goran D. Putnik, and Luís Ferreira. 2019. "Agile Project Management: A Communicational Workflow Proposal." *Procedia Computer Science* 164: 485-90.

<https://doi.org/10.1016/j.procs.2019.12.210>.

Raharjo, Teguh, and Betty Purwandari. 2020. "Agile Project Management Challenges and Mapping Solutions: A Systematic Literature Review." In *Proceedings of the 3rd International Conference on Software Engineering and Information Management*, 123-29. New York: Association for Computing Machinery.

<https://doi.org/10.1145/3378936.3378949>.

Other resources:

Natural Sciences and Engineering Research Council of Canada, NSERC:

https://www.nserc-crsng.gc.ca/index_eng.asp

NSERC Chair for Women in Science and Engineering (Prairies), WISE Planet Project:

<https://www.ucalgary.ca/wise-planet>

Sound clips:

Classroom Ambience: <https://freesound.org/people/joedeshon/sounds/258094/>

Toy1: https://freesound.org/people/deleted_user_7146007/sounds/383871/

Toy2: <https://freesound.org/people/Marissrar/sounds/366914/>

Toy3: https://freesound.org/people/16GPanskaZlochova_Eliska/sounds/496276/

Pencil:

<https://splice.com/sounds/samples/42ce210afbf8807ba76e4e65521a81c928e57c179ee630e10abbe23e8e87a23b/->

Chair:

<https://splice.com/sounds/samples/638756a74c99f096ba24f9498ad439b939b586fc6368ec5e6209d96f40b3c779/->

Footsteps:

<https://splice.com/sounds/samples/713831357229b58af8dd24bfc283dce21974d3e8179eee1efe5d045c6b2f5f88/->

Paper: <https://freesound.org/people/Rslebs/sounds/661838/>

Revolution:

<https://splice.com/sounds/samples/9d436191fb78bb2377a09db5557aa546c913a3c9644e97716fa96c279ae6882b/->

Plane:

<https://splice.com/sounds/samples/b3547865a2b5a20721e43210b74fac33567fdc6ffec32a9ed1c6d94d091f4782/->

Baby cry: https://freesound.org/people/deleted_user_2104797/sounds/346663/

Karate1:

<https://splice.com/sounds/samples/80880b7861ab268e739ee2108cfab6f8839271777154d1fe8fb33d0ca1664a90/->

Karate2:

<https://splice.com/sounds/samples/5ff7cda8b8b69507e6c2c394be3a601954c2fc9d93cf55350c4748420b256821/->

Transcription:

[Theme music in]

LALEH BEHJAT: [00:00:11] We need to be able to imagine a future that is much better... Without creativity, we won't be able to do any of this, but we also won't be able to imagine a future where things are equitable, and inclusive, and just.

DERRITT MASON: [00:00:30] Hello, I'm Derritt Mason. Welcome to "3QTL: Three Questions about Teaching and Learning". This season we're in conversation with post-secondary faculty from across disciplines, and our three questions focus on how the COVID-19 pandemic has reshaped values and transformed classrooms, challenging faculty and students in extraordinary ways, while also sparking innovation. Our guest today is Dr. Laleh Behjat, professor of Electrical and Software Engineering at the University of Calgary's Schulich School. Dr. Behjat is also the Prairie Chair for Women in Science and Engineering at the Natural Sciences and Engineering Research Council of Canada, or, NSERC. In her role at NSERC, Dr. Behjat has worked to radically change the culture of engineering, removing systemic barriers that have traditionally excluded women and non-binary identified people from the field. One of her major initiatives, a program called WISE Planet, offers one year change leadership training to early career participants. According to the program's website, "WISE Planet strives to create a diverse, inclusive, equitable, and just society by training women and other underrepresented groups in STEM to be change leaders equipped to address the major, shared challenges our society faces." Our conversation today, however, will focus on some of the teaching and learning initiatives that Dr. Behjat has undertaken during the pandemic. Dr. Behjat, welcome. I'm so happy to have you here today. I'm really looking forward to our conversation. I'm wondering if you would kindly introduce yourself to our listeners.

LALEH BEHJAT: [00:02:05] Thank you so much. I'm Laleh Behjat. My actual research is on building computer chips. So, what I do is I make computer software that will automatically make computer hardware faster and more efficient. So, if I'm really good at my job, in 10 years, I won't have a job because computers keep on making themselves.

DERRITT MASON: [00:02:25] [Laughs] Because you'd make yourself obsolete, I guess.

LALEH BEHJAT: [00:02:28] Yes, absolutely. That would be the perfect time to retire.

DERRITT MASON: [00:02:32] [Laugh] So, obsolescence into retirement. That's a good, it's a good plan. Could you say a little bit more about the classes you teach in a given year?

LALEH BEHJAT: [00:02:39] For sure. I have taught a variety of courses all the way from Mathematic courses to graduate students, to Engineering Design, to building computers. At the moment, I'm teaching a course to all of the second-year Electrical and Software Engineering on how to make better engineering designs, and also how to do better project management and how to use ethical and value-based and human-based designs for things that they are making. Part of the work I have also done is a lot of research on engineering education.

DERRITT MASON: [00:03:14] I understand you've been involved in a pretty substantial reimagining of the engineering curriculum, a lot of which actually took place during COVID. And I'm wondering if you wouldn't mind saying a little bit more [LALEH BEHJAT: Yeah!] about how your work looked like.

LALEH BEHJAT: [00:03:28] Right before COVID, I and four of my other colleagues and three graduate students, we decided to look at all of the curriculum in the second-year Electrical Engineering Program and see how we can integrate these different courses that are being offered to be offered as one course. Now that integration of the topics gave us some flexibility of things to do. So, for example, one of the things we did was we were able to make the schedule, so the students were doing the hands-on activities when they needed to learn those materials. We also could use the theory called the Theory of Significant Learning. Part of this theory is that you need to have the base knowledge, you need to know the application and integration of this knowledge. So we were doing all of that, but because we were doing it in such more efficient amount of time, and we had the students as one whole group, we were also able to look at the second part of the significance of learning which is the human part, the caring, lifelong learning, and the students being able to put this in the context of humanity.

DERRITT MASON: [00:04:36] This is a perfect segue into the first of the three standard questions we ask all our guests here, which is: I'm curious about the core values that are central to your teaching and learning practice. What did these values look like before COVID? And how if at all, were they transformed during the pandemic?

LALEH BEHJAT: [00:04:52] Some of the core values I have [are] creativity, courage, caring and collaboration. And also, family, I don't know, family did not play a big role in my teaching [DERRITT MASON: Laugh]. But I did have some of the things I learned from how my children learn, back to my classroom. So, I could say, to some extent, but let's look at the first few of them. I think courage is the most important value that I could use. Because if I don't have the courage to do things that I'm uncomfortable with, as I'm not certain of the outcome, or how others perceive it,

then I won't do anything else. No matter what values I have, without courage, I cannot do those other values. Creativity is also really, really important. And the reason for creativity is that, especially for engineers, they're the ones who make things. We need to be able to imagine a future that is much better than the things we have, and the future as engineers are able to solve the grand challenges like climate crisis; it's going to change all of our environment and how we interact with it; the AI or digital revolution that is going to change what we do and how we do it. And also, the biotechnology. Right now, we are making all of these technologies that can change our bodies, and the bodies of future humans, making it completely different humans. Without creativity, we won't be able to do any of this. But we also won't be able to imagine a future where things are equitable and inclusive, and just. And so that's why I think creativity was very important to teach to the students and a lot of work I do is actually how do you become creative. The other part is the caring or the kindness. And without caring for one another, we're not living in a society. And this was very amplified during COVID. We needed to care for each other to be able to function as a society, even when we were isolated. So as part of that, I actually invited someone who has got their Ph.D. on empathy to come to the class and teach the students what is empathy? How do you put it in their design, and so on? And I was actually looking at some of the students' feedback yesterday. And that was one of the things that the students came up with the students, is that learning about empathy and how they can use empathy in their work, and how they could use that to care for one another was very, very important.

DERRITT MASON: [00:07:40] I'm curious, what did the students take away from this experience? How did they react when you said: "We're going to talk about empathy today," and introduced an empathy expert?

LALEH BEHJAT: [00:07:51] So, as an example, there was a student who was making this toy for kids who are blind. And as part of the product they were making, I asked all the students to draw the interaction of the person who was using it with the thing they were making and write a sentence about it. So, the student had written a few sentences about this interaction and drawn a picture of a kid with dark glasses playing with a toy. After the class, I asked them to resubmit a revision of their work. So, the revision came in. The picture was just the dark page, it was totally black, and the writing was all done in Braille. And so, it showed that with empathy, we could actually not just sort of show what the others are feeling or doing, but actually completely feel it and then show that to others. So, I think that was part of that caring, not just for oneself, not for people who are in your learning community, in the group you've worked with, but also for the whole people and environment around you.

DERRITT MASON: [00:08:58] So, circling back to those four Cs: courage, creativity, collaboration, caring and an F, family, did you feel that these were your values prior to COVID, as well, and COVID, kind of reinforced them or did COVID transform them in some way?

LALEH BEHJAT: [00:09:13] I think creativity was always one of my values. And collaboration was also one of my values. If I look back at my teaching work, I've won three teaching awards, all of them were in team teaching or collaborative [DERRITT MASON: Congratulations. That's wonderful. Three teaching awards! Oh, my goodness!], but that's also because of the work my collaborators did. And because if we put two people together who can work together creatively, their work doesn't just add up; it multiplies. And this is what I think happened in the collaborations we had. So those two were definitely part of the core values, but I think caring became a lot more. I saw it a lot more clearly that this should be one of the values. We had all these people who were thinking: "Oh, wearing a mask is really hard." But then we also had people who couldn't get out of their house because they're immune-compromised. Or people who, one of my friends who was just battling cancer and her son came in, and they got COVID, and spent seven months in the hospital [DERRITT MASON: Oh, wow]. So, by caring for one another, you know, by doing simple acts of showing that caring, we could actually reduce the suffering of others. So, that was caring. And courage was also something that became a lot more, sort of, again, pronounced during COVID. And then now afterwards, with all the unrest we were seeing. I think maybe some of the unrest that happened during the COVID, such as Black Lives Matter and the murder of George Floyd, are some of the things that showed how much courage was important. The young woman who filmed that, if she hadn't done that, we would have never known. And if all the other people hadn't gone into the streets and protested, then again, we wouldn't have known.

DERRITT MASON: [00:11:21] Returning here to your four Cs: creativity, courage, caring, and collaboration, it strikes me that there's another 'C' at stake here, which is community. The question of: what kind of community are we fostering in our classrooms? And it sounds like you're doing such a wonderful job of creating community, amongst your colleagues and your students.

LALEH BEHJAT: [00:11:41] Thank you.

DERRITT MASON: [00:11:42] I think it really became apparent during COVID what a challenge it was to build community in our classes, something that I really struggled with. One class that I was teaching in winter of 2021, was a large 250 student first-year, Introduction to Literature class, that I was co-teaching with a colleague and several graduate students. And it was just such a big class that we, I think we really struggled to foster a sense of community in the classroom, especially because the class was so large, and the course was online. I'm wondering what best supported and hindered your teaching practice during the COVID pandemic, perhaps, as it relates to the challenge of building community under such difficult teaching and learning circumstances.

LALEH BEHJAT: [00:12:28] So, one of the things I did with my course was right from the beginning of the class, we assigned the students these learning communities.

So, every six to eight students were put in one learning community. And in the learning community, the first whole week of the class was: How do you work as a learning community? How do you collaborate with one another? How do you understand what others need and how you can communicate with each other? And at the end of the week, the students basically wrote a team contract of “this is what we do.” Now we’ve found (me and the other instructors of the course, and also hopefully the students and the teaching assistants), we found these learning communities were the life-support during COVID for many of the students. If a student was really anxious and nervous, or a student had to travel to another country, because of COVID, and they had to go back to their country of origin before all the borders were closed, they had someone else to support them. Besides the teachers, beside the teaching assistants, they had this community of other students that they could trust. [DERRITT MASON: Like a peer network of support, essentially]. Exactly. And then there were also the other students, who would reach out to them and say: “Hey, what can I do for you? Do you need this, do you need to meet earlier, later? And so on. So, that was one of the things that reinforced the idea of bringing in caring for oneself, because a lot of students were anxious, and they needed to talk about this. “At this point, I cannot understand the basic knowledge or learn about this, because I need some time for dealing with my anxiety or dealing with my family who has all got COVID.” And so on. So, that was one thing: care for oneself, but also caring for other students. And then that way, they could all become a much better community that supported each other in their learning journey.

DERRITT MASON: [00:14:26] I’m wondering, what kind of work did you have to do, if any, once students was put in these learning communities, to give them permission to reach out to each other, to kind of set the terms of how the communities would operate? What was involved in that?

LALEH BEHJAT: [00:14:39] So, the first week of the class is basically sort of preparing them to do this. We first show them what are the learning communities? We do talk about what are safer spaces and what are braver spaces, and so how you can make those spaces even if you come from different backgrounds, make your spaces very brave spaces. We also have places for our students who are coming... for example, something as simple as saying our own pronouns or preferred pronouns, we give a space to the students who want to use different pronouns to be able to say that out in the class if they want to. This is sort of some of the things with rebuilding the culture, that this is an open culture, this is a culture that you need to be brave in. We can’t take out all of the biases, but we can make sure that we have constructive communication during these things. And then we do a lot of work on team building. So, we’ve worked very closely with a group from the Department of Psychology, Organizational Psychology, to work on the team building, and what are the things that the team has to do to better work as a group. And so, the biggest part of that is building trust. We do a lot of exercises for our students to be able to build trust with one another.

DERRITT MASON: [00:16:00] And what would you say was maybe the biggest challenge you and your students faced?

LALEH BEHJAT: [00:16:04] I think one of the biggest challenges is how hard it is, for all of us, not just the students, but for all of us to accept change. I grew up during a revolution and a war. So, I found that I am much more accepting of change, because I have accepted it as a constant in my life. I was five years old when the revolution happened, there were two years of chaos. And then, eight years of war. And then, a few years after that, I immigrated to Canada, which is another very, very big change. And then I became a parent and, then again, everything changed. But what I found is for our students, it was really, really hard to do that sort of changing from one state to another, back to another, and they needed an anchor to support them. And they needed to have this sort of understanding that we are all here for their learning, and not for marks. We are not here to rank them. And so one of the biggest things I did to reduce this anxiety is to change the way I do assessment for the students. I told the students that I'm not going to have any exams. The whole class has got no exams. You come here to the class, and I assume you know nothing. And everything you do gives you some scores. So, it might be experience-point score, or it might be a sort of working on your project, delivering some outcomes, and so on. And for these you get, basically, your mark goes up. And at every point in the class, you would know exactly where you are with respect to what is expected from you in the final exam. I give them a rubric right at the beginning of their project, that these are the things that I expect you to be excellent at the end, good, or like, you know, you need more work. And every three weeks, the students do a retrospective. Groups of four students sit together with a teaching assistant or myself as an instructor. And we go through what they have done in the last three weeks. What were their strengths? What were the weaknesses? And what are the opportunities in the next three weeks? And what are the threats, and how they can actually overcome those threats, make their weaknesses into strengths and how they assign their time to be able to achieve that. So, they do a whole [lot] of planning for their next three weeks of learning.

DERRITT MASON: [00:18:30] Would you say that in the context of an engineering curriculum, eliminating exams is unusual practice? Are exams the norm in engineering? Was this challenging for you? Did you receive any pushback when you eliminated exams?

LALEH BEHJAT: [00:18:44] In the context of engineering education, this is very, very, like sort of something that people haven't seen, and are very reluctant to change. Because they think that the exams are the only way we can [DERRITT MASON: Right, right, right. How else do you demonstrate knowledge without exams?] Yep. But in the context of engineering practice, I didn't make any of this up. This all comes from a software engineering practice called Agile Project Management. [DERRITT MASON: Interesting]. So, I just took what they do in the

industry and said: “Well, why don’t we just do that?” Because this works really well. We have this complicated software that, you know, do everything we want to do. And some people made this, and we can bring this to our classroom and do the exact same thing.

DERRITT MASON: [00:19:50] So, if there was one thing, out of all the new innovations that you brought to your teaching and learning practice during COVID; if there was one thing you were going to keep doing in the future, what do you think it would be? Would it be the assessment? Would it be something else?

LALEH BEHJAT: [00:20:05] Can I pick two, please?

DERRITT MASON: [00:20:07] Please, sure, two is great. [LALEH BEHJAT: I’m never a rule follower] No, that’s wonderful.

LALEH BEHJAT: [00:20:10] I think the first part is the learning communities. And I think that was one of the things that just sort of, looking at students’ feedback, and what they had done, I was thinking that these communities saved some students, but also made the course fun. Some of the feedback was: “This was really fun. I really enjoyed this course”. And the number of times that enjoyment and fun and things like that came into an engineering course, it was just amazing. So, I think I will keep that because that learning community made sure that the students were in a place that they thought they belonged. They thought they were free to express their ideas. And also, they had friends to be their comrades, to be their people around them. That is the first one. But the second one is, definitely, I will never have another exam. This was, and I think it is very important for equity, diversity and inclusion. [DERRITT MASON: Right]. I said that one of my values is family. One of my children has some learning disabilities, and anytime they want to have an exam, they have to go to a Student Accessibility Center. And this is making exclusion for the student, taking them out of the classroom, and why? And the other students are sitting down for three, four hours, you know. Before, when I had exams, they would give me these dagger looks, as if they hated me at this point. Or, they would just come back and say: “Oh, that was easy.” So, I will never go back to having exams and making sure that the students know that the assessment is done as a tool for their learning, not as a way for me to rank them and assign them grades. Once the students know that I think their motivation becomes more intrinsic.

DERRITT MASON: [00:22:07] Exams too are such high stakes scenarios often, and they feel extra high stakes in the context of the pandemic, when students are required to come physically to campus and write an exam in a large space with a number of other students. It makes sense to reconfigure things so that it isn’t required of students. And if they’re sick, and they miss it, that’s a huge, it’s a big deal to reschedule the final exam.

LALEH BEHJAT: [00:22:33] I totally agree with you. And I'll add to that when the exams are going on, we spend enormous amount of time on cheating. Cheating is really bad. But, what if a student, by going and asking another student learns something? It is not cheating; now it is learning. So, if it is not in the context of an exam, it is that: "Hey, I know you'd need this help. Can you go ask your friend there who knows this material, and then come back and explain it to me, or do it in three weeks, you know, when you learned it?" And so, that is one of those things. And I know during the pandemic, a lot of my colleagues spent an enormous amount of time making sure that their online exams were free of cheating, which is a good thing to do. Like, I'm not advocating for cheating [DERRITT MASON: Of course], but I am saying that so much time was spent on this, and such people could have done so many other great things. So, if we change the system and make it so that it is not as punitive: "I take away your grades, or you know, you can't do this or that", but make it as a way of: "This is for learning. And this is how you learn or, you know, we learn not only from our instructors and teachers, but we also learn from each other".

DERRITT MASON: [00:23:48] I just love this. I love how your emphasis on collaboration and your understanding of assessment, not as a method of ranking students, but taking a more learning-centered approach has kind of led to the obsolescence of the concept of cheating. By giving students space to collaborate with each other and come up with answers and solutions when they're ready, and in dialogue with each other, they're learning something and so how one sees cheating--it's actually being transformed into one of your four Cs: collaboration. I've never really thought about it that way: how if you just recontextualize cheating, and make different rules for our students, it actually is a kind of collaboration.

LALEH BEHJAT: [00:24:33] Yeah, when we say that it is if you can learn go ask them, you know... this actually came because I started going to karate classes and the karate people have everybody from white belts to black belts all there, and you're learning from others and you're teaching to others. And at the end of the exam time, like you know, you look at the person beside you: "Oh, I forgot that move," you know, but then you're learning. Next time you don't make that mistake.

DERRITT MASON: [00:25:00] Thank you so much for being here today, Dr. Behjat. I've really, really enjoyed this conversation and learned so much.

LALEH BEHJAT: [00:25:05] Thank you so much for having me.

DERRITT MASON: [00:25:10] 3QTL is recorded at the University of Calgary, which is located on the traditional territories of the people of the Treaty 7 region in Southern Alberta. The City of Calgary is also home to the Métis nation of Alberta region 3. This episode was produced by Xenia Reloba de la Cruz, edited by Tarini Fernando, and features additional editing and sound design by Eric Xie, who also composed our music. Our consulting producer is Stacey Copeland. Support for 3QTL is provided by the Taylor Institute for Teaching and Learning at the University of

Calgary and a generous financial gift from the Flanagan Foundation. I'm Derritt Mason, 3QTL's host and executive producer. Thanks for listening, and we'll see you again soon.

[Music out]

Transcribed by <https://otter.ai> and copyedited by Xenia Reloba de la Cruz and Derritt Mason.