

**[00:00:00] Bonni Stachowiak:** Today on episode number 410 of the *Teaching in Higher Ed* podcast, Mays Imad is back, and she is Rethinking Critical Thinking.

**[00:00:12] Production Credit:** Produced by Innovate Learning, maximizing human potential.

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**[00:00:21] Bonni:** Welcome to this episode of *Teaching in Higher Ed*. I'm Bonni Stachowiak and this is the space where we explore the art and science of being more effective at facilitating learning. We also share ways to improve our productivity approaches, so we can have more peace in our lives and be even more present for our students.

Mays Imad received her undergraduate training from the University of Michigan Dearborn, where she studied philosophy. She received her doctoral degree in cellular and clinical neurobiology from Wayne State University School of Medicine in Detroit, Michigan. She then completed a National Institute of Health-Funded Postdoctoral Fellowship at the University of Arizona in the Department of Neuroscience. She joined the Department of Life and Physical Sciences at Pima Community College in Tucson, Arizona, as an adjunct faculty member in 2009, and later as a full-time faculty member in 2013.

During her tenure at Pima, she taught physiology, pathophysiology, genetics, biotechnology, and biomedical ethics. She also founded Pima's Teaching and Learning Center. Imad is currently teaching in the biology department at Connecticut College. Mays is a Gartner Institute Fellow and an AAC&U Senior Fellow within the Office of Undergraduate STEM Education.

Dr. Imad's research focuses on stress, self-awareness, advocacy, and classroom community, and how these impact student learning and success. Through her teaching and research, she seeks to provide her students with transformative opportunities that are grounded in the aesthetics of learning, truth-seeking, justice, and self-realization. Mays, welcome back to *Teaching in Higher Ed*.

**[00:02:36] Mays Imad:** Thank you. Thank you for having me.

**[00:02:38] Bonni:** We're going all the way back together today. We're going to go back to your childhood. Could you describe yourself as a child to us? What were you like?

**[00:02:48] Mays:** I was very introspective. In fact, recently, I was reading some teacher's comments from grade school from first grade and it describes me just really so specifically that I needed time to sit alone and think and then ask questions and go back and sit alone and think. I don't think I was an introvert, but I definitely was very much theories and abstract and just very introspective.

My paternal grandfather was an intellectual, so I would ask him big questions. I learned what excited him. I'd ask him about history, and I think he really instilled in me this love of asking questions and learning through questions and finding home in those questions if you will.

**[00:03:52] Bonni:** There was something that you worried about a lot as a child as part of this thinking process. What did you worry a lot about?

**[00:03:59] Mays:** I was terrified of being manipulated. I think in part because I knew I experienced whether it was on the playground or at the dinner table, myself, switching my mind or getting persuaded when I didn't want to or manipulated. I knew how easy that can happen and I was terrified of it happening to me and losing my autonomy. It was so important for me to make my own decision to arrive at my own conclusion. While I couldn't articulate why it had something to do with-- well, I now know, with just living life to the fullest.

**[00:04:54] Bonni:** As we fast forward a little bit in your life, could you take us to a very important turning point in your life, and that was the year of 1993?

**[00:05:04] Mays:** Yes. That's the year that my mother and sisters, we emigrated. We escaped Iraq. We had to leave, my sisters were ill. This was after the 1991 Desert Storm. Iraq went from being developed country to an increasingly undeveloped country. There was an embargo and life was just very difficult for your average citizen. It was difficult. It was difficult to leave your school, to leave your friends and family, and all of the uncertainty.

As a teenager, it was really, I remember pain. While we were crossing the borders between Iraq and Jordan, there were issues. We were caught that we were trying to leave the country and my mom was taken away. I remember she turned to me and she said, "Take care of your sisters." I had two sisters with me in the taxi, the stranger, taxi driver. I do remember both being angry that I can't believe I'm doing this and I had no say and at the same time, just terrified.

Somehow I kept thinking, I just need to finish my school. It became like a soothing lullaby, I just need to finish my school. Somehow, if I finished my school and got my education, I knew that I would be okay. Whatever happened, whether my mom came back or not, I would be able to take care of myself and my sisters. My mom came back, we were able to leave, and we made it to Jordan. Then we made it to the States. I think back about that story and what led to that realization that if I got my education, that it was so intimately linked to being okay.

**[00:07:20] Bonni:** That to me seems quite an unusual source of comfort. Do you also find it unusual source of comfort or is that my own cultural background? Perhaps speaking here, do you see that as something that would be a common way, when someone faced with that kind of a situation, to see it as such a comfort?

**[00:07:40] Mays:** Yes. That's a great question. I'm not sure. I know for me, it's always been a source of comfort. I wonder if it's because maybe the tradition that I grew up in, or my grandma reciting poetry and teachings of sages about, for example, Rumi says, "You're not a drop in the ocean. You're the entire ocean in a drop." It's this, sometimes as a child, or even as an adult, I got glimpses of what that means and I find it enormously comforting. It makes the world less lonely, in an existential sense, if you will.

When I look back, and the hardship that I've been through as an immigrant, just as a human, I always found comfort in education, and even healing and understanding, and still to this day. Then, I think, when I speak with students and they share similar experiences that reaffirms my experience, I think, "Well, maybe it's maybe it is a common thing that we have."

**[00:09:05] Bonni:** Something I know that you find to be missing or lacking in education today is critical thinking. I know from what little bit I know about critical thinking, when we say that phrase or that word, we mean a lot of different things by it. Before we really talk about what that means, would you share when you remember noticing that it wasn't there? What kinds of circumstances would you find yourself in where you would think, "Well, they know this, but they don't possess critical thinking?" Maybe that's even in you. Did you notice it first in you or did you notice it first in learners?

**[00:09:47] Mays:** I did notice it in me I think towards the end of my graduate or even postdoctoral years. My undergraduate training was in philosophy. It was all critical thinking, it was all just Socratic questioning and logic and just critical thinking. Then I went and I got my PhD in clinical neuroscience, and then I did my postdoc and it was this ultra-focused very disciplined, strict approach to understanding the world. I understand why that is, and yet I was noticing that I

was becoming, I don't know, less cerebral, less critical, less creative towards the end of my postdoc. That's in part because I was so focused on that one gene that I was studying.

Fast forward several years later, I'm in the classroom and I was teaching a variety of classes, science classes, and one class in particular that I began to ask myself more and more questions about critical thinking was biomedical ethics.

Biomedical ethics is a class that both science and non-science major students took it. It requires that we do argumentations and learning about deductive and inductive reasoning and learning about fallacies. There's a lot of debate if you will. We write arguments, we refute arguments, and so on.

That's when I began to notice in students' writings, including students who had had me in previous courses and did really well in anatomy and physiology and genetics, they were really struggling with the argument part or the constructing or deconstructing arguments, the premise, the conclusion, assumptions, and so on. Then I started just collecting data to see if it's just an anecdote, if it's my perhaps some bias or if it's actually there. What the data showed, this is from several courses, is that indeed students were struggling with the part of the course that dealt with logic and critical thinking, and fallacies.

In fact, students would say, this was the toughest part of the course. Students would say, "How come this is the first time we're learning it?" I thought, is it? Then I look at the science curricula or I look at high school curriculum and it is, we don't teach a course on logic. We don't teach a course, that's exclusively on critical thinking. Then I did another study where I asked STEM students, "Do you want to learn this?" Overwhelmingly, over 90% said, yes. Right now, we're not learning it in a systematic, intentional way. Some went on and said, "This is hurting us in the real world." They linked it to misinformation and linked it to just-- some would even link it to our democracy and how it's all interconnected.

**[00:13:29] Bonni:** When you asked them, "Do you want to learn this?" How did you ask this? Was this something that they had already learned and so you asked them, is this something you'd want to learn more about, or did they already have a conception of whatever came to mind when they thought about argumentation and logical fallacies, et cetera?

**[00:13:50] Mays:** I did two things. With students that were taking my courses, at the end of the course, there is a course evaluation. I added a question about, "Do you think is merit to teaching critical thinking and logic in STEM courses and if so, why?" Then separately, I did a survey where I asked STEM students at the college, at Pima Community College, if they think it is important to include critical thinking and logic in introductory STEM courses. In both cases, students came back and said, "Yes, please, we want this. Help."

**[00:14:35] Bonni:** What can you tell us about what is missing from even those of us that may introduce some of these things in our classes, as far as the inner landscape of critical thinking? What can you tell us about that?

**[00:14:49] Mays:** Thank you for asking. When I presented some of this work at The Society for the Advancement of Biology Education Research, SABER, there was a lot of interest. One of the recurrent questions that I got from my colleagues is, "How do we do this?" What I did is I and some colleagues, Suzannah McGowan, for example, we wrote an NSF grant, it's an incubator grant, and we got the grant. We gathered together a group of science educators. What we wanted to do is we wanted to create--

First of all, decide on definitions. What is critical thinking? How do we teach it? What is logical thinking reasoning, and how do we teach it? We wanted to also come up with examples, sample assignments, and to really spend time on all right, we have those sample assignments, we have definitions, how do we assess it? We did about a year of work with that incubator grant. We created a website. We put everything on that website.

Now, in the process of doing research with my students and also doing the work with that incubator grant, there were two things that emerged. Number one, critical thinking is not enough. If I was seeing that students learned the logical fallacies and learned the structure of an argument and how to assess it and analyze it, and yet they were getting stuck when they encountered something that was ambiguous that dealt with uncertainty, or definitely they were getting stuck when they were dealing with a topic that had some ideological or political implication.

That came out from the research. In addition, we did some consulting with Sam Wineburg, who's done a lot on misinformation. Sam and others are of the opinion that it's not just critical thinking that we need to be able to tell if something is real or fake, and then we also did some work with Maureen Linker who taught logic and critical thinking and philosophy at the University of Michigan Dearborn, who's written a book on intellectual empathy for social justice.

She and others, and the science of learning tell us that thinking has an effective component. That feelings are an important part of the problem-solving or thinking process. The whole inner landscape then is a call for us to broaden what we think and what we conceive of critical thinking. The American Philosophical Association now really confines the definition of critical thinking to logic and these cognitive and rational processes, but we know that those processes don't happen without the affective, the emotional component.

Then what does it mean to have a framework that engages with the feelings also? The reason it's important is oftentimes I tell my students and my colleagues and myself is that our rational thinking can be hijacked when we are under the influence of fear but if I learn to be able to recognize those strong emotions, the feelings, and work with them, then rather than getting hijacked and impacting sometimes in a negative way, my thinking process, they can even inform it. The inner landscape becomes a quest for understanding the relationship between critical thinking and the critical feeling, but also the critical engagement.

**[00:19:29] Bonni:** Something that really helped me understand this, as I read your work, was an assignment that you gave to students about imagining a world devoid of critical thinking. Could you talk about that assignment and what they came up with? This was just fascinating for me.

**[00:19:46] Mays:** As it was for me. I learned from students that if I teach them the fallacies, they'd become really good at it. They become really good at just constructing arguments, deconstruct, they're really good but what I felt was missing is the personal connection to why this is important. This is not just a game and an exercise. I wanted to see if they were making the connections to our survivability, just our democracy, our humanity. That's what I talk about in the paper. It's really important to interrogate, with our students, the utility of critical thinking.

I created this assignment where I say, "Describe, imagine a society that lacks critical thinking. What might that society look like and why?" Then there's another part, is a reflection on their reflection. It was really incredible what came back and what came back actually led me to believe that no, the students actually are really engaged in critical thinking. In fact, we all are in a day-to-day and what we need is perhaps more emphasis on it and more discussion about it.

What came back is this without me preparing them, without me even giving them any hint, but this link to our ability to live together, our ability to thrive, some students talked about empathy. Some students talked about justice, some students linked it to the demise of society and democracy, and so on. They were able to see, at least, the students that I worked with, the connection between this class, this assignment, these fallacies that we were learning, and the future and their role in that future.

**[00:22:03] Bonni:** Before we get to the recommendation segment of the podcast, I'd love to have you share a little bit about what you are seeing as the difference between really teaching something, or perhaps I should phrase it a different way, really getting to experience people, learning something versus introducing concepts or ideas, or asking people to memorize things. What are some distinctions that you're noticing between those two things?



**[00:22:32] Mays:** That's a great question, not just with critical thinking, with any topic and what I'm seeing with students, comments, and their reflections is students want to really fit and marinate with those topics and concepts. They don't want to be presented, to be given a list, memorize it and go on. They've already made the connections that this is important in the real world if you will.

In fact, I was just analyzing some of the qualitative data from one of the studies I did on critical thinking and what comes back, again and again, is students want this to be infused in all of their courses across curriculum, and to be able to practice more and more. One of the students, whom I was reading their input, said that it actually helps reduce their imposter syndrome. The more they practice the skills, the more it becomes second nature, the more they freeze when they are confronted with new situations.

I remember in my classes, the classes that left an impact on me that remember to this day, years later, those are the ones where there was a lot of reinforcement and a lot of integration and making connections, not just with each other, but the materials. I mentioned Dr. Maureen Linker. I remember she was my professor and she was remarkable. Even the stories that she told about her family, about her upbringing. She used those stories to help us practice some of those critical thinking or logic, symbolic logic tools we were using in the classroom. She understood though remarkably so, the affective component of learning.

**[00:24:47] Bonni:** Something that I've been thinking about with regard to this is, and I do think we have to be cautious about this, but I have a colleague who's responsible for a class that our first-year students take and she's finding that she gets better information when she asks them their second year about that class and the value of it than if she asks them at the end of that first semester in college. Again, I think we have to be careful not to just say, "Well, it doesn't matter." I think that initial feedback, I still believe is important yet. Also thinking about it a little bit longer.

To that end, I'm teaching a class right now where I use some modules built by Mike Cofield about information literacy. I had a young man just tell me yesterday, say, "I just don't think I'm going to use this." It didn't make me that afraid because I have noticed that he has a little bit of a pattern of his initial response to things is to push it back a little bit. I'm seeing but I'm thinking, "I want to talk to you in four weeks" because we've just left that and now I have some assignments. The acronym that Mike Cofield uses is SIFT. I called the assignments SIFT in the wild and they're going to be able to go read about any of the topics that they find particularly of interest that relate to the course and then apply it.

I think that it's possible that there's hope for this young man that I'm not going to give up, but because we don't do that in a lot of our classes, they're so used to, "Well, I'm just evaluating this because now this module over we're going on to something else," and they're used to this past fail grade for whether or not any of this is going to be beneficial to them.

Then I know this is another thing that you have written about and researched about too because, to me, it's the context in which these skills are going to be used. To me, unless students are able to have both the agency to explore context that may be more relevant or important to them in their own lives. Anyway, this is something that you were getting me thinking about.

**[00:27:11] Mays:** I'm so glad you mentioned that. It reminds me of-- I always would say, "Why should you worry about this? Why should you invest energy in this? What does this have to do with your Sunday brunch with your family?" I always do that in my classes. I remember a student who finished bioethics with me and she went through the module and critical thinking and logical reasoning and so on.

She come to visit me maybe a year later or so. She said, "I love critical thinking." I said, "Oh yes, say more." She said, "Every time I would argue with my husband, I end up crying and I get too emotional." The other day, they had an argument. That's what she said. "Then in the middle of the argument, I said, 'Well, that's a fallacy.'" She said, "Dr. Imad," and it shifted the whole argument. "I wasn't crying. I was like, 'Oh, I caught a fallacy.'" To hear this student just feel so empowered by her own brilliance and reason and critical thinking was really remarkable. It's an everyday process. It shows up, it can empower us. It can help us. It can illuminate our path forward.

**[00:28:38] Bonni:** The Sunday Brunch. [laughs] Well, this is the time in the show where we each get to share our recommendations. Today, I'd like to share about a movie that one of our kids has been looking forward to pretty much since she first heard about it, it is the new Pixar movie. It is called *Turning Red*, and it is an absolute delight. It's funny, it's charming.

It's about a 13-year-old girl who struggles with some changes that are happening, including that she keeps turning into a red Panda. I'm not giving much away because you definitely see that in the previews. It's just a really fun, delightful movie and something I would seriously suggest for the whole family. It's great to bring out all kinds of conversations and to help us think about how we navigate our emotions. That's my recommendation for today. Mays, I'm going to pass it over to you for yours.



**[00:29:40] Mays:** Thank you. I love your recommendations. I recommend either the book or the show *Station Eleven*, and it's a post-apocalyptic show story about the power of art and creativity in helping us endure trauma and change and uncertainty, and it's beautiful. I loved it so much that I couldn't finish it. I wasn't ready to part ways with it.

**[00:30:11] Bonni:** Oh.

**[00:30:12] Mays:** I recommend that. For our music lovers, I recommend Mustafa the Poet who is a Somali Canadian beautiful artist. He released a recent album and it is heartbreaking and heartwarming, it's a tribute to his friend Ali. What else? To learn more about this, I would recommend, Maureen Linker's book, *Intellectual Empathy: for Social Justice*.

**[00:30:50] Bonni:** Such great recommendations. I'm so glad to get to have this follow-up conversation with you. Thank you so much for introducing me to this wide array of reading and research that feel so new and fresh to me and so important. I'm so glad to be a small part of. Hopefully getting to have other people be introduced to it as well. I hope people will check out the show notes because there's a lot of great resources there as well as the recommendations too. Thank you for coming back on *Teaching in Higher Ed*.

**[00:31:18] Mays:** Thank you so much and thank you for this beautiful work that you do.

[music]

**[00:31:24] Bonni:** Thanks once again to Mays Imad for joining me for today's episode of *Teaching in Higher Ed*.

If you'd like to see the show notes for today's episode, head on over to [teachinginhighered.com/410](http://teachinginhighered.com/410). If you would like to not have to remember to do that every time, I invite you to sign up for the weekly update. You can do that by going to [teachinginhighered.com/subscribe](http://teachinginhighered.com/subscribe). Once a week, you will receive from me an email that has the most recent podcast guest, other related episodes, some recommendations that are beyond what shows up in the episodes, quotable words, and a little preview of the following week's episode. Again, I encourage you to head over to [teachinginhighered.com/subscribe](http://teachinginhighered.com/subscribe). Thanks for listening, and I'll see you next time.

[music]

**[00:32:26] [END OF AUDIO]**

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