Dead Ideas in Teaching and Learning Podcast Series

Season 6, Episode 3: A Neuroscientist's Perspective on Student Engagement
A Conversation with Alfredo Spagna

Center for Teaching and Learning, Columbia University

[00:00:00] **Catherine Ross:** Hello and welcome to Dead Ideas in Teaching and Learning, a higher education podcast from the Center for Teaching and Learning at Columbia. I'm Catherine Ross, the Center's executive Director. As a quick reminder for our listeners in this podcast series, we are exploring dead ideas and teaching and learning.

[00:00:28] In other words, ideas that are widely believed, though not true, and that drive many systems and behaviors in connection to teaching, exercising what Diane Pike called the "tyranny of dead ideas".

[00:00:42] I'm speaking today with Dr. Alfredo Spagna from the Psychology Department at Columbia University.

[00:00:51] Dr. Spagna is a faculty member in the Department of Psychology at Columbia University. His research focuses on the psychological and neural neuromechanisms of attention, perception, and mental imagery. He is a lecturer in the discipline of psychology and teaches both introductory and advanced seminars in neuroscience.

[00:01:12] He also serves as the director of the Neuroscience and Behavior major. Welcome to our Dead Ideas podcast, Alfredo. I'm so excited to be talking with you today.

[00:01:25] **Alfredo Spagna:** Thank you so much for having me.

[00:01:26] **Catherine Ross:** So, as some of our listeners may already know in this spring season, I've been focusing very broadly on this question of why the science of learning is so often either unknown or ignored in higher ed.

[00:01:41] But a couple recent things I've read have made me kind of wonder if it's enough to just get instructors to use these evidence-based pedagogies

because we know that students also bring dead ideas into the classroom. And these articles have also pointed out that they're seeing perhaps an attitudinal shift in how students approach undergraduate education.

[00:02:06] One of them, Stephen Mintz, in his *Higher Ed Gamma* column in *Inside Higher Ed* said that, (and I'm quoting here), I think it's fair to say that many undergrads regard the college experience as essentially transactional. And he said he sees the underlying reason for the reluctance to engage with high impact pedagogical practices in this shift in students' views.

[00:02:33] So, rather than seeing the purpose of undergraduate education as a time for self-discovery and exploration, he's claiming that it's really about acquiring a credential or preparing for a job. So, I wanted to talk to Alfredo because he has worked tirelessly on developing his teaching in his large introductory psychology classes and researching better ways to support all the students who are in his classes a focus on equity. But I'm wondering, Alfredo, if you've run into this phenomenon of students who resist some of these research-based pedagogies, the high impact pedagogies, are they resisting engagement with you or each other? Have you seen evidence of this transactional attitude and it's a, I guess it's a sort of a two-part question, right? If yes, what's that looked like and how did you handle it? And if no, what do you think it is you're doing that what does your research tell you?

[00:03:41] **Alfredo Spagna:** Yeah. Thank you for the question. Absolutely, and I have the feeling that the reason why some students struggle with keeping a high level of engagement in the class is then some somehow also related to our partial understanding of what engagement is, right?

[00:03:57] So, as I was mentioning earlier, I'm an avid listener of this podcast, and I'm so excited to be here that I almost completely lost my voice overnight, but anyway. As I was saying I know that you like a lot to always keep an eye on what the recent literature tells us about effective practices in teaching and learning.

[00:04:18] So I believe that the first thing that we want to discuss here is maybe to understand that engagement is a very complex construct, and this is why both on the instructor side and on the student side, sometimes we struggle keeping a high level of engagement over 15 weeks. So with the term "engagement" we can identify a student's willingness and desire to participate in the learning process.

[00:04:42] So if we think about this definition already, we can begin breaking down it into its own component. So there is the willingness component, right? So this is a behavioral presence, wanting to be in a classroom for some reason. And some students may be struggling on this aspect, right? That requires a lot of effort.

[00:05:04] Wanting to be attending Alfredo's course in neuroscience may not be simple for everyone. So there is this desire component, which is a feeling, and therefore we can identify an effective aspect on engagement. Then there is this anxiety, boredom, other affective, there are other affective aspects of engagement that also are part of why our students sometimes disengage.

[00:05:32] We know towards the end of the semester, they're all going to be worried because they have four, five finals, right? So it's normal and it's actually right to be worried. And then there is the learning process of engagement, right? The cognitive component of engagement, which is, a requirement which requires to process information in real time, sometimes very quickly.

[00:05:55] And in my case, I teach neuroscience courses and psychology courses. So we are in the STEM field and STEM fields can tend to be very difficult on, very heavy on this side. They are always very compounding like you can't miss week three because if you miss week three, you'll miss–or you will understand less of– week four.

[00:06:16] And therefore, now that we have framed this construct "engagement" by understanding some of its components, behavioral, affective, and cognitive, we can understand why it's so difficult to be engaged throughout 15 weeks over four, five courses. And again, and this is also about time, and time is another dimension.

[00:06:39] So, it is difficult on the student side to be engaged for long period of time, and therefore we have to think about how to build components in our regular classroom activities that actually help keep high level across this different aspects of engagement.

[00:06:59] **Catherine Ross:** That doesn't sound simple.

[00:07:01] **Alfredo Spagna:** Oh, absolutely. It is not, it requires a lot of mindful kind of pedagogy, right?

[00:07:08] It requires on the teacher's side, to worry a little bit less about am I good enough to handle a hundred students, right? Because sometimes we're also

pressured--do I know everything? Is this clear? Worrying less about the material and thinking more about who are my students and what do they need at this time point?

[00:07:32] And of course, there's a part that is kind of an additional challenge, which is like sometimes your students are like 20, sometimes they're 40, and sometimes they're 200. And therefore identifying what each students need in a 200lecture course. It's particularly challenging.

[00:07:51] **Catherine Ross:** So how do you sort of grapple with that if you have a large class?

[00:07:57] Because "know your students" I think is really one of the first precepts of inclusive pedagogy. And I remember way back in the nineties, Uri Treisman from UT Austin telling an audience at a conference. He taught calculus there and he said, you know, if you want to teach effectively, you have to know who your students are and know what their passions are and what their strengths are, and then you can teach them.

[00:08:28] But that's a tall ask for 200 students. So how would you sort of go about that? What would you advise someone, a new instructor who's suddenly facing a large class?

[00:08:40] **Alfredo Spagna:** that's a great question and I believe that you know, I'm a cognitive neuroscientist by training, so I tend to do as much as possible you know, evaluation of my students knowledge.

[00:08:52] And I think that the one piece of information that we as instructors sometimes miss is to know who is in class. Right? And as part of awork that I did with the Center for Teaching and Learning a few years ago, we actually conducted just a simple pre-course kind of survey to know who was participating. It doesn't take much, right?

[00:09:15] You don't have to go each you know, the student by student and ask who are you? What's your name, which year you're in. So we just did a five-minute kind of simple demographic check of our cohort, and I must admit that it was, that my feeling was confirmed by the data. My student cohort, my student body in the Intro to neuroscience courses I teach is very diverse.

[00:09:39] So I have first year, second semester students in the same room as a fourth-year neurobiology major. And therefore that is a tension, right? You, you need to know who is in your class to know exactly what they need at any given

moment. So one, one recommendation I will do is try run at the beginning of the semester, a very simple five minutes kind of demographic pre-class kind of survey to understand who is participating.

[00:10:11]: And also try if you, if you can, to add a couple of questions about background knowledge, because once again, sometimes students know a lot about neurobiology or neuroscience and they are seated next to someone that is just, you know, I just took an intro psychology course. I don't know anything. And that's very important.

[00:10:29] **Catherine Ross:** You took the words right out of my mouth. I was going to ask about prior knowledge, serving the prior knowledge. And also, I don't know if you've asked this, but like why are they taking your course?

[00:10:41] **Alfredo Spagna:** Yeah, and that is another part of the complexity of being in a classroom is some students are taking my course because they've heard my name and they want to know about neuroscience, and that is an affective and behavioral component of engagement. That's one type of student, right? I don't really need to be here, but Alfredo seems to be a nice guy and neuroscience is cool, so I'm going to tune in. And some students, it's a requirement, it's part of their core, a course part of their major, and it's an intro neuroscience course, so they really want to do well.

[00:11:14] And that's a different kind of student, very engaged, very motivated, a little bit extra anxious about their final grade or they'll match their learning and so on. And some other students you know, they're taking it, because it's an elective and they, they just want to further their knowledge onto something that I'm teaching in a specific course.

[00:11:35] So this adds complexity and it's extremely important to know who is who. Why while you are starting your course, especially.

[00:11:43] **Catherine Ross:** So Alfredo, everything you've just said then feeds into because that even that initial survey is a way of engaging your students right before they even set foot in your class. So I am curious what other ways you have [00:12:00] found to build the relationships with them that are necessary to support their learning.

[00:12:07] **Alfredo Spagna:** Yeah. So there are many strategies that we can implement in class, and one thing that I want to say upfront is that each class and each material, or each time you meet with students, a different strategy may be better or best fitting that that classroom. So again, it's on our somehow part

of the job to kind of be mindful of who is in class and where in the curriculum or in the semester we are.

[00:12:35]: So some things that can be done, certainly to keep students engaged and I like to use them a lot, are active polls, right? So towards the beginning of the semester, students are, I think, wondering, "Am I doing this right?" We are at week three, week four. "Am I learning?", right? They don't know the instructor, maybe they don't know the content or the material.

[00:12:59] So what is reassuring is kind of having the opportunity to practice in a low stake situation with some questions that are just administered, using Poll Everywhere in my case, to see whether they are kind of learning or capturing what is being discussed in. So by using these polls, which takes almost nothing to build to an instructor, you have your students engaging in class because they need to pay attention when you are explaining something because there's going to be a question soon.

[00:13:34] They have to be kind of able to practice their, to calm down, their anxiety towards having a question, asked right. Because it's coming anyway. And also, they have to be behaviorally tuned in into the conversation and likely in class. So somehow by using a simple thing like a poll or a series of poll in a class, you are acting up upon the different components of engagement, right?

[00:13:58] They are learning how to not get anxious when a question is asked questions, multiple choice questions that will be in the final exam anyway. So kind of practicing also that part, they are paying attention and they are in class and this is a very simple thing that you can do, but that kind of helps them being engaged in class.

[00:14:17] **Catherine Ross:** Right. And they're practicing retrieval, which I'm sure you know as a cognitive psychologist and neuroscientist, that that really helps them solidify some of their learning, in their brains.

[00:14:30] **Alfredo Spagna:** 100%. But then when the courses when, when the course, you know, progresses, then, I like to change a little bit my active learning strategy from a purely you know, kind of recognition of a correct answer, out of four options, which is very basic and it fits perfect week four.

[00:14:50] Then when we are week 8, 9, 10, I try to make students kind of practice with more high-level skills like teamwork, right? So rather than having a [00:15:00] poll that is a multiple-choice question, it's an open-ended question,

and it asks students to collaborate and talk to each other to come up with an original answer.

[00:15:10] And that's a different type of learning, right? Because that's more recalling information, right, and creating a new answer. An original answer, two-way question that was open-ended and maybe that has no right or wrong answer. Right? So again, if you just do this, if you just have your students actively engaging in the class, well then you are, you have them in class, right?

[00:15:35] Then they attend because to do, to get their little 1% or zero 1% of their final grade, they have to be in class, right?

[00:15:44] **Catherine Ross:** Interesting stuff you're doing, you're doing so much., but I always say the goal at the end of a class is that your students should be more exhausted than you are. So I hope, I hope you're at least at that level.

[00:16:00] **Alfredo Spagna:** Yeah. Yeah, yeah, yeah. It happens. It happens. Yeah. I hope so. At least.

[00:16:05] **Catherine Ross:** Are there some other changes that you've made to your teaching? Maybe not directly linked to engagement, but just other things you've done that have really you feel like have really helped your relationship with your students, but also their learning in general.

[00:16:21] **Alfredo Spagna:** Absolutely. There is one thing that I really have learned or started appreciating in the past two, three years and also through the pandemic, is explain everything. As in don't not explain anything in STEM sub content also, but every time we give an assignment toto our students, make sure that it's clear to them what they're asked to do.

[00:16:47] It seems like a simple thing, but actually sometimes we tend to take for granted that all students in our classroom, sometimes 60, 80, 100 students know, for example, how to write a 10-page assignment, right? How to read the paper, or an article. How to review scientific literature. And they don't. And therefore it's very important that we build, that we nest in our regular course activities, moments in which we explain how to do that thing.

[00:17:20] Because otherwise, if we don't explain how to read an article, the sections of an articles or how to review literature, then what happens is that we increase the, the distance between students that are already more advanced and therefore that are ready took upper-level courses and students that are just starting, and therefore the students that is just starting will feel more stressed

and more challenged by a 10-page assignment, which is ultimately not a difficult thing to do. We know that. But always the recommendation I give to our, to our fellow instructors is always be mindful of what the prerequisite knowledge is for an assignment and spend 10, 15 minutes in class to make sure that what is in your mind is actually in your student student's mind, right?

[00:18:18]That what you're asking them to do is actually clear to them.

[00:18:22] **Catherine Ross:** Right. And you're actually taking it a step further. It sounds like you're, you're scaffolding their skill building by what you said just a minute ago by practicing that skill in class for some class activity, right? So you're not just explaining to them how to read a paper.

[00:18:43]You're making sure that you've scaffolded that, that opportunity to do that in a classroom activity.

[00:18:51] **Alfredo Spagna:** Absolutely, and this helps and serves also students that are more advanced in their career, right, academic career. Because [00:19:00] anyway, they're going to refresh their memory about an assignment and that is absolutely important.

[00:19:04] Students really appreciate it and I've seen that over the years, the quality of, for example, the writing assignment I receive is much, much, much higher. It increases significantly their ability to actually fulfill the assignment because we are getting rid of the uncertainty that is behind creating a 10-page writing assignment.

[00:19:29] And it's, it leaves only the uncertainty about the content, which is what is very important. Right? What they're reading, what they're reviewing.

[00:19:37] **Catherine Ross:** Right. And I think it, there's a powerful connection there between scaffolding and equity, right? Because what you're doing is providing an equitable learning space for learners regardless of where their starting point is.

[00:19:56] **Alfredo Spagna:** 100%. And this is why I'd recommend always to keep an eye on the foundational knowledge, right? That each course kind of has built in, right? So always spend the first two, three weeks, which anyway, are add/ drop period. So you will see your roster kind of go all over the place to kind of make sure that students have the same foundational knowledge so that then you can go into, you know, later on in the semester to higher level, you

know, application of that knowledge, therefore bringing also all students up to the same level.

[00:20:29] **Catherine Ross:** Yes. I'm wondering, you know, you spend a lot of time talking with your students. What, what have you learned from them?

[00:20:38] **Alfredo Spagna:** That they struggle with time more than they struggle with assignments themselves.

[00:20:44] **Catherine Ross:** Ooh, that's interesting.

[00:20:46] **Alfredo Spagna:** I know they have no issue in reading articles or reviewing the literature. What some students are kind of having a hard time is scheduling their life to, to fulfill all the they've enrolled, assignments they have to do, and so on, and that therefore time is extremely important.

[00:21:07] I'm going plug this, this here. So just a little plug because a few days ago, together with a colleague of mine, his name is Xiaofu He, he is from the psychiatry department, Adam Brown from the Solar and some other students, John Thorpe, Joshua Friedman, Connor Shatto, so on and so forth. We actually have submitted a NSF grant as working on engagement.

[00:21:31] Fingers crossed on that. And one of the most insightful kind of analogy or thing we have discussed during the preparation period of the grant was we have to teach students how to student. Some students don't know how to student.

[00:21:48] **Catherine Ross:** How to learn! Yeah, yeah.

[00:21:50] **Alfredo Spagna:** Yes. They have no issue with the content at hand. They just don't know how to make their neurobio schedule fit their core schedule and the, all the writing assignment and so on. And therefore, it's really important that we are rigorous, like you discussed in the past, during fall, but also understanding that maybe some of the challenge behind an assignment was not doing the assignment, but being able to understand how much time it required.

[00:22:21] **Catherine Ross:** Kind of the hidden curriculum, right? Some students come in very well prepared to manage that kind of effort, but many students don't. So you're just, pulling that out as another piece of learning to be a successful student and a successful learner.

[00:22:40] **Alfredo Spagna:** 100%.

[00:22:41] **Catherine Ross:** That's fantastic. I, I love that. Just so you know, next week I'm interviewing Todd Zakrajsek, who just published the third edition of *The New Science of Learning*, which is written for students.

[00:22:53] **Alfredo Spagna:** Fantastic.

[00:22:54] **Catherine Ross:** By the way, so you may want to have a look, a peek at that to see if your students would benefit from it.

[00:23:00] **Alfredo Spagna:** Will do, will certainly do.

[00:23:03] **Catherine Ross:** So the last question that I always like to wrap up with is what it is that keeps you inspired and motivates you to do all this work on your teaching. You've done so much.

[00:23:16] **Alfredo Spagna:** Well there, there is one thing that, that is the, you know, is, is the most important for me is to see students coming back and take 2, 3, 4 courses with me, and see that they come back and that they're happy and excited of the next adventure we're going to be living together. Of taking yet another course, a upper-level course and see how, you know, they're, and see them grow and see how much they learn and how first they showed up to my intro neuroscience course and they were struggling or learning about the nervous system.

[00:23:50] And then you see them the following semester, knowing all about the nervous system and wanting to know about what consciousness is, what attention is, and so on. It is so gratifying. I'm so happy to be part of this community at Columbia University. And I really must admit that here at Columbia University, we are so blessed to have such an amazing student body of committed students trying to learn a lot and prepare for their future career.

[00:24:20] **Catherine Ross:** Wow. And that's the benefit of teaching introductory courses, right? I think there's a lot of instructors who don't want to teach introductory courses, but that's where you, then you get to see that progression. You get to see the successes later on.

[00:24:36] **Alfredo Spagna:** Absolutely. And they grow and they learn and you will see it. And it's fantastic. It's what we're trying to do here, right?

[00:24:43] **Catherine Ross:** It is indeed what we're trying to do here. So thank you so much, Alfredo, for taking this time to talk with us and to help push higher education teaching to a better place. Thank you for all of the tips and strategies you shared, and thanks for being part of our Spring 2023 podcast season.

[00:25:06] **Alfredo Spagna:** Thank you very much for having me.

[00:25:11] **Catherine Ross:** If you've enjoyed this podcast, please visit our website where you can find any resources mentioned in the episode, ctl.Columbia.edu/podcast. Please like us, rate us and review us on Apple Podcasts or wherever you get your podcasts. Dead Ideas is produced by Stephanie Ogden, Laura Nicholas, John Hanford, and Michael Brown.

[00:25:35] Our theme music is *In the Lab* by Immersive Music.