

## Sustaining Disciplinary Literacy in Science

University of California, Davis School of Education

<https://www.youtube.com/watch?v=g4zZBtRuSNo>

Danny Martinez: I want to introduce Chris Jadallah, who is a student in learning in mind site, sorry. A student in science and mathematics. He is also the student representative in the graduate group in education. I want to thank him for introducing Dr. Alexis Patterson today.

Chris Jadallah: Yeah, thank you very much Dr. Martinez and hello everybody. It is a privilege to be introducing Dr. Alexis Patterson Williams for today's research seminar. Dr. Patterson Williams research lies at the intersection of equity studies, social psychology and science education. Examining the equity issues that arise when students work together on group projects in science, and the role that social emotional skills play in facilitating equitable interactions between students. Dragging her research is the desire to study the challenges facing those in the field of science education, in order to re-frame science learning in terms of diversity and access which there's such a critical need for. Dr. Patterson Williams has published work along these lines in multiple journals including Equity and Excellence in Education, The International Journal of Science Education, The Journal of Adolescent and Adult Literacy, and many more. She published a paper with co-author Dr. Selena Gray in the journal Theory into Practice that in 2019 won the best article award for the journal. This paper is titled Teaching to Transform the Holistic Science Pedagogy. Dr. Patterson Williams joined the School of Education at UC Davis after receiving her PhD in curriculum studies in teacher education from Stanford University in 2015, where she also received a master's degree in Policy, Organization, and Leadership Studies. As an assistant professor here, Dr. Patterson Williams has been such a wonderful mentor to so many students across different areas, but especially for those in the science and agricultural education emphasis area, myself included. I can personally attest that she's incredibly thoughtful, and incredibly insightful when it comes to research on equity and science education. I have learned so much from working with her. A few less very important points here, Dr. Patterson Williams is a California girl, born and raised, and she calls the Bay Area her home. Shout out to the Bay. But she also has southern roots, and feels at home when she visits her grandmother in Valdosta, Georgia. When I asked her favorite food, she says it was hard to answer because she loves all food, but she could eat pizza everyday. That being said, I will hand it over to you, and everybody, please join me in welcoming Dr. Patterson Williams.

Alexis Patterson Williams: Thank you Chris for the lovely introduction and thanks to everyone for coming out. I know Mondays can be a particularly challenging day full of meetings and just trying to get your week started, so it definitely means a lot to see so many familiar faces. I missed seeing all of you folks in the hallway, and then just seeing some new faces as well, so welcome and thank you. I'm going to go ahead and share my screen. Give me a thumbs up if you can see it. Thank you. Awesome. I'm excited to share the ideas from this forthcoming paper with you today. The paper is entitled, as you can see on this title slide, Sustaining Disciplinary Literacy in Science: A Transformative Just Model for Teaching the Language of Science. For me, my excitement regarding this paper comes from the fact that it represents the coming together

of my various scholarly identities. This is something that I talk a lot about with my students at our pro-seminar class this quarter. It really builds on my early work on literacy and science, as well as bringing to bear my more critical work on ways to make science learning environments more just and transformative for all students, but particularly those students who have been marginalized in science. And so I'm grateful to the Journal of Adolescent and Adult Literacy that gave me the opportunity, and it felt really like a challenge for me to bring my different scholarly perspectives together in a way that I had not yet done in a paper. As I said, I'm excited to kind of talk through these ideas and share them with you today.

All right. This talk really hinges on the premise that literacy and language are essential components of science. Reading, writing, and talking are paramount to the construction of science knowledge and to learning science in general, and engaging with the language of science is central to science learning, and is becoming an emerging priority for science teacher. One of the main reasons why it is becoming more acknowledged in science classrooms is because of the combined emphasis that the Common Core Standards, as well as the Next Generation Science Standards, play in requiring communication using academic science language as well as science within their practices. You'll see this is a chart that has an overlap of various practices from math, science and English language arts, combining Common Core State Standards as well as the Next Generation Science standards practices. You'll see that developing and using models, reading, writing and speaking, which is grounded in evidence, constructing viable arguments, critiquing the reasoning of others. All of these things represent the language and literacy practices of science. I want to dig into this just a little bit deeper.

When you look at the work of Barber and Pearson, they outline that science is reading, writing, talking, and doing, and that a lot of teachers really emphasize the kind of doing component. The inquiry based aspects of science, and we see that in the public notions of what science is and represents in general. And in more traditional classrooms of science instruction, we still see this focus on the doing. But when we look at the literature, we find support for the assertion that the majority, or a large part of what the enterprise of science is, and that trickles down into science classrooms, is literacy. Again, if we look at the Next Generation Science Standards of practices include all of these activities. Developing and using models, we saw that in the previous slide, engaging an argument from evidence, et cetera, et cetera. But if we dig deeper, we see that writing and arguing are core practices of science when we think about the work of Norris and Philips. Tenopir and King talk about how engineers and scientists spend more than 50 percent of their time reading and writing. They did a deep ethnography of sciences and this is what they found. Then going back to the classroom, what we do find though, is that even though science is a large part of what happens, or reading and writing and literacy in general, what are a large part of what happens in science classrooms, that students have difficulty understanding the scientific texts. These informational texts that we often find in science classrooms pose a lot of different challenges for students.

And so in 2016, some colleagues and I really argued that the role of the science teacher is to teach the content as well as the language. That science teachers are language teachers, and we argued that because they are language teachers, it is essential for them to understand the

difficult text features of science text so that students could engage and really take up the literacy and language practices of science. We talked about the difficult text features, which are, include vocabulary, these nominalizations, which really highlight the ways that we try to process into a noun and I call it the shunification of a word. But you think about evaporation, condensation, and all of those words really represent a much more complex process that we've condensed into a word. And so if you don't know what that word means, but you have a sentence that has a long list of all those words in it, you're confused. The academic and science language in general is challenging polysemy. I'm not going to go through all of these, but the paper really does go into greater amount of detail, just the density of the texts. I know many of you all who are either academics or reading graduate school papers, you read a text like five or six times, you're reading this paragraph and you're like, what's going on. But there's so much information packed in that is really challenging to make sense of it. Particularly, if you don't understand the first idea, there's this weaving of ideas. If you're lost at the beginning, you're lost by the time you get to the end even more. A lot of times we think that the graphics and the diagrams are helpful, but sometimes the text or these images also have another language, the tables. The images are not quite clear and so if you can't use the context clues of the words on the page to help you with the images that are also confusing, we find that a lot of students are lost.

We go through and we've outlined in this paper different strategies. Pre-reading strategies as a way to activate prior knowledge when students are reading, we call them during reading strategies to really support the monitoring comprehension. Then post-reading activities which really helps students make sense of, "Okay, I've read it, what did I read? How can I synthesize, summarize to ensure that I comprehend the text?" We were really proud of this paper when it came out but as I said again, for this column that I was invited to write and began to really reflect on this, thinking that I had probably five years ago and even further along. I came to this conclusion that the process of developing disciplinary literacy in science is not a neutral act and if all we do is help teachers understand that difficult text features of academic science language and give them reading strategies to make text accessible, that that as a step forward and as the singular step forward is limited and does not account for the other features of the text that can be harmful of learners. As I said, learning language is not a neutral act. The language is steeped in meaning and has an impact on students. Let me unpack this statement a bit. Because it may not be obvious as to the ways that disciplinary literacy in science can really bring about strong negative emotions in students and that's what we see in the literature.

Let me delve a little bit deeper into that. One of the things that we know about science academic language is that it's oftentimes associated with middle-class, white middle-class values and interests. While they are gains to using the language of science, particularly, for those who are focused on social mobility, there are also losses. There are losses because language and identity are inextricably linked, such that students have to make linguistic choices in order to enact a particular identity. Which means when I'm using a language, I'm not just using words but I'm choosing a particular identity that that language is associated with. When I'm giving this presentation, I'm using standardized English. I'm using a particular vernacular and that signals to some of you perhaps that I'm scholarly, that I know what I'm talking about. This

is a decision that folks have to make all the time because they want to put out this appearance, they want to be accepted, they want their ideas to be valued. That is a choice that I'm making today and it's a choice that we often ask our students to make we can't separate language and identity. James Paul Gee is a great researcher. One of the things that he argues is that while there gains to using the language of science, there are also losses and he explains it like this. He says that "the acquisition of academic language is tied to the learners' willingness and trust to leave their life-world language," which for him life-world languages is the everyday vernacular of a student to participate in another identity, that of what he calls specialist language in science. One that for anyone represents a certain loss but for some people, it represents a more significant loss. Because students are often feeling like they have to choose between the correct language of the classroom or the standardized language of a classroom and their own personal vernacular, it can be off-putting and alienating when they are faced with the language of science is unfamiliar and they feel like they have to choose. One of the things that Gee goes on to say is that science academic language, because it is more associated with these middle-class values, it may require a greater disassociation from the live for a language of students who are not from that background.

Gee has this great question and then I'll build on that question. His question is, "why would a child be willing to accept these losses or make that switch and identity?" Why would a child wants to give up their life-world language, their home language to make that switch to the specialist language of the classroom? I asked the question, what right do we have as educators to make such a request of our children? What right do we have? We know that there's the benefits of social mobility and there's a lot of research that talks about the efficiency of the use of science language but oftentimes the use of that language and the teaching of that science language is really done in a subtractive way. I argue that while we need to teach science academic language, we have to move away from the subtractive approaches that devalue the life-world language to use Gee's vernacular. Or just the everyday language of students to teaching disciplinary literacy in ways that are more additive. When we think about the work of Django Paris and Samy Alim, they give us the language of culturally sustaining approaches. Culturally a sustaining approaches to teaching disciplinary literacy is what I argue we need to embrace. That's teaching that is additive and honor students' various language practices and their identity. It uses these as it honors and heightens the status of student's life-world language instead of measuring success solely by how close students perform white middle-class norms. Or take up the academic science language. With that said, a culturally sustaining approach is more just and more transformative approach to science instruction that extends the understanding of the complex nature of science language to move beyond just the academic language. But it allows students stay engaged with their life-world language to make sense of scientific phenomenon, which really the science of teaching is all about. It's about sense-making phenomenon, not just learning a particular language to explain the phenomenon.

I argue that this requires two major commitments. It includes prioritizing literacy and de-centering whiteness and dominant academic English in science instruction. I am going to apologize in advance for anybody that has come to any of my talks, you all know, I like to do word-heavy slides so that if you want the slides, you get the details of the text. It's word-heavy,

bear with me but hopefully, you'll find it useful for anyone that wants the slides you can email me and I'll have my email up at the end and I'm happy to share.

With that said, one of the premises that I offer is that in order to have a more transformative and humanizing approach to scientific literacy, I offer what I call the holistic science pedagogy as an approach that really attempt to student's emotional well-being and attempts to it as a means of being able to identify when harm is happening in the classroom, and that this is a more transformative, is the more just approach that also embraces and is in line with science standards in science research. If you're not familiar with the WSP, Chris is going to put in the chat a link that will give you a table that is also from this talk and as I am going through the various commitments and how it relates to language and literacy practices in science, you can be following along to get a more in-depth look at what each of these commitments are. I'm going to have a high level mentioning of the commitments that are related to the holistic science pedagogy in my slides but this table will give you a little bit more detail.

We're going to move forward. The (w)holistic science pedagogy is a teacher and student centered approach to teaching science that requires five commitments from the teachers. This is a framework that my sister colleague, Dr. Selena Gray, and I came out with a few years ago. She's a classroom teacher in Southern California, and so this is some work that's really based on my dissertation, her dissertation, and our research that we've been doing since then. These five commitments from what we would call a transformative or a holistic science teacher, these teachers make commitments, and they make commitment to an ever developing self-awareness, a commitment to science and its practices, a commitment to science as a transformative agent, and a commitment to students' social, emotional well-being, as well as a commitment to utilize restorative practices. We really see this framework as a way of disrupting the subtractive approaches to science teaching, and really embracing a more just approach, and a more additive approach to teaching science. I am going to go through now, in a little more detail talking about, not all of the commitments for the sake of time, but the ones that I think are really relevant to language.

The first commitment is a commitment to an ever developing self-awareness. This commitment really encourages teachers to develop a critical consciousness, and to become critically reflective, to begin to interrogate their selves, their beliefs, to understand their positionality, and really begin to deconstruct mindsets that are steeped in white supremacist views. If you go to the Center for Transformative Justice and Education, we just did a talk really emphasizing and highlighting, there's a talk on there that really highlights the value of this commitment. We can't skip this commitment. If we don't do the self work to really understand the ways that we, and when I say we, I mean folks of color, as well as white folks, we value the dominant and standardized forms of language, in particular this talk, but forms of teaching in general. We've got to deconstruct that, those mindsets, be able to pick that apart and then, in order to be able to embrace more culturally sustaining approaches to teaching. That's not the focus of the talk today, but I really do want to emphasize that because I think a lot of times we want to skip past this, because this is the most challenging work, is to challenge self and look at self critically.

Then we try to do curriculum because that feels like there's more things that we can do that don't cause us to have to do the deep self excavation work.

What does it look like? When you've done this deep self awareness work and develop a critical consciousness in this way, we see that teachers began to set the standard for what is appropriate in terms of the language uses in science. As I stated earlier, it begins to move away from this oppressive view that the only appropriate language in science, or the best, or correct answer in science is the academic language, but begins to understand that harm comes when we take that approach, and that we can elevate the language practices, and the linguistic choices of students as they make sense of the world around them, and elevate that to the same standard that we do the academic language. It's not like this is a tool to get to one thing, but that we have these two forms of language really on the same page. A holistic science teacher, would learn from the different communities about their deep histories, bring in their funds of knowledge that are essential to resisting stereotypes, and really again, as I said, welcoming the various repertoires of language and knowledge that students in their communities bring to bear on the science phenomenon, and understanding the scientific world around them.

The next commitment is a commitment to science and its practices, and I think this one is important for me to highlight because this commitment requires that teachers, they encourage students to use science as a means to make sense of the world. But it also is about teachers constantly engaging in the development of their own content and pedagogical knowledge. That does mean understanding the literature, what's current in the research about good science teaching. It is about understanding the standards, and understanding the different practices, the cross-cutting concepts, the disciplinary core ideas that are highlighted in the Next Generation Science Standards, especially if you live in a state or an area that is embracing that. Bringing that to bear, in a critical way, to think of and make sense of the world. What I'm not saying is students don't need academic science language. What I'm saying, is that we need to bring a balance where we're not prioritizing or valuing one over the other. But that we are embracing what students are bringing to the classroom, and seeing that as valuable, and useful as well.

We also talk about, this is the fourth and fifth one, which is a commitment to students' social and emotional well-being, as well as to restorative practices. Really, the fourth commitment is asking teachers to attend to the social and emotional cues that students present in classroom. They have to be committed to monitoring, encouraging and supporting students. I think this is particularly important in science where we often feel like emotions are not a part of the classroom environment. That science has a very objective space and where emotions don't play a role. But as I stated earlier, emotions can really be a place where we can see, where students are feeling discomfort, disengaged, or harmed by something that happened in the classroom, not just the language of the text, but something that might happen in group work. Many of you know, I'm a group work scholar as well. So there are things that happen in that space and we can use emotions as a way to begin to make sense of what our students are experiencing. Instead of shying away from those emotions, which can be strong depending on what the harm is. But really embracing it and looking into it to make sense of how we might respond in ways.

When we think about this response, this is what points to the restorative practices, and also specifically as it pertains to language because science, academic language can be distressing for students. A holistic science teacher would take an active role in noticing the emotional expression of students, and address the harm created by the lesson and this action or response is the enactment of commitment 5, which is making amends between students and the discipline so we don't lose students. We know that there's oftentimes discussion of a leaky pipeline of students who want to persist in science or even engage in the field. But so that students also don't lose interest in science as something that's meaningful for their world as folks in the world around them.

As a science educator, I think it's important to think about the practicality of all of this, and so I want to close by just thinking about how we enact a culturally sustaining approach to disciplinary literacy. To me, translating the holistic science pedagogy into practice, really means that teachers need to attend to the emotional behaviors of students. Because, as I mentioned, they point to moments of disengagement from a task, but that this noticing students' emotion can help engaging where students are disengaging. When we talk about noticing, there's a whole literature around that, and noticing is really about being able to attend to particular stimuli within the environment, make sense of what we are seeing and then take action to respond, and so hopefully some of that language is connecting to what we've heard in the WSP. The self-awareness piece is really what we need, really helps us begin to make sense of, and understand what we might be noticing when it comes to students' emotions. We can use that information as law, as well as the information regarding science and its practices, particularly the difficult text features. If we're thinking about sustaining disciplinary literacy, as we begin to make sense about why a student is disengaging, looking frustrated, expressing negative emotion about a task. Instead of just writing students off as disinterested, we can begin to use all of these different knowledges to bring to bear and to influence how we might respond to students. Then last but not least, one thing that I'll say is Dr. Brian Brown talks about beginning with students everyday language, and only providing the academic language once the idea is firmly understood by students. Again, this really highlights valuing students' language, and increasing the status of that talk authentically within the classroom. We are really being mindful of the ways that we evaluate students' responses to not evaluate the academic answer over somebody's very accurate and correct explanation of a scientific phenomenon using everyday language. I'm going to stop there because it's 12:40 and just open up the floor for questions that folks might have about taking on a culturally sustaining approach to disciplinary literacy in science classrooms as a way to really begin to, I think, repair the harm and build a bridge for students. All students struggle with the academic language of science but beginning to really build a bridge for those students who have historically been marginalized in science, and choose to disengage because they feel like they have to choose a particular identity over the other. Thank you.

Danny Martinez: Thank you, Dr. Patterson. I see a few folks clapping. I want to encourage anyone who would like to ask Dr. Patterson Williams a question to either raise your hand, or to put your name in the chat box, and now we can call on you. In the meantime, I have a question, Dr. Patterson. Sydney, go ahead.

Sydney: Hi, thank you so much, Dr. Patterson. It was really wonderful to hear you talk and I had a question about the way that you use commitment, the word, and what it means to you and what it means in terms of the practical use of it? I was just wondering, commitment to who? Commitment to the students? Commitment to a higher entity in academia? Commitment to themselves? I was just wondering how this word is being used.

Alexis Patterson Williams: Yeah. Thank you. It's a great question. When we talk about our commitments Sydney, we're really thinking about one, we used the word commitment, a lot of the literature uses the word beliefs, and I believe that you would be hard pressed, not that it's impossible, I actually don't believe it's impossible, but I do believe you'd be hard pressed to find an educative, as says, I don't believe in equity. They don't believe in justice, but that their actions don't align with what they actually espouse, what they believe, and so when I say a commitment, in this sense, we're really talking about commitment to enacting a particular approach and for us is the Holistic Science Pedagogy, so it's a more transformative and just approach to teaching science. In that way, we're really talking about committing to students to teach and transform them and socially just ways, but committing beyond just a belief system, but really taking those beliefs and putting them into action and practice.

Sydney: Thank you.

Alexis Patterson Williams: I'll just add that I think that it's also a commitment to oneself. Believe that you experience a great amount of dissonance when you have a certain set of beliefs that you're not actually enacting and so this is a commitment to students, but I also think it's a commitment to one's own self, that if you hold these beliefs to really be true to what those beliefs are, and to be able to live those out within yourself and within your classroom. I saw Gloria, had a question?

Gloria: Yeah. Thank you. Also I want to express my thanks, Dr. Patterson, very stimulating talk and I'm going to try to keep my question focused on the discussion intention and make it about the things that I studied. I'm wondering if you could say a little bit more about the extent to which I guess your framework and your methods require, I guess you could say, instructors to make explicit some of those components that you name, especially toward the end of the last two commitments. For example, I wrote it down for myself, like explicitness about culture. If it's about culturally sustaining and I understood the connection between language and identity. But there is an explicit naming of culture. It sounds to me like it's an implicit connection. So to what degree do you advise, let's say instructors, to make explicit that there's a cultural aspect to engaging in those discussions, whether it's about science content or it's about their own participants as agents of that discipline. Can you say a little bit more about that? I was especially touched by your comments related to traumas in science. Because I haven't worked with K-12 students, but with undergraduates who had then become folks who described themselves as not being science material. To me, seems there's the language of instruction that itself has led to some of these traumas. I'm just curious if you could say something about that.

Alexis Patterson Williams: Yeah, it's a great question, Gloria I feel like we could talk about that for a long time and I'm going to try to keep my comments brief, but feel free to follow up if you feel like you want to hear more. I am a big proponent of being explicit with students. As a teacher, I didn't want my beliefs to be implicit in terms of the inequities, the harms that science has been a tool to perpetuate and that scientists themselves have, because of their own beliefs have perpetuated, and I think we do a disservice when we hide those things. So to me, it's very important to be explicit. I started my seventh grade lesson with the video, my seventh grade year, every time I taught seventh grade, I started it with a video, the power of illusion, as a way to really make science seem practical and relevant because my students deal with stop and frisk on their way to school all the time because they didn't tuck their shirt in on the way, or for whatever reason, because of the color of their skin. So to me, because so many students feel like science is not relevant to them, or they don't see that implicit connection or they're not concerned about why the light switch flips on, they're just glad it does when it does. To me, race, culture, ethnicity, as well as other things, are prime ways to really show how science is meaningful, and they're not the only ways, but they are terribly meaningful to students. So when folks say like they're color blind, that signals to students that they're not fully seen or that they're not fully present in the space and so I think it's really important to make class, gender, sexual orientation, all of those things present because science has something to say about it. Someone in the science community has had something to say about it and so we can bring that to bear in the classroom, whether it's because we're doing some problem-based learning, because we want staff to be culturally relevant. We can bring these various identities to bear into how we understand the world. I'll stop there. I believe it's important to be explicit and I think that's why that first commitment is very important. We have to be honest about the role that science has played in that, in sciences like this inanimate thing. But that science has been used as a tool to create harm. It's also been used to create all these beautiful, wonderful things as well that have sustained life, so I don't want to just paint it in one way. But I think we need to be honest about both the benefits and the harms that have happened, that so many students, at least from historically marginalized communities, have experienced, and bring that in to make the curriculum seem more connected. I think in terms of language, I think it's important to be honest about how language is valued. Our students know it, they feel it, so why don't we call it what it is and help them be agentic and thinking about what you can choose. I'm going to give you both but you have a choice in whether you choose to do the academic language thing or not. But I want you to know that there are consequences in the society that does value this language, and also is your choice whether you choose to buy into that system or not. Personally, I'm a proponent of being very honest with our students and engaging because they're experiencing it, even if they can't name it, they're experiencing that hidden curriculum. I said I was going to be brief so I'm stopping.

Gloria: Thank you so much. Thank you.

Danny Martinez: I have a question around, you mentioned Django Paris and some alumnus work on closely sustaining pedagogies. I know that, there's been very little work in science especially in the volumes that they've put together. One of the questions we typically get is, what do we sustain? Teachers have that question, what is it that we sustain and who gets to

choose what gets sustained? Can you just mentioned some thoughts around what that means in science education?

Alexis Patterson Williams: That's a great question. Well, first of all, we talk about students as agents of change. There's a lot of discussion of that in science education. To me when I think about agency, I think students are agents of change. But I also don't think that means that the teacher doesn't have a responsibility to also be partnering in that change. That's not the sole responsibility of the students that they work hand-in-hand. When I think about who gets to choose what gets sustained, I think, it's a conversation between the teacher and the students. I think that there are certain things that the teacher has to sustain because of the standards and the expectations that they have and I don't see a problem with being explicit about that. Again getting to this notion of being explicit and forthright about the constraints that teachers feel and experience as folks that are being held to a particular expectation about what's suppose to come forth in the classroom. I think to say that we don't sustain these kind of academic expectations that the dominant society has, I think that's disingenuous. I don't actually think that's what Lehman Paris were saying. I also don't think that necessarily has to be highlighted because the pressure is already there to make sure that that get sustained. When I think this conversation adds is sustaining student voice, sustaining their power to choose, to have some influence about what the topics are, not just what the topics are, but how those topics are presented, sustaining their language use and their language choices, which is also not often valued in science classrooms. I think it's sustaining, what I want to say, the practicality of science. Seeing science as something that's meaningful, I think that has to be sustained oftentimes because of tests, because sometimes a for a teacher, the love of science is just the love of science in itself, that we also need to sustain how it applied and relevant to the students. I think, there's a lot of things that have to be sustained at once and there has to be a balanced in that. I think that's the challenge that teachers faces and they're constantly trying to sustain the standards of a field that have not fully come to embrace the beauty and the value that other communities bring to the science, and how do we make space and sustain that as well.

I see Darnel's question about my thoughts about Chris Emdin and work about teaching science through hip-hop pedagogy. I think it's a way to engage in teaching that is relevant for a subgroup of students. I think it's a way, I don't think it's the only way, but what I do appreciate about it is that, it again, heightens the status of the language practice of hip-hop. Often hip-hop is the down upon and there is not seen any value in hip-hop. And so what I do believe hip hop has, I'm thinking about the work of Carol Lee in all of the richness and the robustness of language that has to be used in African American vernacular English. There's that and so much more, the work of Keith Cross comes to mind when you think about all of the different language tools that are employed in hip-hop. Language is just one part of it, I believe there's five other components to hip-hop that we can bring to bear. Bringing that to bear in the science space, I think it's one way to engage in hip-hop pedagogy. I also don't think that is the only relevant culture in science, so that's why I say it's a way. Because teachers ought to be able, and if you're not from a hip-hop background or if you're not from the background of your students, I think, there has to be space for you too. What is relevant to you and was meaningful to you, how do

you show up authentically? Again, that's why I think it's sustaining both what's relevant in the voice and the power of the student as well as the teacher. But so often, we don't see that voice and power being shared. We see one dominating over the other and mainly, what the teacher, or what the district, or what the standards are saying. I think there has to be a balance in that. Final questions? I'm sorry, did I hear somebody else's voice? >> I was just saying thank you.

Attendee: Welcome. Rebecca, can you put some meat on to that question?

Rebecca: Yeah, I wanted to build off of Danny's question about the terminology that we use with teachers to help them get onboard with the reform that you're talking about. It's important for our teacher program especially that we were just having a conversation about it's social justice, it's equity, advocate for equities. One of the terms that my colleagues in mathematics education are using is rehumanize. I want to see what your reaction to that term is and whether you think that's something that'll be productive for our teacher ed program if we're all trying to use the same language as we talk about our efforts to change up what we privilege in STEM education.

Alexis Patterson Williams: Yeah. Humanizing or rehumanizing is not the language that I use, but I was, I'm familiar with Dorinda Carter Andrews work about humanizing pedagogy within literacy education. She talks about that it's sustaining critical self-reflection, resisting binaries, and then acting ontological and epistemological plurality. I do think that whether you call it transformative, whether you call it humanizing, whether you call it culturally sustaining, I think it's approaching the same goal Rebecca, which is really making it such that we're holding space for everyone authentically within the classroom. I think from many years, we haven't done that intentionally or unintentionally. I don't think there's a point in trying to make a qualm about what people's intentions are. But the impact nevertheless is that folks have felt left out, that we haven't talked about, we haven't embraced the fullness of people. Whenever you asked me to leave a part of myself outside of the classroom in order to engage in a version of what success looks like, that's not humanizing. I think sometimes we try to use fanciful language to try to explain what we are doing. But I think when we think about the harm, it's not really as deep, it cuts deep, but to me, if I'm not fully welcomed in the classroom, that's not humanizing because part of me is not in that space. I don't know if that's always the attention of folks or folks are fully aware, but it is the impact and the outcome for so many of our students. I think, well, we can draw the bottom line to that point. Again, as I said I don't think most people would say, I don't want my students to feel as if they are not welcome in this classroom, as if this classroom is not a space for them. But I do think the status quo curriculum leaves students feeling that way and I think that when we can put it in that very simple language about the outcome of students, we then have to do something. We are compelled to do something. And so I think that we have to then rehumanize the classroom environment for all of our students. However, challenging that task might be, that is the work of the teacher. That's what makes it fun, it's not just our work to do, but it's our work in partnership with our students, it's our work in partnership with the community to be able to understand what it means to do that work. I can't figure it out all that in a bubble. Even as a black woman teaching a minority classroom. For me, to assume that I know what's going to be humanizing for my students to me is arrogance, that I

have to engage them as well in that process. It's going to evolve, then my repertoire is going to become more robust the longer I'm in it. But that is always going to be evolving and it's always going to be about connecting with the students in the moment. Thank you for your question, Rebecca, a great one.

Danny Martinez: Thank you, Dr. Patterson Williams. We enjoyed your talk and I want to thank you for closing out this fall quarter's Brown Bag Series.