

UDL Research in 15 Minutes Transcript

David Rose

LOUI: Hello and welcome to UDL research in 15 minutes where researchers share their findings about implementation and the impact, and in-depth investigations of the UDL framework. I'm Loui Lord Nelson, UDL author and leader. Today, my guest is David Rose who is CAST's co-founder and Chief Education Officer Emeritus. David graciously accepted my invitation to be the first guest for UDL Research in 15 Minutes and we're going to chat a bit about CAST and the history of UDL, exciting things that he's seeing now, and what advances he hopes to see in the future. And even though this podcast has the title with 15 minutes in it, I think this one might go a little longer, so just fair warning there! So, David hi and how are you?

DAVID: I'm great. It's great to see you.

LOUI: Thank you!

DAVID: I think you and I talked, I'm in a beautiful cabin by a river in New Hampshire, and I wouldn't break away from that to talk to many people. But for you, I certainly would Loui. Nice to see you.

LOUI: Thank you so much. I really appreciate this. So, you know, we have listeners, I have listeners that are on the younger end. And I don't think they know that you're the original UDL Rockstar and so that was really important for me to have you here. And I just want people to have this a little bit of this history of the fact that, so 30 plus years you were on faculty of the Harvard Graduate School of Education, and tucked in there, you and your colleagues co-founded CAST. And I also want to make sure that people understand the CAST is a nonprofit. It's a research and development organization with the mission is to improve education by expanding methods and tools available to reach every student in our classroom. And it's from there that that UDL grew. But we both know now it's infused in policy and practice all over the world is fascinating to me. And I feel like the explosion has been like in the last 10 to 12 years, but what I'd love is if you would start back in 1984 and just talk about what, what was going on in research that made you and your colleagues compelled to start this idea of CAST?

DAVID: Well, as I mentioned with you, I want to start just a little bit earlier because I don't usually get to tell this part of the story. I had just finished a stint as a Head Start teacher, and I like to say that at the outset for one thing to say, I think of myself as an educator rather than a researcher per se. And I chose to teach in Head Start because I was trying to understand sort of where the differences come that I saw when I'd been a high school teacher. Where, where do they begin and how these individual differences are so extreme by high school? I thought, let me get three four or five-year olds and let me just see what the origins look like, and so I taught Head Start. And by the way, it's most exhausting job I've ever had much easier to teach graduate students at Harvard than to teach 27 preschool kids in Head Start program. But anyway, after doing that, I realized, wow, I don't really have this yet. These kids are strikingly different too, I don't see the origins of those differences. And so, when I went back to my work at graduate school, I decided to study the development of the nervous system, well, where did these differences start? And I think it's you know I actually did a lot of coursework in both MIT and Harvard Medical School to really get a solid background in neuroanatomy neurophysiology and stuff like that. It was really usual at the time, and I love doing it. But I didn't have any particular idea that it was going to lead to anything, certainly not to a career. I just felt like graduate school is a great place to explore your interest deeply and I was able to do that. And I came across a piece of literature in probably be 1969 or so that cut across the grain of the, the central orthodoxy of brain development, which was somebody reported that they had found postnatal, meaning after birth, generation of new neurons in the hippocampus of rats at day, around day 30. And it was published in a relatively minor journal, but it was still kind of like, "what?", because the complete orthodoxy was that our brains are formed at birth. The changes are largely some shaping that happens by culture and environment, but you have all your neurons. And all it happens is you have lots of die, you have fewer and, but that the whole brain is kind of there when you're born across mammals. So this was a really kind of "what?" and people didn't pay a whole lot of attention, but coming from preschool where I saw that changes as dramatic and that five to seven year period, I was curious enough to say well what happens at day 30 in rats what changes? So I studied rat development a bit to see how do they change and I went, Wow, that's not so different than the changes that occur in kids at five to seven and that's why we don't have them go to formal schooling till after that period. And the same with rats, you probably know rats don't go to formal schooling till after day 30, either. And so, that got me curious enough to

start to go fairly deeply into it, in fact, what should I say, compulsively deeply according to my wife. And I started to read everything I could about how the hippocampus develops, how we got the feeling that there is no postnatal neurogenesis, I hope that word will become familiar, no generation of new neurons, nothing new happens to the brain that sense. And as I did that over the course of a year or so some other studies came out to confirm yeah, you know there are postnatal neurons being formed in rats at this period. And, so I decided that I would really pursue this quite seriously. And this is the beginning of what the kind of research that I do, which I have to say thank you for calling me researcher, I don't feel like I'm a researcher but I'm a consumer of research at heart, I think. And so, what I began to do was look at everything that changes in, literally rats, during this developmental period and human children. And I just would look for the comparison. Look, what is this task do? What, what's the rat doing in this task? And what, what is the, the analog in children? What are the things that children are doing that are just like that? And I read, easily, 1,000 articles, and I was very systematic and my thesis eventually was, it had "dentate gyrus CIA granule cells" in the title which is quite unusual for doctoral dissertation in education. And in it, I unbelievably predicted that I think there must be postnatal neurogenesis in the hippocampus for humans. Now my advisors felt, don't go there, you know, you're going to, you know, people do not believe this. So, but they were compelled by the behavioral evidence. That's pretty amazing and I immediately got someone wanted to publish it and so on and things like that. But I felt I needed to do more and I didn't want to publish it at that point. That's a longer story. But I will say the end of the story is at the end of my thesis, my advisors felt it was so compelling that they made an appointment with, with the head of the major research journal in brain science at the time, called Brain Research. And I went down to New York to meet with him. And because this would, again, been a major thing to say there's postnatal neurogenesis in humans. So anyway, I get into his office and he says, "Who are you again I know that I've been told to see you." And I said, "I'm David Rose." And he said, "Where are you from?" And I said, "I'm from Harvard Graduate School of Education." That was my fatal mistake, saying, I'm from education. [I] should never said that. Because you can tell in his brain whet, "Oh God! Another one of these people that don't know anything about brains!", and are, so on. And then he said, "I know Dick Thompson said I should talk to you. What about?" And I said, "Well, I did a thesis, and other behavioral evidence is pretty clear that there may be postnatal neurogenesis in the hippocampus in human children." And he said, "Oh no, no,

there's no postnatal neurogenesis in humans or any kind of primates it's just doesn't happen. But thank you for coming." And that was it. That was the end of the whole interview. And I have to say I was gleeful 15 years later, one of the associate editors of that same journal had heard about this a little bit. And they read call me to say," Oh my god, you were right," because they finally had an article neuro anatomical article that just definitely proved, we have postnatal neurogenesis and just exactly the times that I said it would happen. And they said, "You we're right. You're just too early." So that was my first time I ever did research of any consequence and I didn't actually publish it which is very kind of amazing, and bad...what's the word? Bad karma bad thinking. But on the other hand, the reason I wanted to tell the story is that I feel badly that they didn't because it was way ahead of its time, would have felt great. But on the other hand, it would have launched me into a different kind of career. Would have been a, and in fact my advisors talked about, do you really want to be a bench neuroscientist and you know look at slides. What do you want to do, and I realized, no, you know what? There's something about teaching Head Start that I don't want to lose. And that I want it to be in education not in neuroscience, and so it was a pivotal moment in my life. So that led me to being a neuro psychologist, where I could apply what I knew about neuroscience to kids in schools and things like that and so I got credentials into that field. And that is how we got to 1984, I'm sorry for that long digression but in 1984. I was the clinic corrector where we saw, tons of kids coming in, who were having trouble in school. And our job was to do a neuro diagnostic workup and say, this part of the brain isn't working well and that's what's going on and gives them a label and then, you know, they'll get some kind of special services and things like that go well. So, I had a great staff. 30 neuropsychologists, and so we saw lots of kids, and overall, we were not all that excited about the results. That is, we felt we did a good job on our reports, but if we did any kind of follow up wasn't like dramatic changes were happening to these kids. And so we kind of went out again and we interviewed people in the schools to say our reports, helpful, you know, and so on and we were underwhelmed with our own relevance to change. And simultaneous at that moment out came computers. 1984 was really the Macintosh, and so it became something that everybody could imagine having in their house. Up to that wasn't true. And so we started playing with the computers with the kids who would come in for their diagnostic neuro psych work. We'd set up an hour or so after. Do your diagnostic work and let's try these computer things with you. And that kind of research was the beginning of what became

somewhat more serious, much more serious for some people than for me. And we started selecting kids that we call the pioneers, and they were kids who had a full range of disabilities. And everything from, you know, obvious cerebral palsy, to mild learning disabilities, to emotional disorders, to visual and sensory disorders, everything. A whole range of that. And, and we began to work with those kids in depth, we'd see them a lot, and go through what was happening in school. What was, they, what seemed to work for them with the computers and all of that, and that was the, the breakthrough in terms of us forming CAST was that we eventually called it, this little thing we were doing on the side of our work, none of us were paid for doing it or anything like that it was just pursuing, is there something here that we can recommend that we can change? Then the big transition that I know you know about Loui, is that as we were doing this was the field was called assistive technology and I think probably most listeners are familiar with that we thought was something we could do with the computer, give it to the kid, and they would use it to get around the problems in school. And over time, we became disillusioned with what that could do as one of our best clinicians said, "You know what David? All we're doing is providing better access to boredom." And we all went, "Oh my god you know it's so true." Because when we'd go to visit these pioneers in schools, we're like, you know, we are trying to get around problems that are central to the curriculum, and that didn't feel fruitful. So that's really when Universal Design for Learning was formed, that we decided that instead of trying to identify the disabilities and the kids that we needed to work more on what wasn't really working in school and that our kids were the symptoms of that. They were the outside indicators that something was wrong in our schools. We certainly understood that they were highly diverse and some of our kids did have neurological damage, unquote, but mostly they were highly diverse, and the schools were not well set up for them. And we're not teaching them in ways that made any sense. And so they were victims as much as anything and just labeling them didn't seem to help that. And that became a really big change in what we did a CAST. And by the way, it didn't come without any consequences. We, our referrals drop dramatically because schools have been referring a lot of kids to us they like their diagnostic work. But when we started saying, you know, schools kind of contributing to this. Some of the things you're doing in school don't really make sense for a dyslexic kid or etcetera. Schools were like, wait a minute, we didn't want you to talk about us! We want you to talk about the kids! So we had a kind of "Whoa," and so we actually had a hard time for a year to get our footing. And we eventually did get that footing, but it was a

major sea change and we lost employees where people felt like, I'm not sure this is gonna go anywhere. And I guess I want to say that to the younger people, that sometimes change feels as the, the chaotic edge of the change is destabilizing in lots of ways. We were, we looked like maybe we might fail at that point. And it turned out to be worth it. So that, that's how we got to what followed in 1984. Now if I go on to one last thing that was early Loui, that we by this time we're using computers and we're in schools and seeing pretty broad variety of kids, but very local for sure. But we finally went to a conference. And there we saw Ted Hasselbring give a talk and I think many people will be familiar with Ted Hasselbring's work. One of the really early leaders and assistive technologies. And he saw the same promise in the Macintosh flexibility stuff. And he had made a great program for teaching kids math. And I used to remember its name but it's escaping me for a moment, but it was all made in HyperCard, some of the old will remember that very early things, and he made it, it was just a great little thing on HyperCard very amateurish, but he reported results. And it was working for the kids who other things were not working for. And we were electrified to see somebody with research results that said, you can use this kind of stuff to design things that take away the problems in the margins, or at least ameliorate them greatly. And kids who supposedly can't do this can do this. And so we went up to him afterwards, and he was so generous to say, Sure, I'll talk with you. And so we went out to lunch with him. And that was the beginning, really, of talking with a serious researcher who had credibility in the field. And he became our mentor. And, and really brought us into the fold of the national Office for Special Education Programs, OSEP, and so on, because he was a star. So I wanted to actually mention that too, that the mentoring that senior people can do, educators, and Ted was a great educator, that without Ted opening up to us and helping us along, we wouldn't have made the advances that we did. So he's somebody I want to give credit as a serious researcher who brought us along.

LOUI: Hearing you talk and telling this story and starting with your idea of, you know, you're ahead of your time of talking about the rats, and then the creation within the hippocampus, the neuronal creation, and so okay, and I didn't say, I didn't restart I did publish my research and I had at the time and then even woven within this story of the creation of CAST and then further I know we're going to talk more about UDL, it just, it's, it's been, you've been a part of being revolutionary all the way along. Because with cast starting in 1984, and then UDL growing from that work. And then, like I said in the introduction, it's really, in my

perspective, it's been in the past decade, 12, maybe 15 years that we've just really seen this explosion. Like even when I came into it, it was still just kind of small little groups and now, right? It's just all over the world, and I'm taken by the fact that you and others took hold of this idea and just wouldn't let go.

That level of tenacity that was there to say, We know, we know this this information holds true. And you just kept working at it, to help bring it into the education milieu to bridge it in. And so, we had talked ahead of time about maybe what kind of research you would talk about but this does lead into that next question that I was playing around with which is what would be some significant pieces that kept you guys going? So maybe in the early 90s or even the late 90s when maybe it wasn't going as far in the schools as you thought it would? I don't know, I don't know what the perspective of CAST was at that time. But what was in the research that was making you go, yes we need to keep moving forward with these ideas.

DAVID: Great. The part that I wanted to connect with that, sort of, early obsessive thing of reading probably 1,000 articles came once again, and that was guess would start in the late 80s early 90s, when we realized that we needed a substantial framework to talk about this. You couldn't just say, "Do more diverse things," and you know that we needed some way to provide support for people to explore better themselves, but it gives them guidance. That this is the terrain that's fruitful, and that work was again, not me doing the original research but consuming other people's research. And I actually when I was preparing to talk with you I was realizing it was actually about the same volume. And what we did was because of the strong brain background, and it was common amongst us, we said, "Well let's look at the whole brain, look at all of its parts." And we know we'll have diversity and all of those children will be, you know, have more or less cortex devoted to vision audition or pre frontal or whatever it is that that variation is going to be there. So, let's be careful, and let's just make sure we include everything. And so, if a lot of people don't know this about the guidelines, but if we take the guidelines on strategic stuff, you know expression, it actually we'll just straight up the brain starts at motor cortex, and it starts with physical stuff. What do you do, how do you design environments so physical stuff doesn't get in the way of cognitive and emotional development? You got to handle the physical stuff for kids that don't have good motor cortex. So, you don't inhibit them to be their worst-case scenario and so on. So we did motor cortex, and said, "Well, where's the evidence that in fact schools can do things that people can teach in

ways that kids who have physical disabilities can thrive and learn and do well.” Then we went to supplementary or something called secondary motor cortex. Things like language speaking, all of those, and the skills and we said, okay, what are the things there that we know about that work when someone has trouble with expressive language for example. What kind of things in the literature work? Not to fix it, but to help the curriculum, be better at accommodating to that range of differences. And then thirdly, we went right to the front of the brain, but we're moving straight up the brain to prefrontal cortex to say, “Okay, what happens when kids are weaker or stronger in pre frontal areas from there this strategic planning that happens as the kids get a little bit older, is weaker or stronger?” What are the things that researchers have shown work to design the curriculum? The key thing is by this point, we're looking not to fix the kid, but to fix the curriculum already. So we're going, “What does the educational and special education research show would work to help a kid with pre frontal deficits or with secondary motor cortex deficits?” So we didn't use that language in the guidelines, but they're just made like that. So we had a framework underneath it so we could say, “Have we addressed variation in prefrontal?” And we'd say not yet enough. And so then we dig around and we had to do the same kind of thing thing. What are the prefrontal things? They don't call them pre frontal, but executive functions, that's what people call them. Great. Let's look at all the executive function literature, what works, what doesn't work. And that's how the guidelines were made. So, when we did it and I want to give credit here to Jenna who you know, and she's now at CAST but she was, I think, I don't know, graduate student at the time, but she was a really nice organized person who was able to make sure that we really, you know we're careful in doing all of this. And she and I did, easily, the same kind of numbers sort of like 600 to 900 articles. We read aggressively about the research. So we consumed so all of the UDL guidelines are not done by any research that we did, but by the researchers that were done by the field, especially educators regular educators about, here's how you handle variation in your classroom. Here's the things that really work and don't work. And then we were specific saying, for kids with physical disabilities for kids with skill-based kids, for kids with Executive disabilities, etc. And that became the guideline. So it's an enormous body of research. Now one criticism, which is absolutely fair, is we didn't link them tightly together. We did all this research, and by that time we needed to get them out. And so there are checkpoints where that sort of say, look at these 10 articles, and in revisions it would be good to say, hey, okay, here's the articles in a with a summary of each one saying this is what it

proves, and so on. That that needs to still would strengthen the whole thing and sometimes we do that, but anyway, we just listed here's the research that says this would be good. And that's how we got to the UDL guidelines and that when you say what was promising. I think was promising when we put the UDL guidelines out that they were picked up with very clear that there was a need there for people to have. Don't just tell us to do this in some general way give us something to start with. So the use of the UDL guidelines actually were picked up rather quickly by a lot of people, not everybody practice them, but everybody thought they were interesting and valuable. And they proved to be durable still a lot of people use them, even though they are, you know, need revision right now. So that's how that got there.

LOUI: Do you feel like there's a strength in the research community or as it's growing stronger? I think about researchers like Mary Helen Immordino-Yang in California who has a very specific goal to look at this connection between the cognitive sciences and then the outcomes in education, she's really pushing that closer and I know there are a lot of other people that have been doing that, but it seems to me within my limited scope. I'm also a consumer versus pure researcher, but in my limited consumption of that specific literature, but that feels like that group is growing. Is that true that there is more of an emphasis to see this true and absolute connection?

DAVID: Yeah, I think, Mary Helen is a wonderful example and I was just out of her lab a few months ago. And that, I think the general Zeitgeist is increasingly toward realizing that pathologizing kids is not our best approach. For one thing, it comes with all kinds of secondary effects, and with all kinds of secondary exclusions and so on so forth. And I think there's a much broader band of people now, whether they think in Universal Design for Learning terms are not, who are realizing that diversity, a, is a good thing not a bad thing, and that failure to deal with diversity needs to be first attacked at the school level rather than at the child level, and that studying the natural diversity of children and adults as learners is just a much more much a prevalent thing. I mean I think most people now would find it weird if you thought people were the same. But schools in the old days used to teach as if they were, and even worse like the goal of school was to make them more the same, you know ,they want to do a standardized kids. And now I think very few people think that's a good idea. And I think that's why UDL is, as you said grown a lot recently as there's a general Zeitgeist that goes, oh, you know, people are

really different. Anybody that has three kids or three nieces and nephews realize they don't seem the same to me. They came from the same family in the same environment the same heritage. So it's, there's something different about them. And if we all taught them and behaved in the same exact ways. We would be jeopardizing one or others of these kids would just not be a good fit. So, I want to just go for a moment on. Mary Helen Immordino's because her stuff is part of, I know that you thought, be good if I talked about what sort of future, I'm interested in, and her works for the at the center of a lot of that which is the focus on the emotional parts of the brain, it's just exploded. That just was not there when we started, and she's just a paragon in all of this. But many others to say, there's a reason the emotional parts of the brain are right at the center. Whereas we, as mid-century modern I was gonna say, but we're not mid-century modern anymore, but we grew up thinking that cognition was sort of a high points of our brains and that the, the powerful parts of our brains were the logic parts. And now that science is dead as people realize, no, actually, the emotional parts of our brain are what is really powerful, powerful, and all of the things I'm now studying like implicit biases that they're not coming, they overwhelm logic quite easily. It's very hard to overcome those implicit biases which are part of our emotional systems. That reaction to things that we don't have very much conscious control of. We have to really work at it. It's not automatic. And so Mary Helen looks at this intersection between those incredibly powerful emotional parts of our brain and cognition, which is a good thing and all of that, but I guess I'd like to say one of the things that was great about knowing about the brain was that at the time we did the original guidelines, no one who looked at physical disability was talking about the engagement part. Like, you know, you know if you can get over the physical problems they'll do fine in school. And saying we have dyslexia, if they can get the reading, you know, which is not correct, and that the brain looking at the brain in the way we did systematically said, whoa! We've got to talk about the emotional diversity, engagement diversity. It's got to be one of the core three things. We can't act as if it's sort of, oh yeah, and the kids should be motivated. You know, that it had the same diversity, and then, but with great power. And so that we early, and I think you know, we've evolved ourselves. We used to have it be sort of a third principle. Now we moved it up, doesn't mean anything, but we wanted to say, "No, actually the most important thing is, have you engaged this learner?" And if you haven't done that then you can do all kinds of cognitive design, and you're not going to get very far, and engagement is at the center of UDL, just as the emotional parts of brain are at the center of the brain. So, I like

Mary Helen's work because she's saying. It's at the center of everything. And that's where we start.

LOUI: This is probably going to be too big for this particular conversation but I am just so interested in, you know with, with the roots of UDL being in this understanding of our brains as far as we can understand it right now, and the majority of the research that we, that's been looked at for the development of the framework from what I understand has been from the US perspective. Has that shifted? Have you seen an interest in shifting that? Is there any difference? Is this, is there an international agreement on this kind of work? And I know I'm asking such a huge question so you could just choose whatever narrow entry, you want into that.

DAVID: Well, you're absolutely right. And I mentioned Jenna, and I realize I probably didn't say her whole name, Jenna Gravel, who's just a fabulous long term colleague and was more responsible than anybody for getting out the first UDL guidelines, she and I are now working on, just setting out what are the things that we would need to look at in research terms, and also in practice terms, to revise the guidelines. We think we need to do a substantial revision of the guidelines and people like you have told us that for some time. And, and it's time. And there's plenty of evidence and research that suggests we need to make revisions in the guidelines. And one of them is, actually what I love about it is that the UDL guidelines are were never meant to be permanent, they're meant to be sort of a learning thing themselves that would be stupid if we didn't think that, and sure enough, when it moved international, people like you and so on, taking it international, we learned that well some of these things. You know, they aren't that relevant or they don't seem right in other cultures. And that became part of everybody's understanding. Well we need to think about how this intersects with culture. And one of the other things is, what Jenna and I are writing about write now, we didn't really work on things like identity. Racial, ethnic, gender, all of those things were not part of the UDL guidelines. We really began in a different place. And that research now needs to be part of the guidelines in some way, or we need to link up with other guidelines by other people who have founded their work there that's fine. Anyway, it's got to be done. But as UDL has grown, we found where the, you know, we found there are gaps. We didn't address this. This needs to be addressed. And we hope that we'll work with a broader set of people to, in fact, and that means to your first question, people in other countries, can't

do it like we're all on the US. We can't do it like everybody's white, middle class people can't do it like everybody has strict gender sensibilities, whatever. That these things. We're going to have to broaden the very kind of people that work on the next set of guidelines and that's exciting. And it means that the UDL guidelines will have to grow and develop. They have to get smarter. And I think that's a good thing. And, and is actually kind of exciting, because I think some of the things we've learned most are from people who are not just like us, and live in countries that are not just like ours. And you go, "Oh, I have to think about that."

LOUI: Right.

DAVID: So, I think I am glad you asked that question because it's a really pregnant one and necessary one.

LOUI: So that's actually, we were, we were talking about, possibly, looking at kind of the next, the next step and that does feel like it is a next step. Do you see other areas or pieces of research that are on the horizon or they're just, they're just may become into your knowing that you're just really excited about and maybe you see there might be a space to talk about that within UDL, but it's just right out there on the horizon.

DAVID: Well this is not gonna be the most important to most of your listeners, I don't think, but just a personal thing is that I've become interested, because I'm aging person, in what happens to the brain at the other end of the development continuum? And so, I've been reading a lot about brains and aging and gave a course recently on that topic. And I lead off the course by talking about my own taking of the MOCA, which is, as we're speaking today, famous because Trump just "aced" it, he says. And I actually flunked, and it's a test that I've given and I know and in etcetera. I was, lots of things to talk about it, but one is knowing that you're taking a test that you've given makes you quite unusually anxious and sort of super reflective when you should just take the test. So anyway, I really missed items, and that caught my attention. And I began to want to understand more about what really happens in again, aging and I've now been to a huge course at Harvard Medical School on dementia, so I can understand what that is and just for your listeners I want to say dementia is not one thing. Just like UDL has said all along, there's all kinds of dementing. There's emotional demanding, there's recognition type dementing, there's executive type menting etc. There are many,

many kinds and sort of it's all lumped into one thing like brain damage. And I realized that oh my god UDL has a role to play in what happens to people who are old and they are in the same way treated as if they're all the same, they're just getting stupid. And in fact, the evidence isn't like that. In fact, some parts of the brain, you won't be surprised probably, the emotional parts of the brain are quite resilient. They're the last to go in, in most kinds of dementing, because they're the most important parts of the brain. The brain wants you to know that water is important, that loving is important and those kinds of things. And the brain is not going to give that up easily. So, with a little cognition, "Hey, go, you know, go for it, but we're going to keep you on target, about who you love and who you don't love and what kind of things feel good and what kind of things don't feel good." And so, understanding what really goes and how do we compensate for that is of, you know, personal interest to me, and I don't know whether I have the gumption anymore to start a, you know, thing about it, but I certainly am going to look to find people that I can work with several have been suggested, whose primary expertise is already in this field so they'll know more than I do. And then I can say, okay well let's talk about how you'd apply UDL to people whose differences are now due to aging and not to development. And so I'm kind of excited about that.

LOUI: Absolutely. And when you were mentioning it, I think maybe those who aren't as deeply interested or invested in the research on that on that emotion in the brainstem and what and what Mary Helen Immordino-Yang talks about, but that as you were just mentioning those that very thing of I want some water, or I want to have that emotion, those brainstem pieces that that's just exists in the center of our emotions, and I think it's a, it's a piece that still forgotten not in just day to day or not even just in the classrooms, but in other parts of life. And, as you were just talking about, as we grow older that maybe we think that that maybe we think the curmudgeonly person doesn't want the love anymore and they actually do, because that's just existing.

DAVID: Well, that one of the first things I learned when I was doing neuroanatomy was, I did a little bit of patient work but, there are people who are so demented in what we call recognition cortex, that they don't recognize any of their loved ones don't know the fam, that when people come in, that's their daughter or their spouse or whatever they don't know who they are. But if you measure them physiologically, you see that in fact, everything goes haywire because they know they don't know who, what their name is or who they are but they know they love

them. And it's very powerful stuff. And now everybody sort of gets that. And so, go and see your dementing grandparent, because there'll be happy that you were there, even if they don't remember who you are.

LOUI: I think this is a powerful place for, to end to end our conversation. It's a beautiful place it's just to remind us all that that, that personal connection that we make with others, these, it's the root of everything that we are as humans, we have to maintain that. Well David, thank you so much. I don't even know how much time has gone by, but you've given a lot of time and I, for my very first UDL Research in 15 minutes so thank you so much.

DAVID: Great to talk to you as usual Loui. See you soon I hope.

LOUI: Thank you. So, for those of you who are listening to the podcast, you can find supplemental materials like this recorded video and interview with closed captioning and a transcript at my website, which is the www.theudlapproach.com and articles that we might have cited in this podcast, which I don't know that we did necessarily here, but those, those could always be found below the video reverse representation at my YouTube channel, which is "UDL Research in 15 minutes", and you're going to find more information about David there too because I'll put his whole full bio there because I didn't get the richness of what he's contributed and will continue to contribute, I know. So, and finally, if you are a UDL researcher or you're interested in UDL research, and you want to hear about it, contact me through my website at www.theudlapproach.com. I'd love to hear from you. And thanks to everyone for your work in revolutionizing education through UDL and making it our goal to develop expert learners.