

## Applying UDL to Your Course Materials to Enhance Student Learning MP4 Video Transcript

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And so a quick introduction to CAST. CAST is a research and development organization located in Wakefield, Massachusetts, so just outside of Boston. It's been around for about 30 years. And it is focused on bringing together the learning sciences on one hand-- so the areas of sort of neuroscience, the science of teaching and learning, looking at sort of curriculum development, social psychology on the one hand-- and then looking at the uses of technology and how those things can be brought together to really create flexible learning environments that better meet the needs of all learners.

So we do both research that's applied, where sometimes we build our own software, or we work with people that have software, and we look at how those tools and products when they're designed using UDL work to support all learners. And then we also do a lot of sort of basic research, where we'll look at things like the relationship at a basic physiological level between emotion and cognition. So we're a small team of about 50 people.

But about 30 years ago, with Universal Design for Learning, its origins came really actually in a pizza parlor, which is sort of a funny place to start something that's had really quite a wide reach, where the founders of the organization were actually all clinicians in a hospital setting. And what they were doing is they were creating plans, often very thoughtful and elaborate plans, to help kids who were really not given a place in school, have a place in school.

So you could imagine someone who had limited mobility from the neck down, and because they couldn't pick up a book, it was assumed that they couldn't learn in a classroom. And so they were excluded. So CAST would create these plans, and increasingly figured out that it's actually really not about the kid. The kid can

actually learn. It's the environment. These environments are actually broken for these kids.

So they really started to say disabilities are always at the intersection of the individual and the environment and the tasks that are sort of put it in front of them. And so out of that came the beginnings, the seeds of Universal Design for Learning, which really is a framework for thinking about the design of learning environments that meet the needs of all learners from the outset, without lowering expectations.

So also borrowing from universal design in architecture, where you really design for everybody, for building from the outset. So you don't sort of think about who needs a ramp after the fact. You design it from the outset. Universal Design for Learning applies those concepts to educational environments. And we like to say at CAST that the future is really in the margins.

And what we mean is that when you actually innovate for the students who are traditionally the least well served by environments that don't think about a broad range of students, they're the ones who actually, because those environments are so broken for them, demonstrate what might actually be broken for others as well. So they end up being, as we like to say at CAST, sort of the canaries in the coal mine. Because they're the ones that get sick first, and indicate that actually that the air is not great for anyone to breathe.

So we always look at the experience of students with disabilities as a source of innovation. But the Universal Design for Learning framework has really broadened out now, where it's in instances adopted as the curriculum framework for entire states. It's in the TAACCCT solicitation for grant announcement. So it's a requirement of TAACCCT, and it's in several others we'll look at as well. But those are sort of the origins.

And just in terms of the things I'll be covering today, so wanted to look at the access retention problem, post secondary, because I think UDL is in part a response to that. It's not the only response, but it's certainly a piece of that response. And we're seeing increasingly, people looking at it and connecting the dots along those lines, as opposed to just saying, well, this is what we'll do for the students with disabilities. Actually, this is what we'll do for retention, more generally, because it's good teaching and learning practices.

We'll look at UDL as a research based framework, and go over it a little bit as a strategy for addressing learner variability, which we consider that to be the norm, not the exception. That's what we should assume in a classroom, that our students are very variable, not only one from the other, but a single student over time or in a different context. And for thinking about not only equitable access, but equitable progress.

So UDL is sort of a response not just to the issue of how do we get people in the door, but how do we get them then out the door. How do we get them through and out the door? And in the time we would like. So not in the door one day and out four months later. And then we're going to look at implementation of UDL in curricula, and a couple other examples. And again, if that sort of gets short shrift, we'll talk about it a little bit more in depth, and focus on your work in the workshop portion.

And so just, this was sort of in the intro this morning, talked about a little bit. But let's just sort of look and reflect quickly on what a changing landscape it is. So associate's degrees, many of you are in the business of granting associate's degrees, have ballooned over the last 10 years. 71% increase between 2001 and 2011. Much higher increase than bachelor's degrees, any other types of advanced degrees, they've ballooned.

We know that on average, 11% of undergraduates have a disability. And we know that that's an under inflated number, because most people don't actually disclose. If their disability is hidden in some way, if it's not something that they have to disclose, often students don't. So this is a widely under reported number.

But there's many, many other areas of variability, English language learners, enrollment of students who are 25 to 35 years old increased 45% between 1996 and 2010. Same thing with that older, that age bracket that's just older than that as well, and on the rise. So this is not news to any of you, but it's just a way of sort of reinforcing that learner variability is absolutely the norm in these settings.

And we need to think about responses across our institutions, and in our classrooms, that speak to that in a way that's not about always sort of accommodating for the variability after the fact, but thinking that that's a rich part of a good learning environment. And I just want to sort of point out the relationship

to student retention, and just highlight some of the things we know about student persistence.

So Vincent Tinto's work, he's done a lot of work in two year colleges, and in four, over 30 years. He's really created one of the most lasting models of what are the institution and student level factors that create the conditions for helping students stay, and not leave before they get a degree. And he wrote a book in 2012 called *Completing College*, and he sort of flipped it around and said, what are the things as an institution we need to do to help students stay.

And so these are very interesting, and you'll see hopefully as we look at the framework, that they're actually pretty well aligned with UDL. High expectations and self expectations, so these start with the student's expectation themselves that they can complete. And they're reinforced by faculty and other staff's beliefs in the students, and what they convey in terms of their expectations for students being able to complete.

Academic and social support, and academic and social support both in the classroom and outside. And I thought it was so interesting what Paul was saying this morning. Because as we move to these more collaborative pedagogies, and we give students a role that's different than just the disposable assignment-- I like that a lot-- we can see even more that the classroom is a very social place where there's a need to have students be able to give one another that social support in the classroom that's actually about learning. It's not sort of social support, like someone said hi to me, but it's actually the capacity to collaborate as peers and think together and generate solutions together.

And the area of sort of assessment and feedback, how do we sort of handle assessment in an ongoing way, as opposed to doing what we morbidly like to call an autopsy, at CAST. Where it's the end of the year, you're giving your assessment, oh-- OK. Now we know that this was not working for this person. How do we use assessment to inform instruction. Very interesting that that's really very highly tied to retention.

And then the fourth, sort of academic and social support. The same sort of flip side is academic and social engagement. So how do we sort of make these things happen? And the interesting thing about this is these are the factors that are

associated with student persistence. And we need to couple that with the fact that these are going to look different for different students.

Students, one student is going to need this type of social support, another student's going to need this type of social support. So how do we sort of design for that from the outside? And as faculty, it can be pretty overwhelming, right? Uh-oh, how do I attend to so much variability, and these fairly complicated ways in which we help students persist?

So the nice thing, and the good news, and this is really grounded in the neurosciences, is that some variability in learning is actually systematic. And you can plan for it. And so, it's what we know, and this is really sort of the basic sort of building blocks for universal design for learning, is that people differ systematically in three different ways. This first area is the recognition networks, and how people sort of perceive information through the senses.

So this is sort of the back area of the brain, the recognition network. And what we know is that's going to, there's going to be a wide range in how people perceive information. So you can imagine if you're hearing impaired, you're going to get the information from a webcast very differently than someone who's not. You're going to take that sensory input in very differently. So you need to plan for there being multiple representations of information so that we attend to differences in recognition.

But there's much more subtle differences, too, that are tied to people's background knowledge, experiences. Many of you are probably serving veterans in your setting. A veteran may take in, if you're in a lab and they hear a loud noise, in a chemistry lab or something, and they have PTSD, they may experience that very, very differently than someone else. And then their energy is more sort of fight or flight, and they're not actually focused on your task anymore.

So we need to think that people are perceiving information in very different ways. People also are very different in how they act on information. So not just what information is coming at me and how do I process the what, but then how do I set a goal, and take the steps I need to take to complete that goal. People are very different in how they get from a to z. And we need to plan for that. And that's really the sort of frontal lobe strategic network. So strategic planning and processing.

And then people are very different in the affective network, in our sort of limbic brain, our fight or flight area. We know this. I'm sure you find this with a lot of your students, the students that are coming that are balancing parenting, that are coming into school after potentially not having been so successful in K to 12, and being in the workforce for a long time before they come to college. They're going to be influenced perhaps differently than a student who is coming directly from high school.

And so what we want is really to have purposeful, motivated learners, we need to think about different motivations when we come in. We need to plan for these things at the outset. And that doesn't mean that we create 8 million options along all these lines, but it means that we think about options carefully tied to our learning goals.

So if we know that our learning goal is that a student understands, you know, a cell structure, well we need to plan for the fact that some students are going to be able to process that information visually, and some students are going to need to process that information through different mechanism. And we need to design for that. It doesn't mean that we have to create 8 representations, but we need to have at least one or at least a couple representations that meaningfully get students to the same goal through different avenues.

So out of that comes, and this should be in your packet, and we have web resources to this, and then tons of sort of resources at CAST where all these things are, you can drill down into them. And I'm not going to go through this in detail, but this is the Universal Design for Learning guidelines, basically, based on 800 peer reviewed articles to validate. The principles are sort of, if you go along, the first principles provide multiple means of representation, which we just talked about, to attend to the fact that people perceive information differently.

The second principle is provide multiple means of action expression, given that the how is different, how people get there is different. And the third is that we provide multiple means of engagement, given that people are motivated in different ways. And we often look at these principles as sort of deepening as we go down, from the sort of top level is really about kind of accessibility concerns, web accessibility would factor in along this first way.

So you think that you would offer ways of customizing the display of information. You would make it possible to resize the font. You would make it possible to think about color contrast differently. You would make it, what you create, compatible with assistive technologies. So if someone needed to use a screen reader, you would make what you create compatible with that, and you would test that it is. You would really focus on kind of things around individual choice, not autonomy. There's a lot of research to show that choice is really critical.

Those are sort of basic access issues. But then what we find is that once we've sort of created a foundational layer of access, then we get into the area of sort of making information meaningful and purposeful for learners. How do we do that? How do we go from just, OK, now I know what the environment is, to how do I act on that information strategically and make it meaningful to me in the context I'm in, through to the last level of providing options for comprehension.

So you can imagine how a student sort of comprehends an assignment in a nursing course that's tied to understanding who they might be as a nurse, right? So it's not just information that's not tied up with beliefs and values and who they hope to be in that profession. Comprehension is really about making the information meaningful to that person in the context. So how do we sort of help support comprehension that's not just about understanding facts, but understanding how those facts relate to a future job role?

In the area of executive functioning, supporting someone to really plan and be able to do the things they need to get to a goal, to know how do I organize myself? What, how do I plan my time and manage? And that's particularly challenging, actually, online, because the face to face teacher supports are not there in the same way. And then this area sort of providing options for self regulation. So how, when learning gets challenging, can I really persist? So that's really the area of self regulation.

And the goal of kind of this bottom level is motivated, purposeful, strategic learners, that, put them in a different environment, they can persist, because it's been well designed and these things have been sort of thought of. So that's just the same thing. We kind of think down the principles. Principle one, two, and three, tied to the learning networks, but we think across them, too, building from access to making information meaningful, to building self regulated, motivated learners.

And this is just, I think, an interesting thing to think about, because it brings some of these things down to earth a little bit. So the recent edX settlement with the Department of Justice. edX was served a lawsuit from the American Association for the Deaf for not being completely accessible. The settlement agreement with the Department of Justice is very interesting because it's the first that's actually said the responsibility for accessibility, and making sure that all students can access online environments actually isn't just the platform's jobs.

So it's not the people who create the software. And it's not just the course instructor's job to create course units, or OERs, or whatever they're creating that are accessible. It's both people's jobs. And so the conditions in the settlement, edX has to reach these in 18 months, are really tied to both groups. And we actually see that as a really exciting opportunity for thinking beyond just access, to thinking about retention. So how do we sort of really meaningfully marry this bottom layer of accessibility in UDL to the higher layers of making information meaningful and building self-directed, motivated learners?

And I think that really comes because the software developer is building the tools, and the instructor that's using those tools and developing content in that environment have to actually work together and both think about accessibility. So let's get them to think about not just access, but progress. And we hope that some of what we sort of go through today is helpful for thinking about both those things.

UDL is in federal policy, and I'll go through this sort of quickly, but it's just good to know that it's in the Higher Education Opportunity Act. And it's considered a scientifically valid framework for guiding educational practice that provides flexibility on the one hand, and also reduces barriers. But does so by maintaining high achievement standards.

So it's important to know this is never about dumbing down a curriculum, it's about making sure that the supports are there so that more students can reach the high levels we want them to. And then as I said before, it's in the TAACCCT SGA as a requirement along with 508 compliance, and WCAG 2.0, which are accessibility international standards.

So now I want to sort of get, just in the last little bit here, more into the meat of what we're talking about when we talk about curriculum. So when we talk about a curriculum at CAST, we're not talking about just materials. And I really appreciated

Paul's talk of sort of talking about OERs as not just being about materials. And I think that's really important to think about when you're thinking about OER and you're thinking about how you bring those in, it's really about the whole curricular process.

It's about goals. What are our learning goals for this student? And this is one of the really lucky things about TAACCCT is it's so closely tied to industry, you actually really have to evaluate those learning goals in a way that you might not if you weren't as enmeshed with industry, and thinking about what do we need these students to actually learn in this course. What skills do they need to have? And having industry come in and shine a light on what they think some of the skills are, as well. And really clear goals are the cornerstone of effective curricula. So everything really starts with our learning goals. What are they? How do we make them clear to people?

Then there's the area of materials. And we also sort of add thoughts about selecting technology in there. But what are the materials we're going to use to help students reach those goals? And then what are the methods, the methods of learning, the methods of teaching, that we're going to support students with? And then how do we assess what they know? And how do we use assessment to assess ourselves and instructors, and whether we've actually addressed that variability well enough? That's really the four components of curricula that we see.

So in terms of goals, this is from the open learning initiative. And this is a nice first step, where what they've done is they've kind of put the means outside of the goals in terms of the language they use. So a lot of the language is like explain, describe. It's not saying, you know, you need to kind of describe sort of effective medical technician behavior in this setting. And so I need you to write me five paragraphs on that.

They're saying, I need you to explain this, but whether you explain it through a written document, or an oral presentation, or whatever, they're taking the means, the how to get there, out of the goal, which is really critical. And it can't always be done. And when it can't be done, we think about how do we, if we can only sort of evaluate that someone knows something in a certain way, how do we put supports into that form of evaluation so it's better for more students? But this is a good first step.

And you know, the goal must really be flexible enough to allow learners multiple ways to successfully meet it, but not really embed the means. And we're short on time, so I'm going to leave it. But I think that what I'd like to do in the session is look a little bit, I know you have PhET coming tomorrow, and PhET does sort of dynamic, interactive simulations, which is probably where a lot of your work lies.

And is working, I was just with a professor at UC-Boulder yesterday, talking about work he's doing with them. But these are really amazing opportunities for rich assessment, for rich kind of skill building. But we also need to think about, they're very visual, right? In what ways could we make those things more effective for a broader range of students who maybe can't process visually? They also require a lot of movement.

Now for someone who has limited mobility, or even something like repetitive stress injury where just doing all that moving is quite hard, how do we sort of think about alternate ways to support physical access to that simulation? So some things in terms of materials are easier to help students reach the goals, but some things, like dynamic simulations, that's the cutting edge in terms of how are we going to figure out how to make these things work for broader range of students.

And so if we think about materials, the work there is really about embedding options to ensure accessibility of all materials, media, and technology, to do things like support decoding of text, mathematical notation and symbols, and promote understanding across different languages. So couple examples of this. This is sort of a fairly straightforward example here, and this is from also a course that was developed with TAACCCT grantees.

You have here images, right, the visual representation of information. And the goal here is to be able to answer which of the graphs above is a pie chart, which is a bar graph, which is a line graph. Now for some people, it's not going to be a good representation, right? But what you see is that, there is right there in the system, a text based representation of the same information. I don't, as the person who's low vision have to go to some other place or ask for an accommodation to get this different representation, I can get it right there.

So that long description basically shows that I can get the same quality of information. This descriptive information's not telling me the answer. What it's doing is it's telling me the information that's in the visual representation so that I

can then reach the goal of being able to answer this question, and say what's a bar graph, what's a pie graph, what's a line graph.

So this is another example where we look at something like an equation, and we provide a number of supports. So we've got again, the alternative version that you can click and will describe what's posted numerically. This is compatible with MathML, so screen reader can read it. And that's what text help is, is a very widely used screen reading software. There's the capacity to have terms explained.

So my goal here is that the student be able to answer this equation, not that they know all the terms. So as a professor, I've thought through the fact that, do I need them to know the term denominator, or can I provide a vocabulary support for that? I can provide a vocabulary support, because my key learning goal is that they understand how to do this equation, not that they understand all these terms. So I've separated the means from the goal, which is really why it's so important to think about learning goals.

And then methods are really so critical. And this is where we've seen in our work with TAACCCT that this is sort of a harder piece for, this is sort of the growing edge in terms of thinking about learning goals, thinking about materials, is an easier lift than actually thinking about how do those things blend with methods that are thoughtful of all learners from the outset. So what we've tried to do is work with people that take very good teaching approaches that are really actually quite compatible with TAACCCT, right?

TAACCCT, you have industry and you have community colleges collaborating really strongly. And we've taken loosely the case based learning approach. And we said, let's think about, this is from the National Stem Consortium, and this is Jay, who is our protagonist. And he's in an internship in an electrical vehicle technology company. And he's learning his algebra skills, which is the target of the course, right? He's got to learn these algebra skills in the context of measuring car parts.

And we did this because it's a method that on its own, I think, is pretty appropriate for this population of students. A lot of the students coming in are coming in from the workforce. Let's leverage that as a strength. But then what we did is we said, how do we make that more universally designed? So not just take a good approach, and say OK, well let's use it with that same Socratic methods we always had, where we're cold calling on all students. And maybe that's not great for everybody.

And how do we sort of think about building in the support? So we offloaded a lot of what might be written information into video, the set up, those things. And there's closed captioning, and there's transcripts. So I have the alternatives, in terms of how the information's represented, right away. But a lot of sort of thoughtful work around methods is really helpful, and a byproduct of this is that it was really helpful for bringing industry partners in.

They contributed to the curriculum, not in a validating, knowledge skills, and attitudes, but in a directly, here's a story from the workplace. Put it in your scenario. Here's some artifacts that you can use in there. So a lot of times when you think about how methods support a broader range of students, it's interesting that they actually give an avenue for some of your partners into curriculum support and design that they may not have otherwise had.

But this is another sort of area in terms of methods that is worth talking about. So this is the collegeSTAR program, which is a Universal Design for Learning initiative across a number of the University of North Carolina university's system. And their goal is to sort of better support students with learning differences across their educational experience.

And one of the things they've done is they've built in this tutoring model where they have students participate who did really well in these sort of basic courses that have very high enrollment and low pass rates, like chem 101, or whatever it might be. So students who'd done well in those courses the year before were trained as tutors. They were trained in UDL, and they basically gave face to face tutoring sessions, recorded those online so students who couldn't come to the face to face could watch those after, and they sat in on the class and would meet with the professor and say, hey, both from the tutoring session I gave and from my knowledge of UDL, here are some things students are missing.

These are some things that might need to be re-taught. Here's a different way of approaching it. It's had a really great impact on retention. Students who participated in the tutoring, even just three times, whether it was watching it on video or going to live sessions, had a much higher pass rate than even just the average for the department in the courses that use this tutoring model. But that's a teaching method, right? It's not all on the professor, but it's a teaching method that saying there are other people also who impact the teaching experience that can help bring more support for diverse learners.

And then just in this last area of assessment, there's really two ways of thinking about this from a UDL perspective, and the first is really in the area of sort of Universal Design for Assessment. And I can share a paper on this that really walks through examples. And that is really focused on when you have a fixed mean.

So let's think about, this is more of a K-12 example, but the high stakes, multiple choice state assessments that students have to take, it's a fixed mean. Everybody has to be able to take that multiple choice assessment. Pretty taxing on recall. What are the things, supports, you can embed in that assessment itself to build support for students for whom that assessment, without supports, is not going to be as good a measure of their learning as it might for some other students.

The other way is really thinking about options tied to the learning goals. So we talked about that a little earlier. How do we think about some options around how we would assess students? Can we use an e-portfolio that our learning management system offers, or do we need to have these other assessments that are more disposable? I'll take that term from before.

And there it's really ensuring that learners have options so that we're actually measuring what we want to measure, as opposed to measuring their anxiety or their skill taking, you know, their test taking strategies. We're actually measuring what do they know about the content that we want them to learn. So there's both options in terms of providing different assessments and their support embedded in assessments.

So in the Universal Design for Assessment area, I'll just look at a couple of these. But basically what you want to do is you want to make sure that you've got inclusive assessment populations. So I'll say this doesn't work for me, but an example, if I were taking a math problem and the example was about football, I wouldn't really get it. You want to make sure that your language, your examples, are relevant for your population. So you're not taking things that are, when you're assessing students, are good examples for a small subset, but for a larger population.

You want simple, clear, and intuitive instructions, and precisely defined constructs. So that's where it's really, you know, you know what your learning goal is, and you've really assessed just that. You're not assessing extraneous things like someone's reading ability in a math class. So I can share a paper that really walks

through some examples of that in more detail, but that's the area of Universal Design for Assessment.

And then here is sort of back to UDL and the options issue. So this is an example where we've got the representations broadly, but we don't have any choice around assessment, right? We've got the alternative version to explain the visual information. Vocabulary supports are in there, but then when it comes to assessment, it's like a glass ceiling. Because now that we're measuring what people know, that flexibility is gone, right?

We had the flexibility in how we represented information, and then we've dropped it when it comes to what really counts, which is them demonstrating that they've understood. So that's really a critical area for growth, is how do we sort of give more choice around assessment.

And then I just, we'll talk about this more this afternoon, and I hope that some of you, or all of you if you want will stay and participate in the activity we have, to try to really make sure this website meets your needs. But this is what we've developed as part of our TAACCCT work, all generously funded through the Gates Foundation. It's called UDL on campus, and it's really our first pass at trying to articulate UDL in the post secondary setting.

And it focuses broadly, so there's things that are specific to faculty, like planning your syllabus, which is, people have found, I think, quite helpful in a more UDL way. And there's things that are also not specific to faculty, like there's information on voluntary product accessibility templates. So you know how to look for, is the LMS I'm buying actually a good one, that's already thought about accessibility very carefully.

That might impact someone who's doing technology procurement. And there's things around legal obligations and policy that might impact grant managers or different folks, as well.