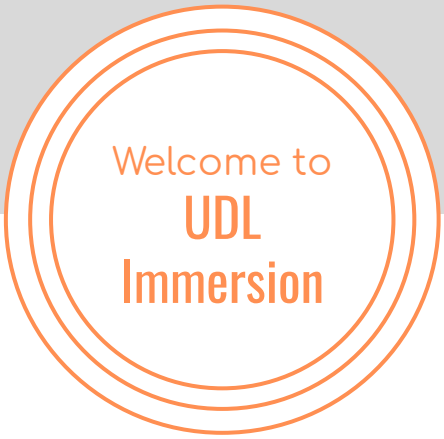
COMPANION GUIDE

UDL

OPEN ACCESS

Leading & Coaching towards UDL



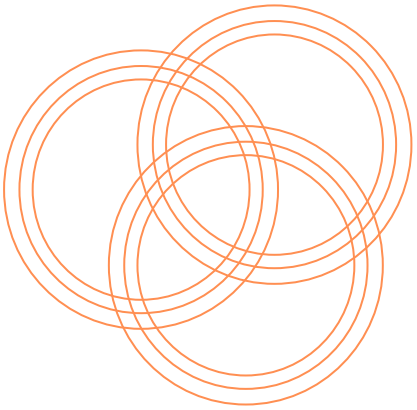
"Don't fear failure. Be afraid of not having the chance. You have the chance!"

-*Sally* (Cars 3)

Opening Routines

We're going to go through a series of opening routines designed to help us all connect with each other and mindfully center our thinking around today's learning. The way in which we open this immersive learning experience sets the tone for a positive day that is grounded in hope, vulnerability, and deep learning. As you move through the training, we encourage you to pay attention to how you feel and what you are thinking. Pay special attention to how this energy impacts how you learn today.

Participants will:



- understand that UDL is not an initiative, but serves as a basis for system-wide transformational change
- understand that UDL often requires us to shift conventional thinking about instruction - to remove barriers, consider learning variability and eliminate the myth of the average student.
- reflect on how UDL creates opportunities for intentional instructional design that accounts for the wide swath of student backgrounds and learning needs
- understand the UDL framework and how the parts of it interrelate

Set Your Intention

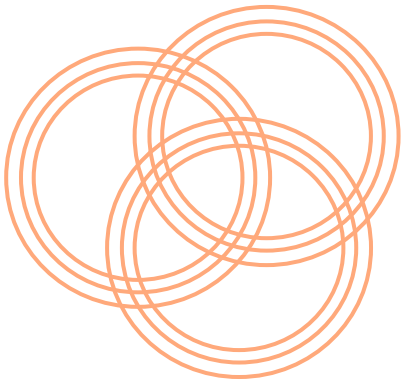
Grounding

By Margaret Wheatley

Choice makes the world go round. The only problem is we don't know this. Everything in our world - what we feel, who we like, what we dislike, what we do - is a choice. When we realize this, and start to act on it, we regain our freedom and control. We become more conscious participants in any situation.

We need first to notice that we've made choices about everything in our lives. How we react and respond, every single feeling, is a choice. Every situation has infinite possibilities for interpretation and reaction. But we collapse all those possibilities the second we assign a feeling or judgement to the situation.

How do we get out of this constriction and discover infinite choice?



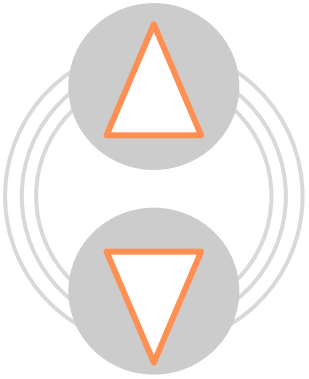
It begins with recognizing that we're not locked in by our perceptions, that other responses are possible. Instead of deciding we don't like a person, even if the reason seems valid and obvious, we could pause and take another look. Or we could ask them a question that invites them to reveal something more about themselves.

Or on a day when we're beating up on ourselves, or feeling depressed, we could notice that we're telling ourselves a story. At that moment, we could deliberately choose another story, one that's positive, bragging, grateful. It won't be a true story, but none of them are. They're all fictions of our drama queen minds.

Changing the story seems unauthentic, lacking integrity. But in this case, authenticity is very overrated. And extremely limiting.

Why, in this world of infinite freedom and choice, would we lock ourselves into one petty story, no matter how much time, attention and creativity we've spent on composing it?

30 Second Elevator Speech



Big Ideas

Universal Design for Learning

Universal Design for Learning is a framework that embraces variability, removes barriers, and supports all students in becoming "expert learners" through specific strategies that are based on what we know about how we learn (the UDL Guidelines).

CAST describes UDL as "*a framework to improve and optimize teaching and learning for all people, based on scientific insights into how humans learn*"*. It is the framework and foundation for designing and delivering instruction that supports the variability of all learners, which makes it the best practice for teaching all students in an inclusive learning environment.

UDL believes that everyone is a variable learner and rejects the idea of an "average learner". "*Yet our educational system is designed around the idea that most people learn the same way and that a "fair" education is an identical one*"*.

Dive Deeper: Todd Rose explains this concept in the "Myth of Average"

UDL believes that barriers are in the environment and not the student. The learning context itself (e.g. the environment, the methods, the materials) effects whether an individual characteristic of a student becomes a barrier to learning, or not. Think of a student who is deaf. If a class is taught in spoken English only, this presents a barrier. If the same instruction is provided in sign language that barrier may be eliminated. The disability is **contextual**, and **not inherent** in a person. A major goal in implementing UDL is to remove barriers and design to the edges of your classroom

Dive Deeper: Watch master educator Shelley Moore explain these concepts in "the Bowling Analogy"

The GOAL of UDL is to create learners who are...

Purposeful & Motivated | **Resourceful & Knowledgeable** | **Strategic & Goal Directed**

UDL believes that all learners, to be successful, must learn and grow *as learners*, not just build content knowledge alone. Classrooms need to become hubs of expert learning, where teachers support students in mastering these outcomes by modeling and supporting skill building and internalization of these skills.

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**/Italic are direct quotes from Universal Design for Learning: theory and practice.*

The UDL Guidelines...

udlguidelines.cast.org

Teachers are guided to provide students with...

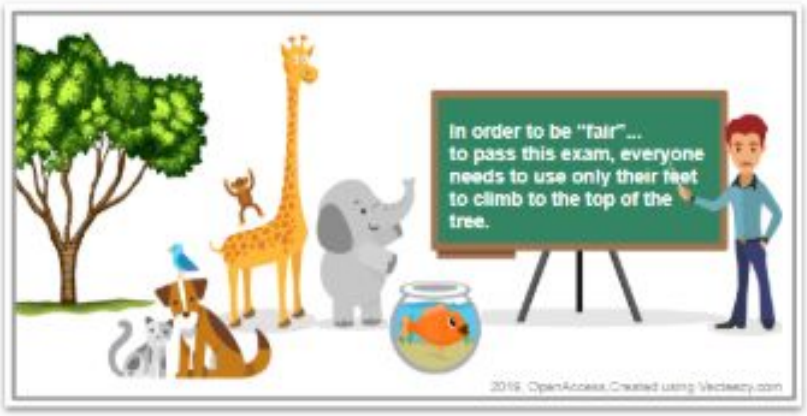
Multiple Means of **Engagement** (The Affective Network)	Multiple Means of **Representation** (The Recognition Network)	Multiple Means of **Action & Expression** (The Strategic Network)

CAST created the UDL Guidelines as a scaffold for teachers to use as they build flexibility into the learning environment. These guidelines are based on three principles that directly relate to the learning networks of the brain.

"Each of the nine guidelines emphasizes areas of learner variability that could present barriers, or in a well-designed learning experience, present leverage points and opportunities to optimize engagement with learning".

It is important not to regard UDL as a "checklist". In a UDL environment, teaching is an iterative design process, where we are constantly thinking about how and why we are designing and delivering instruction and reflecting on how students are learning. The checkpoints under each guideline provide concrete suggestions for how to address and plan for the systematic variability that exists within any given classroom. These checkpoints, or strategies are "*based on a multiyear review of thousands of research articles that identified specific experimentally validated instructional techniques, adaptations and interventions*"*.

Dive Deeper: An interactive version (along with printable versions) of the UDL Guidelines can be found at http://udlguidelines.cast.org/. The research behind each checkpoint or strategy can also be found in the "research" link on each checkpoint.



"Everyone is a genius, but if you judge a fish on its ability to climb a tree, it will live its whole life believing that it is stupid."

-Albert Einstein

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WHAT IS UDL?

UDL is Universal Design for Learning, an education framework based on decades of research in neuroscience and endorsed by the Every Student Succeeds Act. UDL is considered best practice for teaching all students in an inclusive learning environment.

The goal of UDL is to create learners who are

Purposeful & Motivated

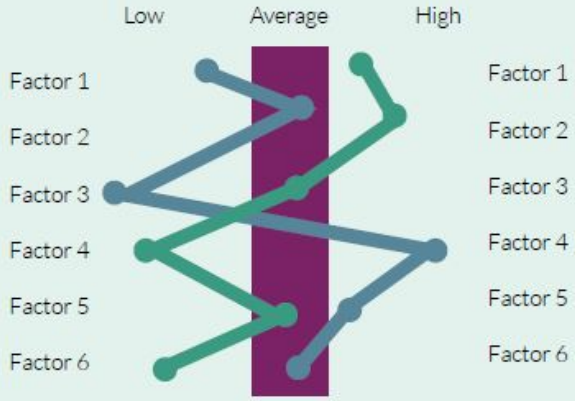
Resourceful & Knowledgeable

Strategic & Goal-directed

in other words, **Expert Learners**

Start by embracing learner variability. There is no such thing as an "average" student. Every student has different strengths and weaknesses.

"Average" Student A



"Average" Student B

Todd Rose demonstrates student variability with the "Jaggedness Principle" in his book, "The End of Average"

With UDL, teachers transition their role to facilitator, removing barriers to learning by giving students options and choices that empower them to take control of their own learning and reach rigorous state-standards. To universally design lessons, teachers must provide:

Multiple means of ENGAGEMENT

The "why" of learning

Allow students to make choices so they remain invested and engaged

Explicitly tell students **why a lesson is relevant**

Offer students tips on **how to stay motivated**

Provide a **variety of resources** to prevent frustration

Encourage students to **assess their own learning** using checklists and rubrics

Provide **varying levels of challenge**

Offer opportunities for **consistent feedback** like self-reflection, peer review, and teacher feedback

Multiple means of REPRESENTATION

The "what" of learning

Provide **visual, auditory, and digital materials** for each lesson

Provide scaffolds to support students with reading materials

Simplify **complicated instructions** and provide visuals to increase understanding

Offer visuals like charts, pictures, movies, audio clips, and resources students can touch and manipulate

Model comprehension strategies like note-taking, highlighting, monitoring, and asking questions

Help students see how the **information is transferable** to other classes and lessons

Multiple means of ACTION & EXPRESSION

The "how" of learning

Allow students to use technology, resources, and tools to express knowledge, such as speech recognition software, dictionaries, graphic organizers, calculators, exemplars and so on

Give students a choice in how they express what they know or what they can do as evidence that can meet or exceed a standard

Provide feedback while students work

Have **students reflect on their own learning** and evaluate the choices they made to express knowledge

Provide tips on how to stay organized

IMPLEMENTATION TIPS

To learn more about Universal Design for Learning, check out UDL Now! by Dr. Katie Novak (available on Amazon and other book resellers) and explore the UDL Guidelines at udlguidelines.cast.org

Novak EDUCATIONAL CONSULTING

UDL Framework

THE UDL FRAMEWORK

What You'll Learn

You will learn what UDL is and is not. You will recognize it as a system change that embraces equity and inclusion (not just another initiative!). UDL requires us to shift conventional thinking about instruction - to remove barriers, embrace learning variability and eliminate the myth of the average student.

You'll get better at:

- Reflecting on your own beliefs about teaching and learning and the systems that drive it
- Understanding UDL as an instructional design framework that supports me in recognizing and anticipating a wide range of learner variability across the environment
- Recognizing how UDL creates opportunities for intentional instructional design that accounts for the wide swath of student backgrounds and learning needs

Constructivist Listening

Purpose:

To create a safe space to become better at listening and talking in depth. Constructivist Listening Dyads help us as we work through feelings, thoughts, and beliefs that sometimes produce anger or passivity, undermine confidence, or cause interference in relationships with students or colleagues.

Guidelines: http://schoolreforminitiative.org/doc/dyad.pdf

1. Each person is given equal time to talk. (Everyone deserves to be listened to.)
2. The listener does not interpret, paraphrase, analyze, give advice, or break in with a personal story. (People can solve their own problems.)
3. Confidentiality is maintained. (People need to know they can be completely authentic.)
4. The speaker does not criticize or complain about a listener(s) or about mutual colleagues during their time to talk. (A person cannot listen well when she/he is feeling attacked or defensive.)

7 Lessons for Leaders in Systems Change

1: To promote systems change, foster community and cultivate networks.
2: Work at multiple levels of scale.
3: Make space for self-organization.
4: Seize breakthrough opportunities when they arise.
5: Facilitate — but give up the illusion that you can direct — change.
6: Assume that change is going to take time.
7: Be prepared to be surprised.

Sketchnote:

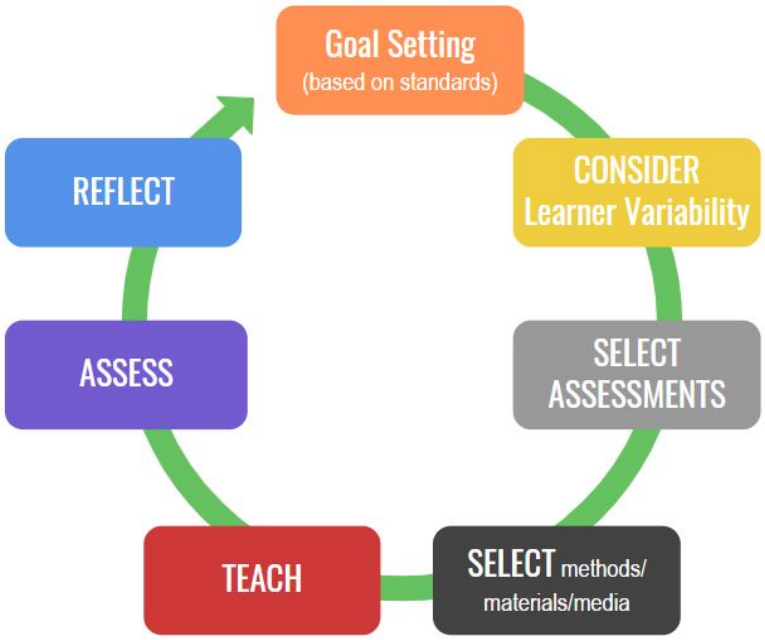
Proactive **Evaluates environment & classroom culture** *Intentional*	**Reactive** **Evaluates the student** *Cause/Effect*	**Static** **Evaluates the curriculum** *Follows Script*
Designs instruction prior to arrival of students	Retrofits instruction by providing accommodations	Teacher lesson and follows unit as designed
Focuses on variability	Focuses on individual ability	Focuses on the “average” student
Plans for the margins	Modifies to individual margins	Does not consider students in the margins
Values variety	Tries to bring all students into “normal”	Conforms to “normal”
Removes barriers	Works around barriers	Ignores barriers

Notes

Design Thinking Process

With access to the necessary resources and supports, the person putting this (UDL) framework and these research findings into action is the teacher. When teachers effectively implement UDL, their lesson and learning environment design choices awaken the affective, recognition, and strategic networks of students. This practice is carried out through a purposeful, iterative process very similar to the work of designers and engineers. In fact, after teachers have been implementing UDL for a while, they often talk about themselves as "learning engineers". They see themselves as a designer of solutions focused on overcoming barriers through a process of problem-solving and iterative design.

As highlighted in Basham and Marino (2013), engineering design is an important concept to the implementation of UDL. Teachers who adopt UDL generally take on the engineering habits of mind that include: systems thinking, creativity, optimism, and attention to ethical considerations (Basham & Marino, 2013). When applied together, these habits and UDL drive the design and implementation of curriculum/instructional goals, instructional planning, the use of instructional methods, strategies, and materials, and progress monitoring that support all students. To achieve this level of support, though, often requires both systems level and teacher level change to be effectively and sustainably implemented.

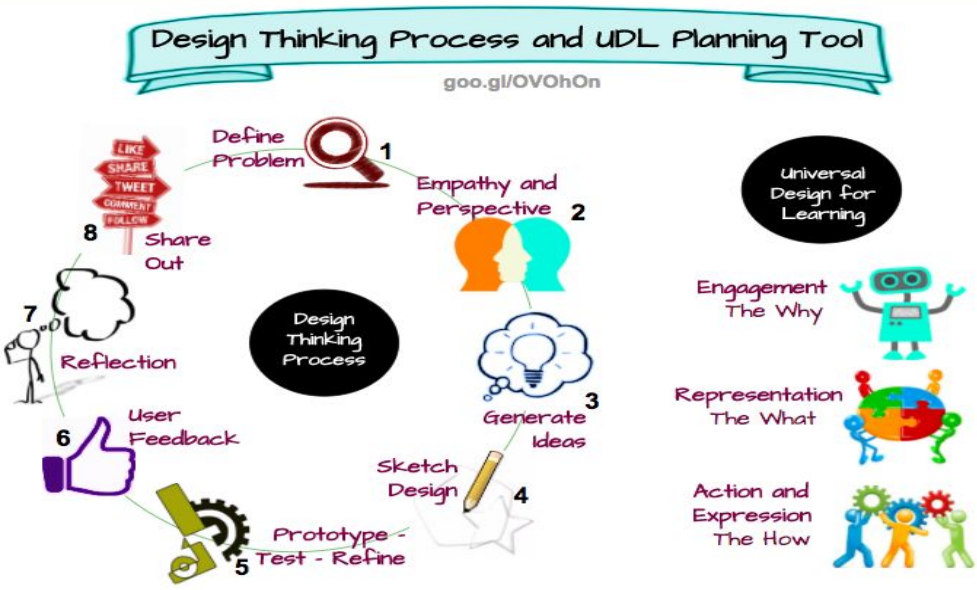


A Blueprint for UDL: Considering the Design of Implementation by L.L. Nelson and J.D.Basham is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License. Based on a work at http://udlirn.org

Design Thinking Process

Bray, B., Bray, B. B. B., & Bray, B. (2017, June 8). Design Thinking Process and UDL Planning Tool. Retrieved from https://barbarabray.net/2017/06/08/design-thinking-process-and-udl-planning-tool/.

In the initial phase of defining the problem, the teacher involves learners to generate possible authentic problems within their local community. The problem can be defined by the teacher to encourage learner interest. We connected the UDL principle Multiple Means of Engagement to this phase by providing options for recruiting learners' interest through optimizing relevance, value, and authenticity. To understand the problem, the teacher activates learners' background knowledge and invites them to highlight patterns and critical features around real world problems that impact them.



The UDL connection to Engagement to the second phase of *Empathy and Perspective Taking* made so much sense to us. The UDL connection involves learners having options for sustaining effort and persistence by fostering collaboration and community. This phase is where learners gain an understanding of the needs of specific people about a problem from their perspective. They may interview, do observations or survey them about the problem.

Some lessons can involve a specific problem identified by the teacher who first wants to encourage empathy.

The middle phases of the Design Thinking Process involve the iterative steps related to idea generation and prototype-test-refine as well as getting feedback from the users.

Representation or the What of Learning is a strong focus during the Idea Generation and Feedback from Users phases as the educator helps learners highlight patterns, critical features, and relationships of their discoveries. The Action and Expression or the How of Learning emerges most strongly during the Creating a Blueprint and Prototype-Test-Refine Phases as learners include their own personal touches and preferred means of expression.

The final phases of the Design Thinking Process involve reflection on the design and making experiences and then sharing out the results to a broader audience.

The UDL connection to Action and Expression is especially strong in the final phases of Reflection and Sharing Out. During the reflection phase, learners are given the option to express what they learned in a way that makes the most sense to them given the nature of the task; and their preferred means of expression. This is especially relevant given all that technology and online tools provide.

For example, students can write a blog, create a photo essay with a caption, record a podcast or video, do a hand-drawn or online sketch, create a comic. Learners, many being savvy at the use of social networks, can then choose how they want to share out their reflections. This serves several purposes related to Action and Expression: (1) it gives learners an authentic audience, and (2) it helps other makers learn from their personal experiences.

Embrace Variability

EMBRACE VARIABILITY

What You'll Learn

You will consider the variability within yourself and your learners, that there are no average learners and that teaching to the edges is needed to address all learners.

You'll get better at..

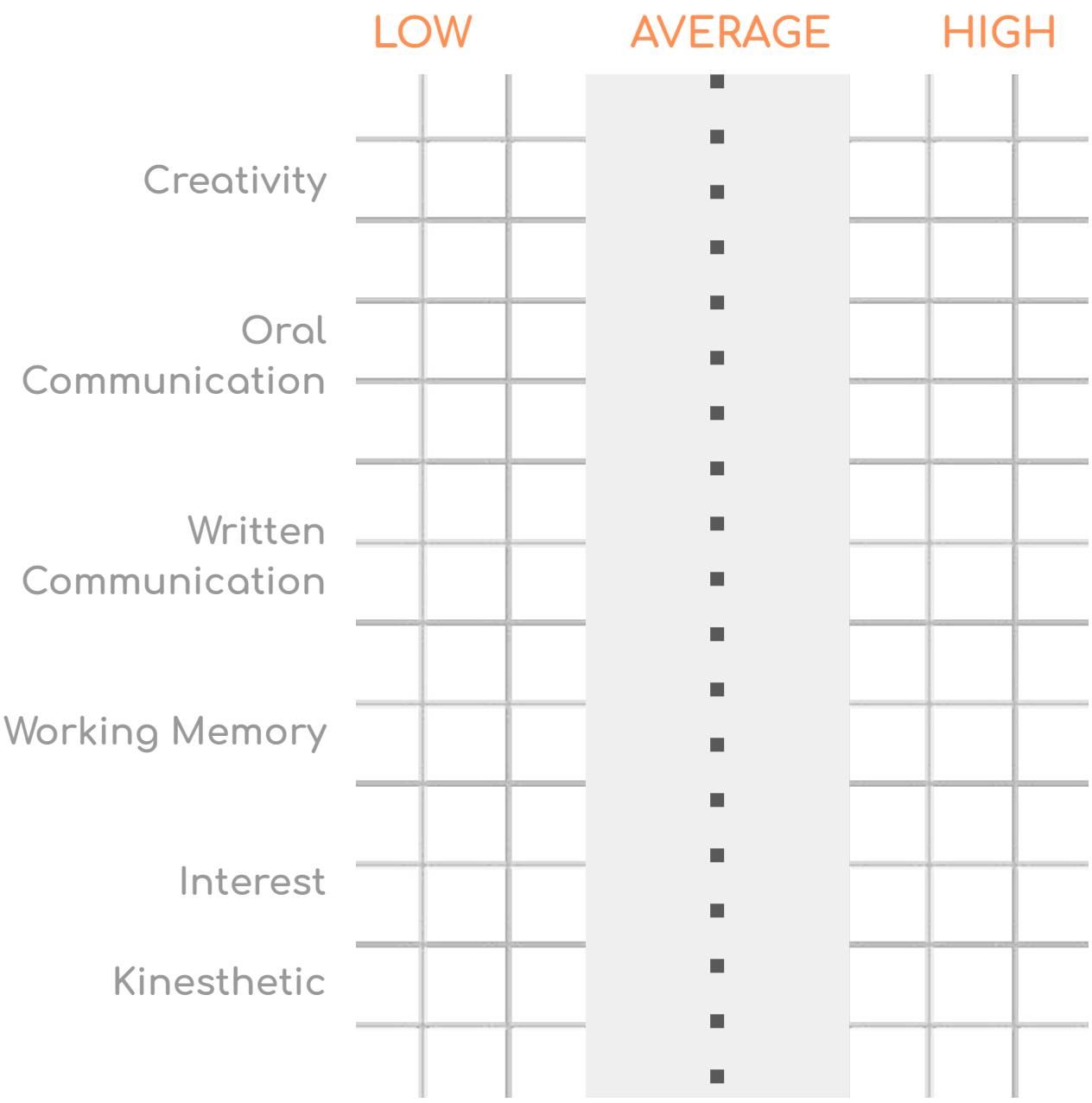
- Recognizing student variability
- Using strategies to build variable expert learners

"Rather than trying to fit kids in, we help kids find their place. That is Universal Design for Learning."

~Shelly Moore

***End of Average* Notes:** How will you utilize the funds of knowledge that students bring to the classroom?

What's Your JAGGED Profile?



Remove Barriers

REMOVE BARRIERS

What You'll Learn

You will discover that barriers are found in the learning environment and not the students.

You'll get better at..

- Recognizing and removing barriers
- Identifying potentially unnecessary barriers in each learning activity designed for students

Barriers to Learning

These are examples of barriers that we may see and hear in a classroom. These barriers were written as student barriers and not environmental. Barriers are in the environment and not the student, so the idea is to flip it and find solutions.

The student doesn't understand the purpose of the lesson

- *This is written as a barrier in the student. It needs to be rewritten as a barrier in the lesson. For example, "The purpose or essential question of the lesson is not clearly stated and referred to throughout the lesson".*
- ***Solutions:*** 1. Ensure the goal is clear. 2. Write goal on board for all to see. 3. Discuss the goal with students.

Hearing impairment

- *This is written as a barrier in the student, with the issue being placed on the student. It needs to be rewritten with a focus on the lesson. For example, "The content in this lesson is only presented in lecture or audio form with no other options for perception.*
- ***Solutions:*** 1. Ensure the material is available in paper and electronic version. 2. Material can be used as manipulatives. 3. Closed caption is on during the video.

Inability to decode text

- *This barrier is written as a barrier in the student; the student is not able to decode text. It needs to be rewritten with a focus on the barrier in the environment. For example, "The lesson requires reading of a text."*
- ***Solutions:*** 1. Offer the same text at different reading levels. 2. Allow students to choose the topic. 3. Have the text read aloud.

Notes:

Conversational Roundtable

Universal Design for Learning GUIDE

THE "WHY" OF LEARNING

THE "WHAT" OF LEARNING

THE "HOW" OF LEARNING

AFFECTIVE NETWORKS

Becoming engaged and staying motivated, feeling challenged, excited, or interested are all examples of affective dimensions.

RECOGNITION NETWORKS

Gathering facts & categorizing what is seen, heard, and read, identifying letters, words, and author style, are all examples of recognition tasks.

STRATEGIC NETWORKS

Planning & performing tasks, organizing & expressing ideas, writing an essay or solving a math problem are all examples of strategic tasks.

Barriers to ENGAGEMENT

- The goal or purpose of lesson is unclear
- Lesson requires perseverance & persistence
- Subject matter is deemed boring or irrelevant
- Assignment is too easy or too difficult
- Classroom environment
- Lesson lacks opportunity for reflection on learning
- Lesson focuses on teacher rather than the student and fails to provide collaboration

Our goal is to stimulate interest and motivation for learning

Barriers to REPRESENTATION

- Text structure
- Text complexity
- Lesson lacks scaffolds for understanding
- Lesson requires background knowledge
- Lesson pacing is too slow or too fast
- Material is offered in only one format (audio, visual)
- Lesson is only in English, lacking support for students of other languages
- Lesson lacks chunking of material/information for processing

Our goal is to present information and content in different ways

Barriers to ACTION & EXPRESSION

- Lesson requires executive functioning skills
- Lesson lacks choice
- Rubrics are not provided
- Assessments required in only one format
- Directions presented in only one format
- Assessment requires rote memorization
- Lesson has no opportunity for students to determine strategies for completion
- Classroom or lesson does not provide options for physical action or movement

Our goal is to provide options for the ways students express what they know

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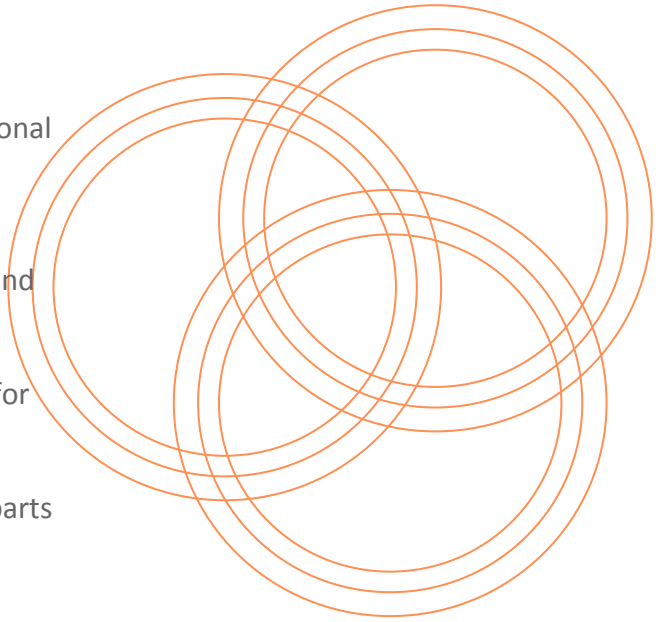
Participants will:

- understand that UDL is not an initiative, but serves as a basis for system-wide transformational change
- understand that UDL often requires us to shift conventional thinking about instruction - to remove barriers, consider learning variability and eliminate the myth of the average student.
- reflect on how UDL creates opportunities for intentional instructional design that accounts for the wide swath of student backgrounds and learning needs
- understand the UDL framework and how the parts of it interrelate



Set Your Intention

Expert Learning

EXPERT LEARNING

What You'll Learn

You will learn the characteristics of expert learners and strategies that support expert learning.

You'll get better at..

- Understanding the characteristics of expert learning
- Developing those characteristics in your students

Dr. David Rose says expert learners are....	
Ms. Liz Berquist says expert learners are...	
Mr. Matt Bergman says expert learners are...	
Mr. Bryan Dean says expert learners are...	
Ms. Tricia Lampron says expert learners are...	
Mr. John Mundorf says expert learners are...	

CAST PROFESSIONAL LEARNING

Until learning has no limits

Top 5 UDL Tips for Fostering Expert Learners

The UDL framework emphasizes the importance of building expert learners in any context. Learning and expertise are not static. They are continual processes that involve practice, adjustment, and refinement. CAST defines expert learners as purposeful and motivated, resourceful and knowledgeable, and strategic and goal-directed. These **Top 5 UDL Tips for Fostering Expert Learners** can be used to support the development of expert learners—so learning has no limits.

1 Support relevant goal-setting

Expert learners know what they are working to achieve and why it is relevant and important. The goals are clear, whether they are content-related, tied to discipline standards, behavioral or skill-based, or about group work and collaboration. The UDL guidelines can be used to guide goal setting to be focused on directing purposeful, resourceful, and strategic learning.

Try it! Invite learners to reflect on a learning goal through the lens of their personal experience or work they want to accomplish. If a learning goal is too easy or too far out of scope, this is a great opportunity for discussion. Through making relevant connections, the goals become purposeful and meaningful and will maximize opportunity for transfer to real world experiences.

Ask yourself:

- Are the goals clear and relevant for my learners?
- How can I better support my learners to set their own relevant and meaningful goals?

2 Communicate high expectations for all and recognize variability

Expert learners go for gold! Encourage high expectations for all learners and recognize that each will progress in a unique way toward achieving the goals. Expert learners know how to use relevant resources in service of rigorous goals and can reflect on choices made- adjusting strategies and choices to reduce barriers to learning.

Try it! Use wise feedback that lets all learners know they are capable of achieving the high expectations. For example, you may say, "I realize this is a challenge and I am confident you can use the resources available to reach this goal." Use the UDL Guidelines to help think of ways to offer options for engagement, representation, and action & expression to support the variability of your learners.

Ask yourself:

- Have I communicated consistent, high expectations for all learners?
- Have I supported my students to set high expectations for themselves?
- What resources have I made available in the learning environment for learners to use for engagement, representation, and action & expression?

3 Promote disciplinary expertise

Expert learning differs across disciplines as there are specific practices, habits of mind, and commitments unique to each content area. For example, writing and thinking like a scientist is different from writing and thinking like a historian. Expert learners are purposeful and motivated, resourceful and knowledgeable, and strategic and goal-directed in particular, discipline-specific ways.

Try it! Clarify distinguishing features of disciplinary experts in your domain. Discuss and highlight how disciplinary experts engage in their discipline. What are the practices, habits of mind, and commitments that students need to develop in order to actually *do* the discipline?

Ask yourself:

- Have I defined and shared disciplinary expertise in my domain?
- In what ways are there opportunities for learners to become purposeful, resourceful, and strategic in the different disciplines I teach?

4 Focus on the process, not just the outcome

Expert learners understand that learning is a process that takes effort and value relevant feedback. They see challenges as opportunities to learn—to expand their knowledge. Use mastery-oriented feedback to encourage focus on the process of learning.

Try it! Showcase the steps that lead to a final product. For example, share editing drafts, mistakes in a math problem, or misunderstandings about content. Allow time for learners to discuss mistakes or mishaps they may have made. These are valuable for learning.

Ask yourself:

- How do I highlight the learning process in my discipline?
- Am I offering mastery-oriented feedback throughout the learning experience?

5 Guide self-reflection

Expert learners pause for introspection. They reflect on how resources and choices have helped or posed barriers to their learning. They recognize the importance of formative and process-based feedback throughout their learning, not just at the end of an experience. If goals are not met, expert learners know to reflect on why. They recognize where things didn't go as well and think about how they might make different choices next time.

Try it! Have learners share reflections about their learning frequently, such as through an exit ticket, online feedback option (such as PollEverywhere), or verbally. Encourage learners to take risks and stretch beyond their typical learning choices, and allow for reflection on successes and challenges.

Ask yourself:

- Have I offered time for reflection about the learning process, and how that process varies across disciplines?
- Where can I foster collaboration among learners to share about their learning processes in pursuit of the goal?
- How do I model the process of expert learning for learners?

Additional Resources

Wise Feedback: Background on the importance of providing high standards and ensuring learners they have the skills needed to achieve the goals.

Process-Based Feedback: A short video that shares the importance of process-based feedback as described by the work of Carol Dweck.

SMART Goals: A website that outlines the basic ways to make goals specific, measurable, attainable, relevant, and timely.

Self-Determination Theory: A short video about Deci and Ryan's theory that includes autonomy, relatedness, and competency.

Research Based Guidelines

RESEARCH BASED GUIDELINES

What You'll Learn

The UDL Guidelines are based on the use of specific research-based strategies that are based on what we know about how we learn.

You'll get better at..

- Using the UDL Guidelines to move students towards developing into expert learners

Neurobiology and Learning

@AllisonAPosey | aposey@cast.org

Before you were born, your brain was like a jumbled blob of connections- each of us with our own unique blob - and based on how you interacted with the world around you, your brain was sculpted in unique ways.

Take for example, the first time you encountered a dog. Perhaps it approached you, licked your face, gave you a sniff- your brain started to construct an experience of this creature (in the environment)-

- You **perceived** the roughness of its tongue, softness of its fur, movement of its tail. The owner may have used the English word "dog" that you came to associate with this creature
- You began to construct an understanding of how to **interact** with a dog- "pet it, throw balls for it, feed it,"
- You also constructed an understanding about your emotions, about how you feel in relation to this dog-perhaps your heart rate increases a bit, DA released- your body and brain could say, this is good, hang out with this dog again! You learned that the emotion "happy" was what you were feeling

Initially, your experience of "dog" was limited... so when you first saw another 4 legged furry creature with a tail (a cat), you might have said,"hey, dog" and tried to throw it a stick...
but then when the cat didn't respond in the same way, perhaps it meowed and licked its fur....your brain constructed new, different pathways based on this interaction (perceiving, acting, engaging) - and you learned "cat."

Over time and with new experiences, your brain constructed more and more nuanced- or 'expert' understandings of dog, fine tuning unique qualities of different breeds- and in contrast with cats, skunks, wolves or other 4 legged furry creatures with tails.

Your interactions with the external world influenced your internal biological world - including the development of neural pathways that became more connected and efficient with use.

This is the basic process of learning. It relies on all parts of your brain...and it is a unique combination of nature and nurture for each of us. For example, your first interaction with a dog might have been of being knocked over and a frantic parent responding.

Each experience and interaction with our environment influences our biology, leading to remarkable variability in our learning networks.

Before entering school- each of our students has already constructed neural networks based on their experiences- reading, writing, storytelling, experimenting. They may have built a number sense, learned to read, learned to play fairly... through what they **perceived, how they interacted**, and **how they engaged** in those interactions. Their environments already influenced their biology.

Our older students have had years of experiences both in and out of school contexts that have contributed to the development of their neurobiology. They have constructed narratives, stories of themselves as learners. Are their stories ones of engagement, with high expectations, where they are empowered to make learning choices as part of the community? Or are they about being compliant, of being a troublemaker, or with a labeled disability?

So what do we know about learning?

✓ "Older" brain research focused on the anatomy of the brain and the functions of different regions. What we now know is that learning is: the changes in the connections within and between the complex web of integrated and overlapping networks, based on our own personal experiences. This leads to great learner variability (the rule, not the exception).

Although human brains are remarkably similar, up close they are distinctive in their anatomy, chemistry and physiology. Every brain is unique.

UDL & the Learning Brain

In the past decade, there have been unprecedented ways to examine the living brain and to better understand what happens during learning. Universal Design for Learning (UDL) was inspired by such advances in cognitive neuroscience research and offers a framework that integrates what we know about the learning brain to inform the design of environments that support all learners.

First, let's talk about the geography of the brain. Generally, incoming sensory information, such as what we see and hear, is received in the back of the brain, including the occipital and temporal lobes of the brain (Recognition networks), processed and relayed for meaning in the center of the brain (Affective networks), and is organized in the frontal lobes for response or action (Strategic networks). While there is no linear progression for this process, this model for thinking about three broad learning networks can be helpful when we design learning experiences.

The UDL Guidelines and associated checkpoints align to this neurological organization and help educators address the predictable variability in learning that we know will be present in any environment. UDL recognizes variability in:

- Engagement (the **why** of learning, which aligns with affective networks): interest, effort and persistence, and self regulation
- Representation (the **what** of learning, which aligns with recognition networks): perception, language and symbols, and comprehension
- Action & Expression (the **how** of learning, which aligns with strategic networks): physical action, expression and communication, and executive function

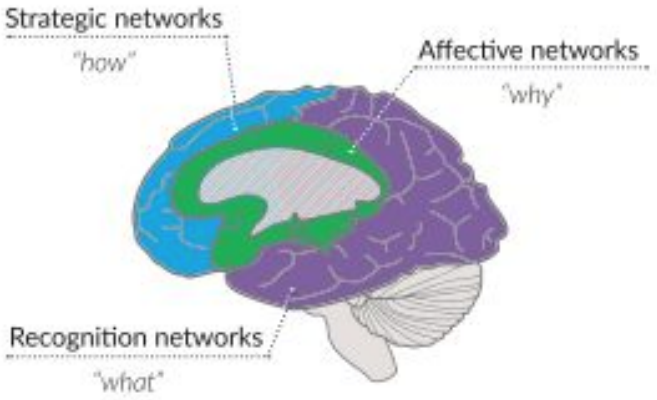
Knowing key facts about the brain can help inform learning design for the variability of learners.

There is no average brain.

Variability is the dominant feature of the nervous system. Like fingerprints, no two brains are alike. Each brain is a complex, interconnected web that is sculpted and influenced by genetics and interactions with the environment.

Variability can be overwhelming for educators who are planning for dozens of learners each day. Luckily, learner variability is predictable, and can be organized across three brain networks targeted by the UDL framework: affective, recognition, and strategic.

The concept of neuro-variability is important for educators, because it reminds us that learners do not have an isolated learning "style", but instead rely on many parts of the brain working together to function within a given context. There is no single way a brain will perceive, engage with, or execute a task. Variability is not just an important consideration for thinking about differences between students, but also within students in different contexts.



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When we design learning environments proactively for variability, we anticipate and value the incredible strengths and diversity of our learners.

The brain has incredible plasticity.

Each brain is made up of billions of interconnected neurons that wire together to form unique pathways. We are born with a foundation of brain structures. Over time, these structures change based on our experiences and interactions with our environment.

When we learn, some connections become stronger and faster. As Hebb's Law (1949) states, "neurons that fire together wire together." Connections that are not used are weakened and pruned away. In other words, "use it or lose it."

Understanding the plasticity of the brain is important for educators, because it helps us recognize that learning is a constant growth process constructed over time. Proactive design of flexible pathways toward learning goals supports learners by building on the strengths and connections that are already established. Frequent, formative feedback and opportunities for active learning create and strengthen the connections within our learning brains. Our brains are not fixed, but grow and change with use.

What you know really matters.

Previous experiences drive our interest and engagement, perception and attention, and goals and actions. The nervous system constantly makes predictions and anticipates how we will fare in a particular environment or towards a particular goal. For example, if a learner is asked to do a math problem, read aloud, or respond to a prompt, the brain will recall prior experiences in that context. That recall drives perception, action, and engagement. Based on previous experiences, the brain decides which goals are valuable — or not valuable — to pursue.

Acknowledging the variability in learner background knowledge and experience is important for educators, because each learner brings a unique blend of experiences and expectations to each learning event. When we design for variability using the UDL framework, clarifying the goals and integrating flexibility in engagement, representation, and action and expression, we acknowledge that learners do not learn in one linear pathway. This approach fosters learning environments that value the uniqueness of our learners and the variability each brings. This empowers learners to maximize their strengths, focus on areas of challenge, and drive their own learning processes. Ultimately, UDL helps foster expert learners who are purposeful and motivated, strategic and goal-directed, and resourceful and knowledgeable.

Goals drive the nervous system.

Essential to any learning experience is a clear goal. A clear goal enables the nervous system to direct energy purposefully to build relevance, perceive information, and act strategically. Ultimately, educators and learners need to be aware of the intended learning goals so that they can begin to build connections, connect to background knowledge, and practice for expertise.

Recognizing that our brains are goal-driven is important for educators, because if we don't make learning goals explicit to our learners, they have no way of knowing what the target is, how to reach it, or when they've achieved it. Think about a GPS or navigation app. Without a destination, a GPS is simply a map with infinite possibilities and no directions. Once we input a destination, we can then decide whether we want a route without tolls, one that meanders through the countryside, or one that is the fastest or shortest distance. With a clear, explicit learning goal, learners are empowered to choose their best pathway to achieve that goal.

Our brains always have a goal, whether it's to avoid a task, sneak a cookie from the jar, or complete a task with the least amount of effort. The more explicit we are with our learners about the goals and incorporate their own goals, the more meaningful the learning experience will be, the more purposeful the options available will be, and the less likely our brains will focus on competing goals.

Understanding these key facts about the learning brain not only helps educators in designing challenging, high quality learning opportunities, but they're also incredibly important for our learners to understand, as well. The more we understand about our own learning and how it happens, the further we advance toward the ultimate goal: becoming expert learners.

Suggested Citation: CAST (2018). *UDL and the learning brain*. Wakefield, MA: Author. Retrieved from http://www.cast.org/our-work/publications/2018/udl-learning-brain-neuroscience.html

Resources

Human Connectome Project

Brain Facts

Neuroscience for Kids

UDL Theory and Practice, Chapter 3: Variability

Brain Matters, from Harvard Graduate School of Education's Dr. Todd Rose

Annenberg Learner: Neuroscience and the Classroom

Why learning styles don't exist, by Daniel Willingham

Daniel Willingham's Learning Styles FAQ

We Don't Need Learning Styles by Elizabeth Stein, MiddleWeb

Linking Research to Classrooms Blog from Kennedy Krieger Institute

A Sentence, A Phrase, & A Word Protocol

- Select one sentence, one phrase, and one word that stood out to you from the article.
- Share your sentence with one person and hear theirs. Discuss why that selection stood out to you.
- Find a new partner for your phrase and your word.

My Selection		Others' Selections	
Sentence		Sentence	
Phrase		Phrase	
Word		Word	

The Universal Design for Learning Guidelines

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Provide multiple means of Engagement

Affective Networks
The "WHY" of Learning

Provide multiple means of Representation

Recognition Networks
The "WHAT" of Learning

Provide multiple means of Action & Expression

Strategic Networks
The "HOW" of Learning

Access

Provide options for Recruiting Interest (7)

- Optimize individual choice and autonomy (7.1)
- Optimize relevance, value, and authenticity (7.2)
- Minimize threats and distractions (7.3)

Provide options for Perception (1)

- Offer ways of customizing the display of information (1.1)
- Offer alternatives for auditory information (1.2)
- Offer alternatives for visual information (1.3)

Provide options for Physical Action (4)

- Vary the methods for response and navigation (4.1)
- Optimize access to tools and assistive technologies (4.2)

Build

Provide options for Sustaining Effort & Persistence (8)

- Heighten salience of goals and objectives (8.1)
- Vary demands and resources to optimize challenge (8.2)
- Foster collaboration and community (8.3)
- Increase mastery-oriented feedback (8.4)

Provide options for Language & Symbols (2)

- Clarify vocabulary and symbols (2.1)
- Clarify syntax and structure (2.2)
- Support decoding of text, mathematical notation, and symbols (2.3)
- Promote understanding across languages (2.4)
- Illustrate through multiple media (2.5)

Provide options for Expression & Communication (5)

- Use multiple media for communication (5.1)
- Use multiple tools for construction and composition (5.2)
- Build fluencies with graduated levels of support for practice and performance (5.3)

Internalize

Provide options for Self Regulation (9)

- Promote expectations and beliefs that optimize motivation (9.1)
- Facilitate personal coping skills and strategies (9.2)
- Develop self-assessment and reflection (9.3)

Provide options for Comprehension (3)

- Activate or supply background knowledge (3.1)
- Highlight patterns, critical features, big ideas, and relationships (3.2)
- Guide information processing and visualization (3.3)
- Maximize transfer and generalization (3.4)

Provide options for Executive Functions (6)

- Guide appropriate goal-setting (6.1)
- Support planning and strategy development (6.2)
- Facilitate managing information and resources (6.3)
- Enhance capacity for monitoring progress (6.4)

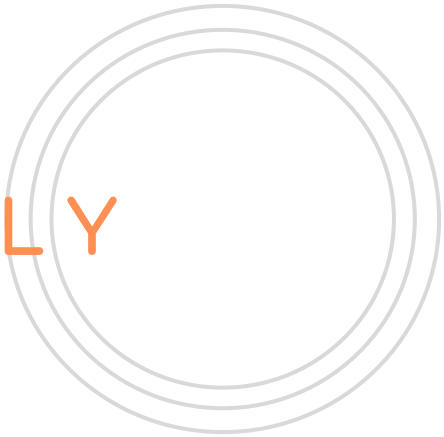
Goal

Expert learners who are...

Purposeful & Motivated	Resourceful & Knowledgeable	Strategic & Goal-Directed

Plan & Apply

PLAN & APPLY



What You'll Learn

UDL starts at the lesson planning stage. It requires teachers to intentionally set clear goals, provide flexible assessments, and provide flexible methods and materials in designing instruction.

You'll get better at..

- Setting clear goals, aligned to content standards
- Separating the means for achieving the goal
- Allowing for multiple paths or options for meeting the standards
- Building in flexible methods and materials into learning activities
- Regularly using formative assessments in order to plan and redirect instruction for my students
- Providing students with a variety of successful ways to demonstrate their skills and learning

Top 10 UDL Tips for Developing Learning Goals

Learning goals are the foundation of any effective curriculum. Only by clarifying what we want learners to accomplish can we begin to consider what assessments, methods, and materials will be most effective.

Here are 10 tips about learning goals from a UDL perspective:

1. **Convey clear goals that everyone can understand**
   Standards- and curricular-based goals are often written using language that is difficult to understand and unpack. Rewrite and clarify what you want your learners to achieve.

   Ask yourself:

   - Do my learners know what the goal means?
   - Are my learners able to visualize and/or describe the desired outcome in their own words or in their own ways?

2. **Share goals in multiple ways**
   Sharing the intended goal in many formats ensures learners continue to know what they are working toward. For example, you may state the goal out loud, have it posted virtually or physically so that everyone has access to it, include it on a handout or printable, or ask learners to record or restate the goal in their own words.

   Ask yourself:

   - What options do my learners have to perceive the goal?
   - Do all of my learners know where to find the goals we're working toward?

3. **Align goals with standards**
   Standards articulate what the educational community values and can be flexible enough for teachers to incorporate options for how their students may go about attaining them.

   Ask yourself:

   - How are my goals connected to the standards or established programs of study?
   - Have I ensured the standards will be achievable in my learning environment through the selected assessments, materials, and methods?
   - Are my learners aware of the standards and how they connect to the learning experiences?

4. **Differentiate outcomes from means**
   Separating the goal from the means of attaining the goal allows for flexibility in achieving the goal. It can also help pinpoint assessment issues when measuring goals.

   Ask yourself:

   - How have I offered flexibility in how my learners can demonstrate mastery of the intended goal?
   - What barriers are removed by offering some flexibility in the means?
   - For means- or process-oriented goals, am I providing flexibility in other areas such as topic choice or choice of assistive tools?

5. Divide large goals into sub-goals or objectives

Breaking larger, long-term goals into smaller short-term goals can make the process feel obtainable. It also allows opportunities to celebrate milestones in achieving long-term goals.

Ask yourself:

- Are the goals manageable for the time period allocated?
- Have I provided learners with opportunities to create their own milestones in attaining long-term goals?

6. Consider the process as well as the end product

The process of learning can be just as valuable as the end result, and newer standards like the Common Core State Standards and the Next Generation Science Standards explicitly call out process-oriented goals.

Ask yourself:

- In what ways does my goal encourage focus on the learning skills and processes, as well as the content?
- Do my assessments emphasize process and skill knowledge as well as content knowledge?

7. Provide models and examples of excellence

Offering examples of what attainment of a goal can "look like" (or "sound like" or "feel like") gives learners a model of what to work toward.

Ask yourself:

- Are there are opportunities for learners to know what constitutes excellence?
- Have I included models and examples in my rubric for assessment?

8. Prepare your assessment with your goals in mind

Aligning assessments to your goal or goals ensures that your assessments are measuring what you've intended them to measure. Make sure you're aware of and attempt to eliminate construct-irrelevant elements within your assessments.

Ask yourself:

- Does my assessment align with what I want my students to know?
- What barriers are there in my assessment that may impact students showing what they know?

9. Include opportunities for personal connections to learning goals

Affective goals, such as developing enthusiasm for learning and an ability to self-regulate, are also important for learners to engage in the learning experience.

Ask yourself:

- In what ways does my goal allow for learners to personally relate and engage to this goal?
- Have I provided opportunities for learners to articulate their own personal learning goals?

10. Make time for reflection

We're busy and always have a lot of curricular ground to cover in our learning environments. It's important to pause and save some time to reflect on our goals and how our learning experiences and assessments have supported our learners in attaining those goals.

Ask yourself:

- Have I given my learners opportunities to reflect on the learning experiences?

Key Questions

To Consider When Planning Lessons

THINK ABOUT HOW LEARNERS WILL ENGAGE WITH THE LESSON:

Does the lesson provide options that can help all learners regulate their own learning?

Does the lesson provide options that help all learners sustain effort and motivation?

Does the lesson provide options that engage and interest all learners?

THINK ABOUT HOW INFORMATION IS PRESENTED TO LEARNERS:

Does the information provide options that help all learners reach higher levels of comprehension and understanding?

Does the information provide options that help all learners understand the symbols and expressions?

Does the information provide options that help all learners perceive what needs to be learned?

THINK ABOUT HOW LEARNERS ARE EXPECTED TO ACT STRATEGICALLY & EXPRESS THEMSELVES:

Does the activity provide options that help all students act strategically?

Does the activity provide options that help all learners express themselves fluently?

Does the activity provide options that help all learners physically respond?

Top 10 UDL Tips for Assessments

In CAST's Universal Design for Learning: Theory and Practice, assessment is defined as "the process of gathering information about a learner's performance to make educational decisions" (Salvia & Ysseldyke, 2009). Universal Design for Learning (UDL) encourages "assessment by design," but what does that mean specifically for educators? How can you use the UDL framework to design and reflect on assessments?

10. Build communities of practice that support curricular modifications from assessment data

Both formative and summative assessments can be used to reflect on the purpose and effectiveness of instructional materials and learning strategies. Collaborating with colleagues around these topics to collect and analyze data, discuss outcomes, examine challenges, and recommend solutions can be both effective and empowering.

Ask yourself:

- How do I collaborate with other educators to design effective instruction and curricular materials that support the targeted learning goals as measured through the assessments?
- In what ways do I adjust my instruction or curricular decisions after evaluating assessment results/data?

9. Reflect on summative assessments for future lesson design

Summative assessments focus on learner performance after instruction has occurred, such as unit exams, state summative tests, final project artifacts, or chapter summaries. They are often used for accountability purposes, criterion for admittance, or to compare learner performance. Summative assessments can also be used to reflect on ways to improve teaching strategies and to further design goal-directed learning environments.

Ask yourself:

- What kinds of summative assessments am I using to measure my learners' learning outcomes? Are there barriers to accessibility?
- What are the summative assessments measuring and how can that data be used to inform my future instructional design?

8. Involve learners in their learning progress through assessment data

Communicate with learners about their progress towards the intended learning goals through formative assessment data, mastery-oriented feedback, and providing guidance for possible adjustments or new strategies that may support the intended skill. This allows learners to become active advocates and take ownership their learning.

Ask yourself:

- Have I offered timely, goal-related feedback on the assessment?
- Have I offered learners the opportunity to assess individual learning progress and process (for example, through regular check-ins)?
- Have I shared options, strategies, and background knowledge needed to build the necessary skills and expertise for achieving the targeted learning goals?

7. Use and share rubrics to clarify expectations

Rubrics are effective in making the goals and expectations of an assignment explicit. They can serve as a baseline of what is expected and can even include room for students to add goals they have for a given assignment. Clear communication of expectations through a rubric can allow for consistent measurement of the intended goal.

Ask yourself:

- Does the rubric align to the intended skills or knowledge?
- Have components that are not tied to the goal been removed or reduced in my rubric?
- Are there opportunities for choice within the rubric to engage learners in the assignment?

6. Support learner variability through flexible assessments using UDL Guidelines

To ensure accurate assessment of a skill or knowledge, consider the UDL principles (engagement,representation, action & expression) when designing your assessments. Flexible options available in an assessment can enhance access, support learner performance, and reduce possible perceived threats.

Ask yourself:

- Is it possible to include choice in how my assessment is represented, how my learners can show what they know, or how my learners engage in the assessment process?
- How do the flexible options still support the intended learning objectives that need to be measured?

5. Eliminate unnecessary barriers in assessments

Assessments often have additional barriers or challenges for students that are not connected with the intended learning goal. Where possible, remove the barriers that do not tie to the learning goals you want to measure.

Ask yourself:

- What are the targeted skills or understandings this assessment is intended to measure?
- What may be preventing learners from showing what they know in my assessment?

4. Include frequent formative assessments

Formative assessments are ongoing and frequent ways to measure learners' progress toward the targeted learning goal. Data from formative assessments should influence instructional decisions. Examples of formative assessments might include reflection questions on exit tickets, "do now" questions, portfolio collections, journal entries, or quick polls with individual whiteboards or Plickers. Formative assessments can be used to determine which learning environments are effectively supporting learners towards achieving the intended goals.

Ask yourself:

- How do I use information from formative assessments to adjust future instruction?
- If my learners are not achieving the intended goal, how will I redesign my instruction?

3. Assess engagement as well as content knowledge

Assessing student engagement in the learning process can support metacognitive reflection about students' own learning. Engagement is essential for the learning process, so learning how to use resources strategically towards given demands in a task can encourage resourceful, goal-driven, purposeful learning. Consider a resource such as the Mood Meter to build vocabulary and reflection around emotion and engagement.

Ask yourself:

- How have I assessed student engagement during the learning process?
- What strategies or supports helped a learner persist through a challenge to engage in the learning?

2. Offer authentic opportunities for assessment

Offering relevant, authentic options for assessment can help learners transfer usable knowledge and understand the "what," the "how," and the "why" of their learning.

Ask yourself:

- In what ways do my assessments engage learners in understanding the authenticity and relevance of the content?
- How am I providing opportunities for learners to apply new knowledge to novel situations and authentic experiences?

1. Align assessments to learning goals

When the learning goals are clear, assessments allow educators and learners to observe and measure whether learners have achieved the intended goal. Consider designing assessments alongside learning goals so that you can ensure you are measuring the intended goals of your lesson.

Ask yourself:

- Are my learning objectives/goals clear?
- Does my assessment reflect and measure the intended learning goals, or are there additional components or skills that are also being measured by my assessment?

Overview

This is an elementary school ELA assignment that is intended to take one class period, about 45 minutes. Prior to the lesson, students have been engaged in Common Greek and Latin roots. This lesson is focusing on new roots. At the end of the lesson, students will demonstrate knowledge of the roots by completing a student activity.

This scenario aligns with ELA standard L.5.4b - Use common grade- appropriate Greek and Latin affixes on roots as clues to the meaning of a work (e.g., *photograph, photosynthesis*).

Lesson

Students will choose from a Choice Board, an option for showing understanding of taking unfamiliar words and recognize the root in those words to help determine their meaning. This is important because students need to recognize parts of words in order to make meaning.

Goals

The students will be able to take unfamiliar words and recognize the root in those words to help determine their meaning.

Materials

Computer | Writing paper | Index cards

Methods

1. Students will watch Flocabulary video Roots.
2. Teacher will post on the board the word Introspection that is unfamiliar to the class.
3. Teacher asks, "What do you recognize based on what you see in this word?" Students turn and discuss with a partner.
4. Teacher asks, "Can you gain meaning based on what you see in this word?", "Does this word sound like any other words you know?"
5. Teacher defines the word by breaking it apart into 3 parts: intro-spec-tion (A reflective looking inward: an examination of one's own thoughts and feelings.
6. Teacher creates an anchor chart with roots, definitions, examples, and sketches.
7. Students are given post-its to add familiar words.
8. Students will be given a list of words to choose from the Choice Board. Options will include to: 1. Create a matching game, such as Memory (root with meaning including images) 2. Create a Google Slides E-book with, root highlighted and images 3. Compose a narrative story using the words and make sure the root word is highlighted (This can be done on paper or in an electronic word doc.

Assessment

1. As students discuss, the teacher will check in on their responses.
2. The teacher will have a checklist of student names to mark as they monitor student work.
3. At the end of class, students will complete a google form for self-reflection.

Overview

Monthly staff meetings are used to share information and to problem-solve. The focus of this staff meeting is MTSS. The staff has been implementing Tier 2 reading interventions. These meetings center around 4 C's - Communication, Clarity, Capacity, and Consistency.

Goal

Discuss the progress of reading interventions in Tier 2 MTSS.

Welcome

1. Stand up and Share out - What is one piece of MTSS Tier 2 reading intervention work moving forward and one piece of work that you may be worried about slipping backward?
2. Communication/Consistency of Practices
    a. Review the MTSS Calendar and Handbook
    b. As a grade level/department, discuss the priorities from the last meeting and determine if the focus should continue in this area or if the focus is shifted to another area.
3. Capacity Building - Review, Discuss and Provide Feedback
    a. Review the Checklist of Reading Practices
    b. Self-Assess and prioritize areas for improvement for fall, winter, and spring
    c. Use the checklist to support the work of the District Office and Instructional Coaches
4. Clarity - Spotlight on Best Practices from the field
    a. A department or grade level or individual will share out a positive happening in the classroom around reading intervention

Next Meeting: January 23

Focus:
What is the impact of Tier 2 reading interventions on the reduction of SSTs and assessments?

Goal

The goal of this coaching meeting will be to check in with Mr. Janes about his upcoming English 9 lesson.

Mr. Janes has identified a learning strategy (collaborative group work) that he would like you to come and observe. Although his early teaching career shows much promise (he has great relationships with students and is a content expert), lately, he has been sharing that he feels overwhelmed with issues of classroom management and grading. During your last meeting with him, he shared that he is feeling "burned out" and he can't see himself in the teaching career for another 25 years. You are wondering about how you can provide the best coaching experience for him.

As you plan your conversations, you have identified the importance of working with him on building his own instructional expertise. You are providing him with resources on collaborative conversations and learning targets. In addition, one of your goals is to strategize some classroom management strategies that will help him maximize the learning time for his students. Finally, you have set a goal to help him build his own personal capacity and resilience as a new teacher.

Additional details:

Mr. Janes has shared that he is introverted, uncomfortable with expressing emotion, and as a child was diagnosed with dyslexia. He loves technology and is a Google Certified Educator. He also coaches the varsity track team, which he loves.

PROFESSIONAL LEARNING SCENARIO

You have been tasked with designing a one-day professional development session for all the high school social science teachers in Hamilton Unified School District. Your goal is to provide information on the California History and Social Science Framework and offer for lesson planning time that incorporates the new Framework.

A colleague has provided you with a slide presentation from another district which might get you started. The slide presentation is text-heavy and with little to no activities for participants.

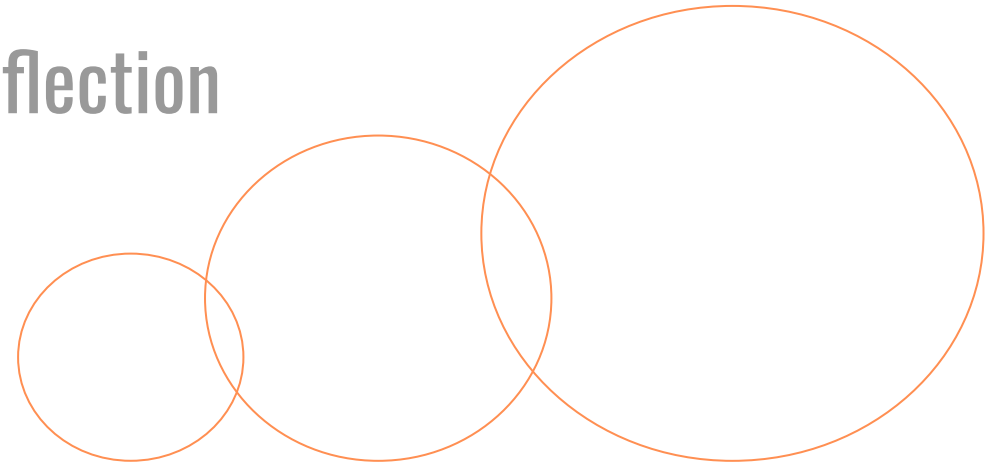
Goal

Design an engaging day of professional learning for a group of teachers with a wide range of knowledge and skills in the Social Science Framework. You would like to design a day that is useful, practical and offers teachers a way to apply and share their new learning.

In addition, some of the teachers have expressed their optimism about the new Framework, in that it supports inquiry-based instructional methods. On the other hand, some of the teachers who will attend your training are accustomed to providing lectures and having students take notes. They have said in a prior meeting that what they are currently doing does not need to be changed. As a result, you are anticipating some resistance.

Design a professional development day that will accommodate a wide range of adult learners. As you plan, think about how the learning might look through multiple means of engagement, representation, and action and expression.

Final Reflection



What is one ***LITTLE THING*** you can do tomorrow?	What is one ***KEY MOVE*** you can make to change a current practice?	What is one ***BIG PLAY*** you want to aim for over the next year?

Dive Deeper

1. CAST's *free* eBook: ***UDL Theory and Practice***
   Go deep into the research behind learning and the development of the framework
   (http://udltheorypractice.cast.org/login)

2. ***CAST Youtube Channel***
   Find videos from UDL experts
   (https://www.youtube.com/user/UDLCAST/videos)

3. ***Live Binders***
   This UDL toolkit provides information on various areas of UDL
   (http://www.livebinders.com/play/play?present=true&id=2372242#anchor)

4. ***CAST Padlet***
   Padlets from the various CAST trainings
   (https://padlet.com/CASTUDL)

5. ***Learning Designed***
   Access man curated & reviewed UDL resources from a variety of contributors
   (https://www.learningdesigned.org/resources)

UDL *Terminology*

Average Learner	In reality, the average learner is a myth and does not really exist. Remember, variability is the norm, rather than the exception. While a mean (average) can be calculated on a population's performance, it does not define the variability of the learners or support the design of environments. The design of environment supports the outcomes of the environment.
Barrier	Barriers to learning emerge when the design of a learning environment fails to meet the variability of the learners. Many barriers are consistent over time and can be anticipated and overcome in the design phase. Some barriers are more momentary and emerge based on an interaction or situation. A simple example is to ask a learner who has difficulty with handwriting or spelling to hand-write a paper. A one-size-fits-all learning environment unintentionally gives rise to multiple barriers. A key to success, is to design environments that proactively overcome anticipated barriers and to support the design of flexible environments.
Design Thinking	Design thinking is a five-step approach to solving problems through design. Educators can follow the five steps by understanding learner variability (1. Empathize), identifying barriers in learning environments that may support failure or support undesired outcomes (2. Define), come up with ideas and solutions for overcoming barriers (3. Ideate), develop a means or plan to implement (4. Prototype), and gather data on the effectiveness of the design (5. Test).
Expert Learner	Expert learners are those who know how to learn, who want to learn, and who are prepared for the changing demands and skills of the future. UDL helps make learning more personalized and supports purposeful, motivated, resourceful, knowledgeable, strategic and goal-directed expert learners.
Learner	UDL is focused on the design of all learning environments, including but not limited to K-12 school environments, university learning environments, and both formal and informal learning experiences because of this, not all individuals are actually students, so we focus on the learners of the environments and experiences. So, in UDL, all students are better characterized as "learners" and our designs are centered on these learners.
Learner Variability	Neuroscience continues to find that variability is the norm rather than the exception. Actually no two brains are the same. UDL supports educators in understanding the variability present in their learning environments. The framework then helps educators consider how to design flexible environments that support engagement, comprehension, and demonstration of understanding.
Learning Environment	(sometimes called Learning Experience) Learning environment refers not only to physical and digital settings in which learning takes place but also to any interaction learners have with the content, their learning materials, tools, peers, teachers, and so forth. These interactions can be physical or cognitive. Well-designed learning environments are flexible and meet the needs of all learners.
UDL Guidelines	The UDL guidelines provide a frame for understanding the types of variability that might be present in any environment. The current version of the guidelines also present example practices for how to support the various forms of learner variability in the environment The newest guidelines are located at: http://udlguidelines.cast.org/

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