



MA DOE Project FOCUS Academy: Universal Design for Learning (UDL)

UDL 101M: UDL and the Math Curriculum: Meeting the Needs of Learner Variability in Mathematics

Overview of the Course and Requirements:

Instructor Contact Information:

CAST; 40 Foundry Street, Suite 3, Wakefield, MA 01880; 781-245-2212; email: pd@cast.org NOTE: Instructors are available from Monday through Friday from 9 a.m. to 5 p.m. by email and during office hours that are posted on the course website. Additional consultation is available by appointment.

Course Description:

This Universal Design for Learning (UDL) course is designed to equip you with the ability to design, create, and provide math lesson plans that ensure the engagement and participation of varied learners within a high standards-based mathematics curriculum. Course sessions have been created within the context of current Massachusetts Curriculum Frameworks and local curriculum requirements to ensure alignment with existing academic standards and benchmarks.

Predicated on CAST's three principles of UDL—that multiple representations of information, multiple means of expression and action, and multiple means of engagement greatly enhance learner achievement—the module will acquaint you with:

- the principles, applications, and research background of UDL;
- the convergence of assistive technologies (AT) and UDL;
- the ways that digital media can increase the accessibility of core instructional materials and textbooks
- the way that the UDL framework can help you address learner variability in mathematics
- the way that the UDL framework supports the development of expert learners
- how to use the UDL Lesson Design process to evaluate and redesign math lessons.

Required materials:

The course has required readings and media that are freely available online. These are accessed as links throughout the syllabus. They are compiled online at: <http://mfaudlblog.wordpress.com/>. Feel free to print the materials if you choose.

Course Structure:

This course is divided into five topics covered during twelve sessions—9 asynchronous (online) sessions and 3 synchronous (web conference sessions) over 12 weeks.

Course Structure:

Date	Session Focus	Topic	Assessment Tasks	Related Course Goal
1 – Web conference session (real time) 10/4/11	Introduction to the course	Intro to UDL Conceptual Change	Attend session or submit a summary	
2 – Asynchronous session (complete online) 10/5/11	Intro to UDL, Conceptual Change		Participate in an online discussion	Participants will connect and apply the concepts covered to their instructional practice.
3 – Asynchronous session (complete online) 10/11/11	Introduction to the UDL framework, UDL & AT		Participate in an online discussion	Participants will connect and apply the concepts covered to their instructional practice.
4 – Asynchronous session (complete online) 10/18/11	Variability in the Affective Networks	Variability in the Affective Networks & Multiple Means of Engagement	Participate in an online discussion	Participants will connect and apply the concepts covered to their instructional practice.
5 – Asynchronous session (complete online) 10/25/11	Multiple Means of Engagement		Lesson analysis	Participants will analyze and evaluate a lesson using the UDL framework.
6 – Web conference session (real time) 11/1/11	Review of the first worksheet, development of expert learners		Attend session or submit a summary	
7 – Asynchronous session (complete online) 11/1/11	Variability in the Recognition Networks	Variability in Recognition Networks & Multiple Means of Representation	Participate in an online discussion	Participants will connect and apply the concepts covered to their instructional practice.
8 – Asynchronous session (complete online) 11/8/11	Multiple Means of Representation		Lesson analysis	Participants will analyze and evaluate a lesson using the UDL framework.
9 – Asynchronous session (complete online) 11/15/11	Variability in the Strategic Networks	Variability in Strategic Networks & Multiple Means of Action and Expression	Participate in an online discussion	Participants will connect and apply the concepts covered to their instructional practice.
10 – Asynchronous session (complete online) 11/29/11	Multiple Means of Action and Expression		Lesson analysis	Participants will analyze and evaluate a lesson using the UDL framework.
11 – Asynchronous session (complete online) 12/6/11	Lesson Planning, Accessible Instructional Materials	Putting it All Together - Lesson	Final Assignment due 12/13/11	Participants will analyze and redesign a lesson using the UDL framework.

12 – Web conference session (real-time) 12/13/11	Review and Take-aways	Planning & AIM	Attend session or submit a summary	
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Course Requirements:

Every weekly session includes . . .

1. **Required readings and/or media.** Use the guiding questions to guide your thinking and learning as you are reading, watching or listening. **You are not required to submit answers to these questions.**
2. **Required activities** to complete. Use the “Pause and reflect” prompts you to think about your experience with the activity. **You are not required to submit answers to these questions.**
3. **One of the following (see table below for dates):**
 - **Synchronous (web conference) sessions** - You are required to attend 3 synchronous (web conference) sessions (at the beginning, middle and end of the semester). If you cannot attend the session, you can still receive credit by watching the recording (posted to Moodle within 48 hours) and summarizing it for your instructor (you can choose the way you want to do this. For example: write a 1-page essay, a podcast, a PowerPoint, etc. This needs to be submitted by Tuesday following the web conference.)
 - **Questions for online discussion** Discussions require you to reflect upon the readings, the activity **and** to make connections with your own practice in a discussion format with the other participants in the course. You should post your reflection early in the week and come back to respond to comments on the reflection. You should read and respond to *at least* one other participant's post. A rubric for participation is included in the [appendix](#).

NOTE: A cafe forum is specifically provided on Moodle for chatting with classmates and sharing other information that is unrelated to the discussion questions (e.g. sharing resources, off-topic discussions or inquiries.
 - **Analysis worksheet:** Analyze a lesson plan with one portion of the UDL framework. These are opportunities for you to show your understanding of how to use the Framework.
 - **The final assignment** will require you to apply what you have learned to examine and make suggestions for improving a lesson plan with the UDL Framework. A rubric is included in the [appendix](#).

Assessment:

Assessment will be based on participation in course activities such as [discussions](#), [web conference sessions](#), UDL guidelines worksheets and [completion of the final assignment](#). Instructors will provide ongoing assessment throughout the course via timely and relevant feedback to discussion forum postings including comments and post ratings. Authenticity of your work will be verified.

Grading Rubrics:

Click here

Attendance and Participation:

See course requirements above.

Participants with Disabilities:

You should contact the instructor if you need assistance in developing appropriate accommodations.

Bibliography:

Assigned readings and resources are listed within each session description.

Technical requirements:

Requirement	Microsoft Windows	Apple Macintosh
Versions Supported:	Windows 7 Windows Vista Windows XP, Service Pack 3	OS X 10.6 (a.k.a. Snow Leopard) OS X 10.5 (Intel) (a.k.a. Leopard)
Browsers Supported:	Internet Explorer 6.x, 7.x, and 8.x Firefox 1.5 and above (recommended Java)	Safari 2.0 and higher Firefox 1.5 and above Java Runtime Environment (JRE) 5.x or higher
Processor Speed:	1 Ghz or higher	1 Ghz or higher
Memory (Minimum):	128 MB 256 MB or higher recommended 1 GB for Windows Vista or 7	256 MB 512 MB or higher recommended
Bandwidth Required:	56 Kbps 256 Kbps recommended (minimum DSL)	56 Kbps 256 Kbps recommended (minimum DSL)
Display (Minimum):	1024x768 or higher, with 16-bit color	1024x768 or higher, with 16-bit color
Other Hardware:	Full duplex sound card Speakers (USB headset recommended) Microphone OPTIONAL (USB headset recommended)	Full duplex sound card Speakers (USB headset recommended) Microphone OPTIONAL (USB headset recommended)
Required for Viewing Recordings:	Adobe Flash Player 9.x	Adobe Flash Player 9.x

To test your system regarding these requirements, go to <http://www.ilinc.com/services/support> and click on the “Join” button to join the session test. You should also see all green checkmarks in the System QuickCheck box on the same page. *Be sure to test your speakers and/or headset while you are in the session test!*

To test the Java version on your computer, go to <http://www.java.com/en/download/testjava.jsp>.

Copyright Policy:

Authenticity of your work will be verified. If an instructor becomes aware that your work infringes on intellectual property rights or does not comply with US copyright law, the work will receive a failing grade. Salem State and CAST adhere to federal laws regarding the use of copyrighted materials. To learn more about copyright, go to <http://www.copyright.gov/circs/circ01.pdf>.

Grade Appeal:

If you disagree with the evaluation of your work or believe that an improper grade has been assigned to your work may appeal the grade with the course instructor.

Course Credits:

Coursework for this module is equivalent to a 45-contact-hour, 3-credit,* graduate-level course. You may opt to receive 67.5 professional development points or 3 graduate credits through Salem State College.* In order to receive course credit from Salem State College or 67.5 PDPs, you must receive a C- or better.

***Payment of \$275 for graduate credit is the responsibility of the class participant.**

Bibliographic Resources:

Bibliographic resources can be found throughout the syllabus.

Curriculum Standards & Frameworks:

Massachusetts [7.08: Professional Standards for Educators](#)

(2) (a) 2. Draws on results of formal and informal assessments as well as knowledge of human development to identify teaching strategies and learning activities appropriate to the specific discipline, age, and range of cognitive levels being taught.

(2) (a) 5. Plans lessons with clear objectives and relevant measurable outcomes.

(2) (a) 7. Incorporates appropriate technology and media in lesson planning.

(2) (a) 8. Uses information in Individualized Education Programs (IEPs) to plan strategies for integrating learners with disabilities into general education classrooms.

(2) (d) 2. Works to promote achievement by all learners without exception.

(2) (d) 3. Assesses the significance of learner differences in home experiences, background knowledge, learning skills, learning pace, and proficiency in the English language for learning the curriculum at hand and uses professional judgment to determine if instructional adjustments are necessary.

(2) (e) 3. Maintains interest in current theory, research, and developments in the academic discipline and exercises judgment in accepting implications or findings as valid for application in classroom practice.

National Board Certification Standards for Professional Educators

- [5 Core Propositions](#)
- [Exceptional Needs Standards](#)

National Educational Technology Standards

- NETS-T: <http://www.iste.org/standards/nets-for-teachers.aspx>
- NETS-A: <http://www.iste.org/standards/nets-for-administrators.aspx>

Session 1: iLinc Synchronous Web Conference Session

Introductory session: This session includes a synchronous (real-time) web conference session that consists of an opportunity to meet the instructors and to learn about the different resources and technologies that will be used in this course. The session will include a tour of Moodle and the National Center for UDL website. The session will include interactive polls and an opportunity to ask questions.

NOTE: If you cannot attend the session, you can still receive credit by watching the recording (posted to Moodle within 48 hours) and summarizing it for your instructor (you can choose the way you want to do this. For example: write a 1-page essay, a podcast, a PowerPoint, etc. This needs to be submitted by Tuesday following the web conference.)

Session 2: Learner Variability and Introduction to Universal Design for Learning (UDL)

UDL is based on recent research in the learning sciences that has shown that learner variability is universal. As a result, UDL maintains that the primary impediment to achievement of many learners is inflexible, “one-size-fits-all” curricula that are not flexible enough to deal with learner variability. UDL asserts that the onus for dealing with this variability should be on the curricula (rather than on the learners). This premise represents a conceptual shift from traditional ways of viewing learners and the curriculum used to teach. This session examines the ways that, When educators shift their focus toward designing curriculum that accommodates the widest spectrum of learners from the beginning, rather than retrofitting it to accommodate individual learners, the result is curricula that can respond to learner variability.

Session Goals:

- Participants will understand how individuals in the margins influenced the development of the UDL framework.
- Participants will consider the way that the concept of disability is a model for describing the interaction of the individual and the learning context.
- Participants will understand that learner variability is the rule rather than the exception.

Assigned reading and other media:

Watch & Read:

- Watch this brief video where David Rose talks about the concept of learner variability (:54): <http://bit.ly/q4Bd4H> (original link: <http://www.youtube.com/watch?v=rlv6JJQOz64>)

Questions to guide your understanding: Is variability of learners rather than the disabilities of learners is a more productive approach for educators? Why?

- [The Future is in the Margins: the Role of Technology and Disability in Educational Reform](#). Anne Meyer and David Rose. In *The Universally Designed Classroom and Digital Technologies*. 2005. Cambridge, MA: Harvard Education Press.

Question(s) to guide your understanding: In what way are Meyer and Rose challenging the reader to think differently about learners, curricula and the idea of disability?

- Watch this [brief video](#) where David Rose describes how the concept of UDL came to fruition (1:57): http://www.udlcenter.org/resource_library/videos/udlcenter/udl#video2

Questions to guide your understanding: How did working with learners in the margins help to shift Rose's thinking about the target for change?

- [What Brain Research Tells Us About Learner Differences: Introduction](#)
- [Special Education and the Concept of Neurodiversity](#). Thomas Armstrong. In *New Horizons for Learning*. (2005).

Question(s) to guide your understanding: In what way is the concept of neurodiversity similar or different from what Meyer and Rose are suggesting?

Session activity:

Think about how you currently address learner variability. How difficult is it? How does it make you feel when some learners are successful and some are not? In what ways do your assumptions about learning lead you to address learner variability in the way that you do?

Choose **one** of the following metaphors, read or view the additional information, then reflect on your choice in the discussion forum.

1. Addressing learner variability is like ***eating ice cream with a fork***. In what ways do assumptions about adapting, supporting, scaffolding and accommodating learning relate to the use of special devices and assistive technologies to address learner variability?

Read [What is an ice cream fork?](#)

Read Wahl, L. [Assistive Technology: Enhanced Learning for All](#)

2. Addressing learner variability is like ***cleaning a boys' school bathroom***. In what ways do assumptions about time, work ethic, effort and perseverance affect how you address learner variability?

Watch [Dirty Bathroom](#) (original link: <http://www.youtube.com/watch?v=3Co2tGFhisc>)

Read [A matter of effort and perseverance](#)

3. Addressing learner variability is like ***teaching your child to drive a car that has a stick shift***. In what ways do assumptions about potential, challenge, frustration, autonomy, competence, and coping skills affect how you address learner variability?

Watch *Erin learns to drive a stick shift*: (original link:
<http://www.youtube.com/watch?v=nYc9JtyS3fk&feature=related>)

Read *Teaching Teens to drive*

4. Addressing learner variability is like being the ***only one in Martha's Vineyard who doesn't know sign language***. In what ways do assumptions about inclusion, community and communication strategies affect how you address learner variability?

Read the story of colonial Martha's Vineyard:

Burke, J. (2007). [Martha's Vineyard: Hearing had to learn to sign](http://deafness.about.com/cs/featurearticles/a/marthasvineyard.htm) Retrieved from
<http://deafness.about.com/cs/featurearticles/a/marthasvineyard.htm>

Wikipedia article [Martha's Vineyard Sign Language](#)

Note: The story of colonial Martha's Vineyard provides an example of ways that people in the margins influenced an entire community. By being fully included in island life, the deaf members expanded the community's view of ways to represent knowledge, to use varied strategies for expression and to engage every member of the community.

Questions for online discussion:

NOTE: Be sure to draw on information from the readings, the activities, and your own experience in answering the questions.

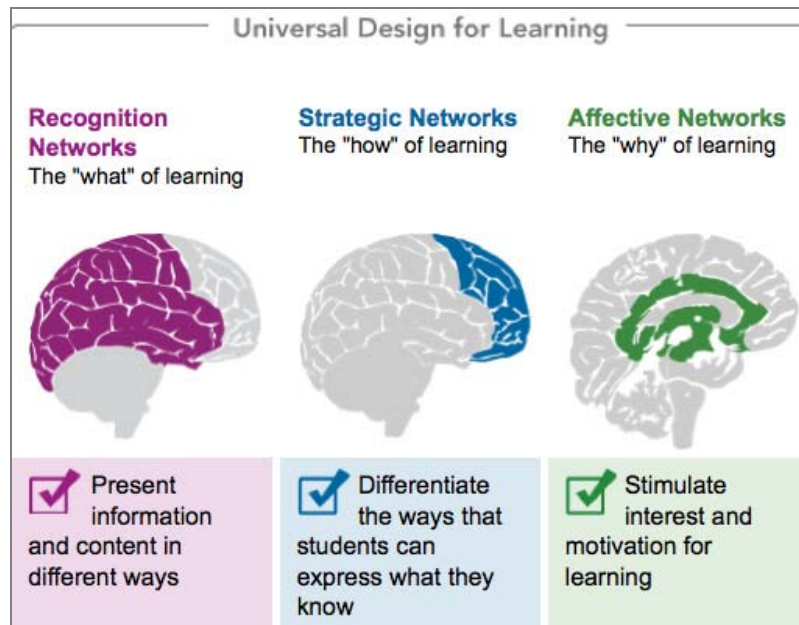
Which metaphor did you choose? Why did you choose that one? In what ways does addressing learner variability reflect similar emotions to the emotions reflected in the metaphor you chose? Think about how these metaphors parallel with general assumptions about meeting learner needs and what Meyer & Rose are asserting in "The Future is in the Margins" article.

For example: How do you think the story of Martha's Vineyard and the concept of neurodiversity align with what Meyer and Rose are suggesting in "The Future is in the Margins?" How might the story of colonial Martha's Vineyard provide a model for inclusive classrooms? What kinds of challenges would it pose? What kinds of questions does it raise for you? Be sure to read other participants' responses and ask them to either clarify or elaborate on a point that they make or offer your own insight into their responses.

Session 3: Introduction to UDL as a Framework for Planning to Address Learner Variability

In this session, you will be introduced to Universal Design for Learning (UDL). UDL provides a framework for understanding the differences among learners (learner variability) and to plan ahead for this. This framework helps to make explicit the ways in which learners are likely to vary—taking all of the dimensions along which learners are naturally varied and providing educators with practical ways to apply that understanding to the learning environment in order to allow more learners access to appropriate and challenging learning experiences.

Session goals:



Watch & read:

- [UDL at a Glance](#) A short (4:38) video created by CAST that illustrates the three principles of Universal Design for Learning.

Questions to guide your understanding: How can the UDL framework help educators address learner variability?

- Rose, D.H., Hasselbring, T.S., Stahl, S., and Zabala, J. Assistive Technology and Universal Design for Learning: Two Sides of the Same Coin.

Questions to guide your understanding: To what extent does a UDL classroom environment eliminate or reduce the need to use assistive technology (AT)

- Rose, D., Gravel, J.W., and Domings, Y.M. (2010). [UDL Unplugged: The Role of Technology in UDL](#)
- [UDL and Technology](#)

Questions to guide understanding: To what extent does digital technology make implementing UDL easier?

Session Activities:

- [UDL Online: Introduction Section](#) (this section has several pages--read and do the activities from *The Challenge: Learner Diversity to UDL and the Learning Brain*).

NOTE: UDL online is a multimedia module that is used as part of post-secondary teacher training. It is set up like an online, multi-media textbook. The left navigation bar is similar to the table of contents. You will know which section you are in because it is highlighted in the navigation bar. Each section contains several pages. You can start at the link above and then advance the pages by clicking on the

arrows on the top and bottom right of each page. NOTE: Be sure to complete the section all the way to the page entitled: *UDL and the Learning Brain*.

1. Watch this short video [UDL principles and Practice](http://www.youtube.com/watch?v=pGLTJw0GSxk&feature=related) (6:36) (original link: <http://www.youtube.com/watch?v=pGLTJw0GSxk&feature=related>)

Pause and reflect: How do you think offering options can help educators meet learner variability in the classroom?

Questions for online discussion:

NOTE: Be sure to draw on information from the readings, the activities, and your own experience in answering the questions.

Choose one to discuss:

1. How can designing flexible curricula for the learners “in the margins” help us design learning experiences for all learners? What challenges exist in doing so? Do you think that designing curricula in this way would affect your ability to accurately assess learners? Provide an example from your practice to help illustrate and support your answer.

OR

2. Some people feel that digital media and technology are a requirement for UDL implementation. In what ways do you agree or disagree? Provide examples for some non-digital ways that you might alter materials and methods in a classroom. Compare your examples with those offered by other participants.

OR

3. Do you think that UDL reduces the need for assistive technology (AT)? Do you agree or disagree with the authors in the *Two Sides of the Same Coin* article? Why?

Session 4: Learner Variability in the Affective Networks

This session will explore affective networks – parts of the brain involved in motivation and engagement in learning, i.e. the variability that exists in how individuals can sustain interest in learning or are challenged, and excited. These networks are important for developing and sustaining interest and attention for learning.

Session Goals:

1. You will be able to explain how the affective networks of the brain are involved in motivation and engagement.
2. You will be able to explain how emotion impacts learning.

Watch & Read:

- [What Brain Research Tells Us About Learner Differences: Affective Networks](#)

Question(s) to guide your understanding: How does understanding the functions of the affective networks help in designing curriculum to meet the needs of all learners? How important do you think affect is in learning? Why?

- ["How Not to Talk to Your Kids"](#) Bronson, P. (2007). New York Magazine

Question(s) to guide your understanding: What message are adults sending when they praise children? How can switching the type feedback we give help kids to persist in the face of difficulty?

- [Interview with Carol Dweck: Students' View of Intelligence Can Help Grades](#) (4:28) NPR audio podcast
- ["Brainset" – Neuroscience Examines Carol Dweck's Theory](#)
- ["Researchers say Math Anxiety Starts Young"](#). Article from Washington Post

Session activities:

1. Read ["Kids Master Mathematics When They're Challenged but Supported"](#)
2. Complete step 5 and 6 of the [Affective Network section of The Three Brain Networks](#)

Pause and Reflect: Was the video on the research on praise surprising to you? How so? Why do you think challenging students with difficult math problems might actually engage the affective networks?

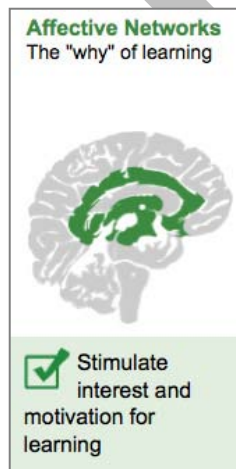
Questions for online discussion:

NOTE: Be sure to draw on information from the readings, the activities and your own experience in answering the questions.

Do you believe that our emotions have an impact on how we experience the world (e.g. what we see, what we hear, what we do, what we pay attention to)? Why or why not? How do you think this impacts learning? Provide examples from your own practice to illustrate and support your answer.

Dive Deeper:

- ["Learner Engagement in High School Classrooms from the Perspective of Flow Theory,"](#) Shernoff, D. J., Csikszentmihalyi, M., Schneider, B., & Steele Shernoff, E. In *School Psychology Quarterly*; Summer 2003; 18, 2; pg. 158-176.
- ["Parallel Memories: Putting Emotions Back Into The Brain,"](#) www.edge.org
- ["Researchers face up to liars: Expressions speak louder than words,"](#) Cromie, W. J.
- ["Why whites of eyes spell 'danger,'"](#) BBC News
- ["Flow' & Mihaly Csikszentmihalyi,"](#) Farmer, D.
- ["Flow States and learner Engagement in the Classroom,"](#) Shernoff, D.



Session 5: The Affective Networks and Principle III: Multiple Means of Engagement

This session connects learner variability in the affective networks with the UDL principle that addresses how learners are motivated and engage with learning (the 'why' of learning). This principle guides educators to provide multiple means of engagement.

Session Goals:

1. You will be able to explain how the UDL principle—multiple means of engagement—helps educators address the variability within learners' affective networks.
2. You will demonstrate understanding of how the principle Multiple Means of Engagement can be used as a lens to evaluate lessons.

During this session educators will learn about how to identify barriers to learner engagement and suggest options for learning that recruit interest, sustain effort and persistence, and promote self-regulation.

Read & Watch:

- a. [UDL guidelines – About this Representation](#)
- b. [UDL guidelines – Multiple Means of Engagement](#)

Question(s) to guide your understanding: What is the logic behind the vertical structure of the UDL guidelines? How does this help us develop expert learners?

- [The Surprising Science of Motivation](#) – Watch this interesting video (10:47) on the science of motivation.

Question(s) to guide your understanding: Was the research that Dan Pink referenced surprising? Does it change the way you think about motivating learners in your classroom? How do you think this can apply to teaching and learning?

Session Activities:

- UDL Online Section - [Affective Networks](#)
- UDL Online Section - [Multiple Means of Engagement \(4 pages\)](#)

In this section of UDL Online you will watch a short video demonstrating a digital learning tool. After watching the video, click on the Activity tab for some guided practice using the guidelines to evaluate the tool shown in the video. After you complete the activity, click on the “examples” button to check your answers.

Pause and Reflect:

How do you think the UDL principle “use multiple means of engagement,” relates to the variability in the affective networks of learners? Think about a curriculum that is not flexible and does not provide options that engage all learners. Remember to think about ALL learners (those with special talents and those who struggle with school work).

Assignment:

1. Download a copy of the UDL Guidelines Worksheet for Engagement (on Moodle). Familiarize yourself with the third principle, Provide Multiple Means of Engagement, along with the associated guidelines and checkpoints. To explore each checkpoint, go to the National Center website (<http://www.udlcenter.org/aboutudl/udlguidelines/principle3>) where you can find explanations and links to examples and research.

NOTE: When you get to the page, be sure to click on the blue arrow to open the box with the checkpoint explanation in it.

2. Choose **ONE** of the following lessons (from the Interactivate Website):

1. **Area (elementary):** <http://www.shodor.org/interactivate/lessons/AreaElem/>
 1. **Goal:** Students learn about area and the units used to measure area using a variety of materials including computer applets
 2. **Geometry in Tessellations:**
<http://www.shodor.org/interactivate/lessons/GeometryTessellation/>
 1. **Goal:** This lesson allows students to examine tessellations and their geometric properties. The activity and discussion may be used to develop students' understanding of lines, planes, angles, and polygons
 3. **Algorithm Discovery with Venn Diagrams:**
<http://www.shodor.org/interactivate/lessons/AlgorithmDiscovery/>
 1. **Goal:** This lesson is designed to help students learn about algorithms through Venn Diagrams and Box Plots. Students will develop algorithms for solving Venn Diagrams, collect data for each algorithm, and compare the efficiency of each algorithm, using box plots.
 4. **Ideas that Lead to Probability:**
<http://www.shodor.org/interactivate/lessons/IdeasLeadProbability/>
 1. **Goal:** The activity and two discussions that make up this lesson introduce ideas that are the basis of probability theory. By using everyday experiences and intuitive understanding, this lesson gives students a gradual introduction to probability.
3. Read through the lesson.
 4. Try out the activities in the links.
 5. Fill out the top of the second page of the UDL Guidelines Worksheet for Engagement with your name, the lesson title and URL.
 6. Complete the rest of the UDL Guidelines Worksheet for Engagement using the lesson you have chosen for analysis. Consider each checkpoint contained within the UDL Guidelines and decide whether that checkpoint is **present**, **not present**, or if you are **unsure** about whether or not it is present in the lesson. Include any additional **comments** about how the lesson does or does not address the checkpoint.
 7. Save your responses on the worksheet. Be sure to indicate which lesson you chose at the top of the page. Save As: your first initial, last name (e.g. jsmith.doc). Upload the file to the Moodle assignment page or email your instructor for alternative arrangements.

NOTE: Refer to the rubric for grading criteria.

Session 6: Synchronous Web Conference Session:

Session note: This synchronous web conference session is intended to allow you to share your reflections and new understandings with other participants. During the session, we will go over the Engagement Principle Worksheet activity, provide a summary of the discussions, highlight the structure of the guidelines, review the supporting neural networks and the goal of developing expert learners.

NOTE: If you cannot attend the session, you can still receive credit by watching the recording (posted to Moodle within 48 hours) and summarizing it for your instructor (you can choose the way you want to do this. For example: write a 1-page essay, a podcast, a PowerPoint, etc. This needs to be submitted by Tuesday following the web conference.)

Session 7: Learner Variability in the Recognition Networks

This session will explore the recognition networks - parts of the brain that are involved in pattern recognition i.e. the variability that exists in how individuals identify, categorize, and make connections between what we see, hear and read. Beyond simple recognition, these networks help us to build knowledge: develop concepts, understand meaning and connect new learning to knowledge we already have and making predictions based on that knowledge.

Session Goal:

Participants will be able to identify how the recognition networks of the brain are involved in taking in and making meaning of representations and building knowledge.

Watch & Read:

- [What Brain Research Tells Us About Learner Differences: Recognition Networks](#)
- [Are Math Skills Built into the Human Brain? An Interview with Veronique Izare and Brian Butterworth](#)
- [Numbers Guy: Are Our Brains Wired for Math?](#) An Interview with Stanislas Dehaene

Question(s) to guide your understanding: How does understanding the variability in recognition networks help educators in designing curriculum to meet the needs of all learners?

Session activities:

Do **one or more** of the following illusion activities:

- [The Thatcher Illusion](#), an example of an inverted face illusion with a brief explanation.
- [Illusion Works](#) A “collection of optical and sensory illusions” presented at two levels: introductory and advanced. The introductory level includes simple explanations of the illusions, and the advanced level includes more complex explanations.

Pause and reflect: When you were doing the illusion activity(s), think about how your recognition networks were processing the information. How do you think it might have differed from the other participants in the course?

- When you watch this [video of the Antiques Roadshow](#), think about how background knowledge differs among the two men in the video. How does the individual variability in the level of background knowledge impact the way they each view the blanket? (original link: <http://www.youtube.com/watch?v=wIkYn39i4Fw>)

Pause and reflect: How do you think that background knowledge is connected to the recognition networks? How might the variability among learners in a classroom impact the way they learn? What kinds of things contribute to the variability?

Questions for online discussion:

NOTE: Be sure to draw on information from the readings, the activities, and your own experience in answering the questions.

Choose one:

1. How do you think experience impacts the recognition networks? How does learner variability in the recognition networks present challenges for educators?

OR

2. Consider the importance of the recognition networks to learning. Can you think of ways that you have provided or observed another educator who provide an alternate representation that helped more learners develop concepts, understand meaning and connect new learning to their own background knowledge? What factors should educators consider when selecting different representations?

OR

3. How do you think a learners' native culture affect the things he or she pays attention to, the way he or she takes in information and constructs new meaning? Can you think of examples where this may have happened in your own classroom or in a classroom you were observing?

Dive Deeper

[Mathematics and the Brain – paper by Brian Butterworth](#)

Session 8: The Recognition Networks and UDL—Provide Multiple Means of Representation



This session connects learner variability in the recognition networks with the UDL principle that addresses how information is represented or presented (the ‘what’ of learning). This principle guides educators to provide multiple means of representation. During this session you will learn about identifying barriers to representation and providing options that give learners various ways of acquiring information and knowledge.

Session Goals:

Participants will be able to explain how the Representation principle—multiple means of representation—helps educators address the variability of learners’ recognition networks.

Read:

- c. [UDL Guidelines-version 2.0](#)
[UDL Guidelines-version 2.0 – Multiple Means of Representation](#)

Activity:

UDL Online Section - [Multiple Means of Representation](#) (5 pages): In this section of UDL Online you will watch a short video demonstrating a digital learning tool. After watching the video, click on the Activity tab for some guided practice using the guidelines to evaluate the tool shown in the video. After you complete the activity, click on the “examples” button to check your answers.

Assignment:

1. Download a copy of the UDL Guidelines Worksheet for Representation (on Moodle). Familiarize yourself with the first principle, Provide Multiple Means of Representation, along with the associated guidelines and checkpoints. To explore each checkpoint, go to the National Center website (<http://www.udlcenter.org/aboutudl/udlguidelines/principle1>) where you can find explanations and links to examples and research.

NOTE: When you get to the page, be sure to click on the blue arrow to open the box with the checkpoint explanation in it.

2. Choose **ONE** of the following lessons (from the Interactivate Website):
 - a. **Area (elementary):** <http://www.shodor.org/interactivate/lessons/AreaElem/>
Goal: Students learn about area and the units used to measure area using a variety of materials including computer applets
 - b. **Geometry in Tessellations:**
<http://www.shodor.org/interactivate/lessons/GeometryTessellation/>
Goal: This lesson allows students to examine tessellations and their geometric properties. The activity and discussion may be used to develop students' understanding of lines, planes, angles, and polygons
 - c. **Algorithm Discovery with Venn Diagrams:**
<http://www.shodor.org/interactivate/lessons/AlgorithmDiscovery/>
Goal: This lesson is designed to help students learn about algorithms through Venn Diagrams and Box Plots. Students will develop algorithms for solving Venn Diagrams, collect data for each algorithm, and compare the efficiency of each algorithm, using box plots.
 - d. **Ideas that Lead to Probability:**
<http://www.shodor.org/interactivate/lessons/IdeasLeadProbability/>
Goal: The activity and two discussions that make up this lesson introduce ideas that are the basis of probability theory. By using everyday experiences and intuitive understanding, this lesson gives students a gradual introduction to probability.
3. Read through the lesson.
4. Try out the activities in the links.
5. Complete the rest of the UDL Guidelines Worksheet for Representation using the lesson you have chosen for analysis. Consider each checkpoint contained within the UDL Guidelines and decide whether that checkpoint is **present, not present**, or if you are **unsure** about whether or not it is present in the lesson. Include any additional **comments** about how the lesson does or does not address the checkpoint.
6. Save your responses on the worksheet. Be sure to indicate which lesson you chose at the top of the page. Save As: your first initial, last name (e.g. jsmith.doc). Upload the file to the Moodle assignment page or email your instructor for alternative arrangements.

NOTE: Refer to the rubric for grading criteria.

Session 9: Learner Variability in the Strategic Networks

This session will explore variability in individual strategic networks: the parts of the brain involved in planning and performing tasks. i.e. the variability in the way that individuals organize tasks, express ideas, or solve a problem. These networks are important for developing strategies for learning and expressing what we know.

Session Goal:

Participants will be able to explain how variability in the strategic networks of learners impact learning.

Assigned reading and media:

[What Brain Research Tells Us About Learner Differences: Strategic Networks](#) (first page only)

[UDL online: Strategic Networks section](#) (2 pages) UDL online is a multimedia module that is used as part of post-secondary teacher training. It is set up like an online, multi-media textbook. The left navigation bar is similar to the table of contents. You will know which section you are in because it is highlighted in the navigation bar. Each section contains several pages. You can start at the link above and then advance the pages by clicking on the arrows on the top and bottom right of each page.

NOTE: Be sure to complete the section all the way to the end of the summary.

Question(s) to guide your understanding: How do you think using a variety of media help to meet the needs of the strategic networks of all learners?

Paul Smith's web site. Born in 1921 with cerebral palsy, Paul Smith was kept out of school, but not out of learning; this biographical web site describes his art and life.

Question(s) to guide your understanding: How important were Paul Smith's strategic networks in providing him with a way to express himself through his art? If he were included, do you think Paul would have been successful in the schools of the 30's and 40's? Would he be successful in the schools of today?

Session activities:

Go to the following sites and try at least two of these activities.

- d. [Selective Attention Activity](#): follow the directions on the beginning of the video. This is a test of selective attention
- e. [The Tower of Hanoi](#), a mathematical puzzle that tests strategic planning. (try changing the number of disks and see if you can come up with a general strategy)
- f. [Sudoku](#): Try different levels of Sudoku and analyze the strategies you use. Do you develop new ones? Compare them to the ones listed [HERE](#).

Pause and reflect: When you were exploring these activities, what kinds of strategies did you develop as you worked the problems or puzzles that were presented? Did your strategies change over time?

Questions for online discussion:

NOTE: Be sure to draw on information from the readings, the activities, and your own experience in answering the questions.

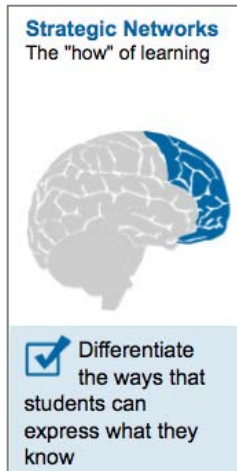
Choose one to discuss:

- Consider the importance of the strategic networks to learning. Can you think of examples from your own practice where learners' strategies were counter to your goals as an educator? How might providing options help to encourage learners to develop strategies that are desirable and help them to achieve the instructional goal?

OR

- Think about specific strategies that you and other educators typically use in their instruction. Can you identify the strengths and weaknesses of each of these in relation to the variability in learners' strategic networks?

Dive Deeper



[“University of Pittsburgh Scientists Identify How Brain ‘Gets Ready’ to Perform,”](#)

University of Pittsburgh Medical Center

Session 10: The Strategic Networks and Multiple Means of Action and Expression

This session connects learner variability in the strategic networks with the UDL principle that addresses how information is acted on or expressed (the ‘how’ of learning). This principle guides educators to provide multiple means of action and expression. This session will help you identify barriers to action and expression and suggest options for physical action, expression, communication and executive function so that all learners can act on the content and effectively express their understanding.

Session Goals:

Participants will understand how the Strategic principle—multiple means of action and expression—helps educators address the variability of learners’ strategic networks.

Read & Watch:

- [UDL and Expert Learners](#)

Question(s) to guide your understanding: What does UDL mean by expert learners? Can you think of ways that an educator might help learners become expert learners?

- [“What is executive function?”](#) By Philip David Zelazo, PhD

Question(s) to guide your understanding: Why is executive function particularly important in a school setting? How could educators increase or reduce executive function demands in a classroom?

- [“Problem-Solving: Opening Up Problems”](#) by Jenni Way

Question(s) to guide your understanding: How does executive function support problem-solving? How could educators increase or reduce executive function demands in math?

Activity:

- UDL Online: [Multiple Means of Action and Expression](#) Section (3 pages). In this section of UDL Online you will watch a short video demonstrating a digital learning tool. After watching the video, click on the Activity tab for some guided practice using the guidelines to evaluate the tool shown in the video. After you complete the activity, click on the “examples” button to check your answers.

Pause and Reflect: How is offering Multiple Means of Action and Expression challenging for educators? Is it possible to assess learners equitably when they use multiple means of action and

expression to show what they know? Why or why not? Be sure to look at and offer comments on the opinions of other participants.

Assignment:

1. Download a copy of the UDL Guidelines Worksheet for Action & Expression (on Moodle). Familiarize yourself with the second principle, Provide Multiple Means of Action & Expression, along with the associated guidelines and checkpoints. To explore each checkpoint, go to the National Center website (<http://www.udlcenter.org/aboutudl/udlguidelines/principle2>) where you can find explanations and links to examples and research.

NOTE: When you get to the page, be sure to click on the blue arrow to open the box with the checkpoint explanation in it.

2. Choose **ONE** of the following lessons (from the Interactivate Website):
 - a. **Area (elementary):** <http://www.shodor.org/interactivate/lessons/AreaElem/>
Goal: Students learn about area and the units used to measure area using a variety of materials including computer applets
 - b. **Geometry in Tessellations:**
<http://www.shodor.org/interactivate/lessons/GeometryTessellation/>
Goal: This lesson allows students to examine tessellations and their geometric properties. The activity and discussion may be used to develop students' understanding of lines, planes, angles, and polygons
 - c. **Algorithm Discovery with Venn Diagrams:**
<http://www.shodor.org/interactivate/lessons/AlgorithmDiscovery/>
Goal: This lesson is designed to help students learn about algorithms through Venn Diagrams and Box Plots. Students will develop algorithms for solving Venn Diagrams, collect data for each algorithm, and compare the efficiency of each algorithm, using box plots.

1. Ideas that Lead to Probability:

2. <http://www.shodor.org/interactivate/lessons/IdeasLeadProbability/>

Goal: The activity and two discussions that make up this lesson introduce ideas that are the basis of probability theory. By using everyday experiences and intuitive understanding, this lesson gives students a gradual introduction to probability.

3. Read through the lesson.
4. Try out the activities in the links.
5. Complete the rest of the UDL Guidelines Worksheet for Action & Expression using the lesson you have chosen for analysis. Consider each checkpoint contained within the UDL Guidelines and decide whether that checkpoint is **present**, **not present**, or if you are **unsure** about whether or not it is present in the lesson. Include any additional **comments** about how the lesson does or does not address the checkpoint.
6. Save your responses on the worksheet. Be sure to indicate which lesson you chose at the top of the page. Save As: your first initial, last name (e.g. jsmith.doc). Upload the file to the Moodle assignment page or email your instructor for alternative arrangements.

NOTE: Refer to the rubric for grading criteria.

Session 11: Putting it all Together

This session consists of practical applications of the UDL framework to instructional practice by outlining the UDL Lesson Planning Process. This session unpacks the four elements of curriculum, which CAST defines as goals, methods, materials and assessments. It also provides an overview of Accessible Instructional Materials (AIM) and how to get AIM for learners who need them.

In order to effectively understand how to design or redesign a lesson plan, it is important to be able to establish and articulate clear goals and to identify each element of the curriculum. With a clearly articulated goal as a guide, it is clear which methods and materials can be used to provide options for recognition, strategic and affective networks and still maintain the integrity of the lesson.

Session Goals:

- Participants will be able to identify the goals, methods, materials, and assessments in a lesson plan.
- Participants will be able to explain how options for materials (including AIM), methods and assessments can optimize the learning experience for all learners.
- Participants will understand the strengths and challenges inherent in various methods and materials used in teaching.

Read & Watch:

1. [What is Meant By the Term Curriculum?](#) National Center for UDL
2. [What does it mean to say the curricula are Disabled?](#)
3. [How does UDL Address Curricular Disabilities?](#)

Question(s) to guide understanding: How does UDL define curriculum? Why are curricula disabled? How can UDL address curricular disabilities?

4. [Accessible Instructional Materials \(AIM\)](#): read this page that provides an introduction to AIM. **Note:** Although the page is provided by the NY Department of Education, the information is applicable in any state.
5. A short (8:30) introduction to [AIMing for Achievement DVD: Introductory Overview](#) video (scroll down to the subtitle: *What is it Like?*) This introduction to the AIM DVD provides a brief overview to accessible instructional materials or AIM. It includes a range of information that is useful to people with varied interests and responsibilities related to the provision of accessible instructional materials.

Questions to guide your understanding: How can AIM provide access to instructional content to learners for whom printed text is a barrier?

Activities:

Complete the following multimedia section of UDL online entitled [UDL and Curriculum](#) (13 pages) from the Review page through to the PAL Process Summary page.

In this section of UDL online, you will be introduced to the Planning for All Learners (PAL) process. You will go through activities that help you to think about these facets of the curriculum (goals, methods, materials and assessments). Be sure to complete the section all the way to the end of the summary.

Pause and Reflect: The UDL lesson planning process is a methodical way of planning or redesigning a lesson. Think about the strengths that using this approach presents for educators.

Final Assignment:

You will choose a lesson you've taught, observed, or from a website, analyze it using the UDL Guidelines, and create an action plan for adjusting or revising the lesson to better address the learner variability in your classroom.

Directions:

1. Choose a lesson you'd like to adjust or revise to better meet the needs of the learner variability in your classroom. This can be a lesson you've observed or taught yourself, or you can pick one from the following websites:
 - a. [Illuminations](#)
 - b. [Math Forum](#)
 - c. [Interactivate](#)
 - d. [Thinkfinity](#) (search for math lesson plans)
2. Indicate the goals, methods, materials, and assessments used in the original lesson.
3. Using the UDL Guidelines and their associated checkpoints ([Provide Multiple Means of Representation](#), [Provide Multiple Means of Action & Expression](#), and [Provide Multiple Means of Engagement](#)), describe which checkpoints are present, which additional checkpoints will be included in the revised lesson, and which checkpoints are not present in the original nor revised lesson. For the checkpoints that are not present, describe why each checkpoint isn't included in the revised version. Remember, not all checkpoints necessarily need to be addressed in a particular lesson, but each checkpoint should be considered in your lesson analysis.
4. Develop a plan for how you might adjust or revise the lesson, including:
 - A summary of your plan to adjust or revise the lesson;
 - Information about the adjusted goals, methods, materials, and assessments;
 - A description of the challenges you might encounter in the revised lesson and ideas about how you will address those challenges;
 - A description of what successful implementation of the lesson will look like.
5. The way you choose to present this information is up to you. Some examples are listed below, including a guided worksheet, but feel free to be creative and use whatever media you feel comfortable using. Choose **ONE** of the options below, or email your instructor to discuss alternatives:
 - a. Fill out the guided worksheet.
 - b. Create a PowerPoint or Prezi presentation (no longer than 10 slides or transitions).
 - c. Create a Glogster web poster.
 - d. Create a wiki or website.
 - e. Produce a video (no longer than 5 minutes).
 - f. Write a paper (no longer than 5 pages).

NOTE: See the [rubric in the appendix](#) for the criteria that your instructor will use to assess your work.

Dive Deeper:

- [CAST UDL Curriculum Self-Check](#) - Use this site to help you apply UDL principles in your teaching to reach and engage all of your learners. The goal of UDL is to enable all individuals to gain knowledge, skills and enthusiasm for learning.
- Meo G. (2008). [Curriculum planning for all learners; applying universal design for learning \(UDL\) to a high school reading comprehension program](#). *Preventing School Failure* 52(2), 21-30.
- [Beyond the Text](#): Comparison chart of e-book and digital talking book (DTB) hardware and software

Session 12: Web conference

Session note: The web conference session is intended to allow you to share your reflections and new understandings with other participants in this synchronous session. During this session we will go over the Representation and Action & Expression Worksheet activities, provide a summary of the discussions, include a tour of some digital tools and discuss what a UDL classroom might look like!

NOTE: If you cannot attend the session, you can still receive credit by watching the recording (posted to Moodle within 48 hours) and summarizing it for your instructor (you can choose the way you want to do this. For example: write a 1-page essay, a podcast, a PowerPoint, etc. This needs to be submitted by Tuesday following the web conference.)

Appendix:

Course Point Value and Grade Correspondence:

Point Value breakdown:

Task	Maximum Point Value
Five Online discussions	5 points each (25 total)
Three web conference sessions*	5 points each (15 total)*
Three Analysis Assignments	10 points each (30 total)
Final Assignment	30 points

* If you cannot attend the session, you can still receive credit by watching the recording (posted to Moodle within 48 hours) and summarizing it for your instructor (you can choose the way you want to do this. For example: write a 1-page essay, a podcast, a PowerPoint, etc. This needs to be submitted by Tuesday following the web conference.)

Grading Equivalent

Grade	Points
A	94-100
A-	90-93
B+	87-89
B	84-86
B-	80-83
C+	77-79
C	74-76
C-	70-73
F	0-70

In order to receive course credit from Salem State College or 67.5 PDPs, you must receive a C- or better.

Online Discussion Participation Rubric:

Timely participation in the discussions is intended to maximize your learning and is a requirement of the course. Your response to the Discussion Forum Questions is required by the end of the week when they are due (dates are listed on the syllabus). These responses are considered as part of your grade and consequently should be thoughtful syntheses of the course readings and activities and reflection on how the ideas presented might apply to your practice. It is also recommended that you post your response early in the week and check back once or twice to respond to a peer. In doing so, you are participating in the community of practice that includes rich discussions among other educators in the field.

The following rubric will be used to assess your participation in the online discussions:

Criteria	Unacceptable (0)	Acceptable (1-2)	Target (3)
Reflect upon material presented and readings	0 Points: Reflection submitted doesn't reference readings or activities and/or shows minimal or superficial consideration of the content.	1-2 Points: Reflection submitted references the readings or activities and/or shows consideration of the content.	3 Points: Reflection submitted references the readings or activities and/or shows in-depth consideration and understanding of the content.
Quantity and timeliness	0 Points: Reflection and/or comments to peers are not posted on time.	2 Points: Reflection and comments to peers are posted on time.	

Final Assignment Scoring Rubric:

	Does not meet expectations	Meets some expectations	Meets all expectations
Lesson description	0-1 Points: Shows little understanding of the lesson goals, materials, methods, and assessments.	2 Points: Shows adequate understanding of the lesson goals, materials, methods, and assessments.	3 Points: Shows originality and expertise in understanding the lesson goals, materials, methods, and assessments.
UDL checkpoints	0-1 Points:	2-3 Points:	4-5 Points:

	<i>Does not meet expectations</i>	<i>Meets some expectations</i>	<i>Meets all expectations</i>
analysis	Shows little understanding of multiple means of engagement.	Shows adequate understanding of multiple means of engagement.	Shows originality and expertise in understanding multiple means of engagement.
	0-1 Points: Shows little understanding of multiple means of action and expression.	2-3 Points: Shows adequate understanding of multiple means of action and expression	4-5 Points: Shows originality and expertise in understanding multiple means of action and expression
	0-1 Points: Shows little understanding of multiple means of representation.	2-3 Points: Shows adequate understanding of multiple means of representation.	4-5 Points: Shows originality and expertise in understanding multiple means of representation.
Description of lesson adjustments or revisions	0-1 Points: Shows little understanding of what is required to revise a lesson using the UDL Guidelines to meet the needs of learner variability.	2-3 Points: Shows adequate understanding of what is required to revise a lesson using the UDL Guidelines to meet the needs of learner variability.	4-5 Points: Shows originality and expertise in revising a lesson using the UDL Guidelines to meet the needs of learner variability.
Description of challenges, possible solutions, and vision of success	0-1 Points: Shows little or no description of the challenges, possible solutions, and vision of success of the revised lesson.	2-3 Points: Adequately shows an understanding of the challenges, possible solutions, and vision of success of the revised lesson.	4-5 Points: Shows originality and expertise in identifying the challenges, possible solutions, and vision of success of the revised lesson.

	<i>Does not meet expectations</i>	<i>Meets some expectations</i>	<i>Meets all expectations</i>
Presentation of deliverable	<p>0 Points:</p> <p>The assignment presentation or media is difficult to understand and shows little understanding of the UDL Guidelines.</p>	<p>1 Point:</p> <p>The assignment presentation or media is adequately displayed and shows a good understanding of the UDL Guidelines.</p>	<p>2 Points:</p> <p>The assignment presentation or media is clear, concise, and demonstrates expertise in understanding the UDL Guidelines.</p>

DRAFT