**Universal Design for Learning: Mathematics Instruction 201**

## COURSE DESCRIPTION:In this course, participants use what they learned from the pre-requisite UDL: Addressing Learner Variability 101 to build additional research and application of UDL to math lesson design. Participants also explore helpful technology and tools that support math instruction that address the needs of all learners and they collaborate, build, and share these ideas through a community of practice.

This Universal Design for Learning (UDL) course is designed to equip participants with the ability to evaluate, create, and recreate math lesson plans that ensure the engagement and expert learning of varied learners within a high standards-based mathematics curriculum. This includes the diversity of learners from a range of cultural, linguistic, socioeconomic, racial, and gender backgrounds. The design of instruction is intended to be proactive into a tier one, general education classroom. 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.

TEXTS:Meyer, A., Rose, D.H., & Gordon, D. (2013) Universal design for learning: Theory and practice, Wakefield MA: National Center on Universal Design for Learning. Digital version: <http://udltheorypractice.cast.org/login>

Also, refer to the readings within each of the sessions.

## CURRICULUM STANDARDS & FRAMEWORKS:

### Massachusetts [7.08: Professional Standards for Educators](http://www.doe.mass.edu/lawsregs/603cmr7.html?section=08)

(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](http://www.nbpts.org/five-core-propositions)
* [Exceptional Needs Standards](http://www.nbpts.org/sites/default/files/documents/certificates/nbpts-certificate-ecya-ens-standards.pdf)

### 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>

## COURSE REQUIREMENTS:

The course is equivalent to a 3 credit, 45 contact hour, graduate level course.

Every weekly session includes one or more of the following:

* Face to face introduction and conclusion sessions with optional video streaming and optional office hours. You have the option to engage in optional phone or Skype office hours by signing up on a provided form.
* Asynchronous sessions can be completed anytime over the course of the week and include:
	+ - * 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.
			* 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.
			* one of the following deliverable assignments (see course map for dates):
			* Synthesis activities (online discussions) to build a community of practice and require you to synthesize the readings, activities and to make connections with your own practice in a discussion format with the other participants in the course. A rubric for participation is included in the appendix.
			* Lesson Analysis and Evaluation Activity: require you to analyze and share a lesson plan for barriers and evaluate it with one portion of the UDL framework to identify elements of UDL. These are opportunities for you to demonstrate your ability to use the Framework as an evaluative tool.
			* The final assignment requires you to demonstrate high level abilities to apply what you have learned about research basis of math, UDL and the learning to evaluate and make suggestions for improving a math lesson plan with the UDL Framework. A rubric is included in the appendix and includes sharing and collaboration within the class community.

### Technology Requirements:

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| --- | --- | --- |
| Requirement | Microsoft Windows | Apple Macintosh |
| Browsers Supported: | Internet Explorer 9 or laterFirefox: Complete the most recent updateChrome: Complete the most recent update | Safari 6.0 and higherFirefox: Complete the most recent updateChrome: Complete the most recent update |
| Processor Speed: | 1 Ghz or higher | 1 Ghz or higher |
| Bandwidth Required: | 56 Kbps256 Kbps recommended(minimum DSL) | 56 Kbps256 Kbps recommended(minimum DSL) |
| Display (Minimum): | 1024x768 or higher, with 16-bit color | 1024x768 or higher, with 16-bit color |
| Other Hardware: | Speakers (USB headset recommended)Microphone OPTIONAL (USB headset recommended) | Speakers (USB headset recommended)Microphone OPTIONAL (USB headset recommended) |

## VALUATION OR GRADING POLICY:

Assessment will be based on participation in course synthesis activities such as online discussions, asynchronous video sessions, lesson analysis worksheets, and completion of the final assignment. See rubrics in the appendix for details on how the work will be evaluated. 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.

### Quality Expectations:

This course is equivalent to a 3 credit, graduate level courses. The work presented for grades must be rooted in adequate theory and will require a high level of critical thinking, analysis and synthesis of material.

*Point Value breakdown:*

|  |  |
| --- | --- |
| **Task** | **Maximum Point Value** |
| Seven Online Synthesis Discussions | 6 points each (42 total) |
| Introduction, midterm, and final reflection | 3 points each (9 total) |
| Three Lesson Analysis and Evaluation Assignments | 8 points each (24 total) |
| Final Assignment  | 25 points  |

### Grade Equivalents: If taking for PDPs If taking for graduate credit

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Letter Grade | Points |  | FSU Letter Grade and Grade Point Average | Points |
| A | 95-100 |  | A (4.0) | 95-100 |
| A- | 90-94 |  | A- (3.7) | 92-94 |
| B+ | 86-89 |  | A-/B+ (3.5) | 89-91 |
| B | 83-85 |  | B+ (3.3) | 86-88 |
| B- | 80-82 |  | B (3.0) | 83-85 |
| C+ | 77-79 |  | B- (2.7) | 80-82 |
| C | 74-76 |  | B/C+ (2.5) | 77-79 |
| C- | 71-73 |  | C+ (2.3) | 74-76 |
| F | 0-70 |  | C (2.0) | 71-73 |
|  |  |  | F (0.0) | 0-70 |

 **Academic Integrity:**

Our Academic Integrity policy is as follows: "Materials submitted in this course must represent your own work except where the work of others is properly attributed (cited). The authenticity of your work will be verified. If an instructor feels that there is evidence that work submitted is not your own, infringes on intellectual property rights or does not comply with [US copyright law](http://www.copyright.gov/circs/circ01.pdf), he or she is required to bring this matter to the attention of the Department under whose auspices this course is offered. They will investigate the matter and take any proper actions that might be required. For students taking the course for credit, the matter will also be turned over to institution for investigation. Consequences may include failure of assignment, course failure and jeopardizes the status of your teaching license. If you have questions about this policy, it is your responsibility to see the instructor prior to the due date of the first assignment.”

 **Participants with Disabilities:**

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

## CONTENT / TOPICAL OUTLINE

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| **Session Type/Date** | **TOPIC** | **Related Course Goal(s)** | **What is due?**  |
| 1 – Face to face or video streamed option Introduction | **INTRO and REVIEW of UDL & VARIABILITY IN MATH LEARNING CONTEXTS**  | * Participants will examine their current beliefs about the nature of ability, especially related to math learning.
* Participants begin to participate actively in the collaborative community of online practice with others enrolled in the course, especially from their school or site.
* Participants will understand that ability is determined by the interaction of individual variability and the learning context, especially in relation to math learning environments.
 | Participate in the face to face or video streamed session (1 hour)Complete brief reflection in the online discussion forumPost a profile to Blackboard |
| 2 – Asynchronous session (complete online)  | * Participants will reflect on variability that is unique to the math learning environments.
* Participants will understand that ability is determined by the interaction of individual variability and the learning context.
 | Synthesize what you have learned from the media and Try It in an online discussion. Share feedback with a peer. |
| 3 – Asynchronous session(complete online) | * Participants will review math-specific standards and sources of both content-driven and engagement-related goals.
* Participants will share math-related skills and engagement-related goals that expand across the grades for learning math across the curriculum.
 | Synthesize what you have learned from the media and Try It in an online discussion. Share ideas and resources to the online site. |
| 4 – Asynchronous session (complete online)  | * Participants will understand the way that neural networks vary across individuals and are reflected in the UDL Guidelines.
* Participants will use the UDL guidelines to address learner variability for a math lesson, including thinking about the goals, assessment, materials, methods, and learning environment.
 | Synthesize what you have learned from media and the math video case example in an online discussion. Share feedback with a peer. |
| 5 – Asynchronous session (complete online)  | **RECOGNITION** (the ’what’ of learning)**MULTIPLE MEANS OF REPRESENTATION** | Participants will be able to explain how the recognition networks of the brain are involved in how we gather information, integrate it into concepts, make connections between them. They will make specific connections to how this happens for expert math learning.* Participants will be able to describe the way that recognition networks vary across individuals and the challenges that this presents for math educators as they present complex, abstract ideas in math.
 | Synthesize what you have learned in an online discussion and share feedback with a peer. |
| 6 – Asynchronous session (complete online)  | * Participants will be able to design options into math learning contexts that support the UDL principle Multiple Means of Representation to reduce barriers in a math lesson (goal, materials, methods, assessments).
* Participants will demonstrate understanding of how the principle Multiple Means of Representation can be used as a lens to evaluate curricula for barriers and elements of UDL to proactively plan for all learners in a tier one, general education setting.
 | Analyze and re-design a math lesson for elements of UDL options for Representation. Post resource ideas related to UDL Representation. |
| 7–Video streamed session: Midcourse checkin | **REVIEW & REFLECTION** | * Participants will reflect on how the UDL guidelines are levers for addressing learner variability in representation towards math goals for the development of expert learners in math.
* Participants will think about specific math-related skills and proactively design accessibility in perception, options to build comprehension of language and symbols in math, and options to build background comprehension so there is transfer of math skills to real-world application.
* Participants will share a specific math-related “problem of practice” to focus on during the second part of the course.
 | Participate in the online webinar (or watch the recording)Complete brief reflection, including a challenge you face in your math learning context. |
| 8 – Asynchronous session (complete online)  | **STRATEGIC NETWORKS** (the ‘how’ of learning)**MULTIPLE MEANS OF ACTION AND EXPRESSION** | Participants will be able to explain how the strategic networks of the brain are involved in how we act on information, develop strategies, set goals and express what we know specifically about math-related content and concepts.Participants will be able to describe the way that strategic networks vary across individuals and the challenges that this presents for math educators in specific examples of math. Specific focus will be on variability in executive function and working memory for math problem-solving. | Synthesize what you have learned in an online discussion and share feedback with a peer. |
| 9 – Asynchronous session (complete online)  | * Participants will be able to explain how the UDL principle: Multiple Means of Action and Expression helps educators address the variability in learners’ strategic networks for math-related tasks.
* Participants will demonstrate understanding of how the principle: Multiple Means of Action and Expression can be used as a lens to evaluate math curricula (goals, methods, materials, assessments) for barriers and elements of UDL, especially in consideration of assessments in math.
 | Analyze a lesson and infuse ideas for UDL options for action and expression. Post resource ideas related to UDL Action & Expression to community site. |
| 10 – Asynchronous session (complete online)  | **AFFECT** (the ‘why’ of learning)**MULTIPLE MEANS OF ENGAGEMENT** | Participants will be able to explain how the affective networks of the brain are involved in motivation and engagement, especially related to math.Participants will be able to describe the way that affective networks vary across individuals and the challenges that this presents for educators, especially related to math anxiety and stereotype threat.  | Synthesize what you have learned in an online discussion and share feedback with a peer. |
| 11 – Asynchronous session (complete online)  | * Participants will be able to explain how the UDL principle: Multiple Means of Engagement helps educators address the variability in learners’ affective networks in a math lesson and build more expert math learners.
* Participants will demonstrate understanding of how the principle Multiple Means of Engagement can be used as a lens to evaluate curricula for barriers and elements of UDL towards high level learning goals in math.
 | Analyze a math lesson to evaluate and infuse ideas for options for Engagement that relate to the learning goal. Post resource ideas related to UDL Engagement to community site. |
| 12– Asynchronous session (complete online) | **UDL LESSON PLANNING PROCESS** | * Participants will be able to support the goals, methods, materials, and assessments in a math lesson plan using the UDL Guidelines using resources and ideas from discussions and resources they have gained in this course.
* Participants will reflect on how UDL can be a framework that can inform their identified challenging focus area.
* Participants will reflect on what it means to be an expert math learner and how UDL supports students to become more purposeful, strategic, and engaged.
 | Synthesize what you have learned in an online discussion and share feedback to a peer. |
| 13– Asynchronous session (complete online)  | **PUTTING IT ALL TOGETHER** | * Participants will demonstrate the ability to use the UDL framework to analyze and evaluate math lessons and learning environments proactively in a tier one general education setting for barriers and elements of UDL.
* Participants will demonstrate the ability to use the UDL framework to improve the lesson design to address learner variability and support the development of expert math learners.
 | Redesign a lesson for the Final Assignment (due the week after the final session)  |
| 14 – Face to face or video streamed option. Final Session | **REVIEW, REFLECT &** **TAKE AWAYS** | * Participants will understand that the UDL guidelines are levers for addressing learner variability and supporting the development of expert learners in math.
* Participants will showcase highlights from their lessons through an online platform (such as Padlet or Google drive) with the growing community of practice.
 | Complete brief reflection.Post your final project. |

### RUBRICS

This course is equivalent to a 3 credit, graduate-level courses. The work presented for grades requires a high level of critical thinking, analysis and synthesis of material and must be rooted in adequate theory and applied practically into classroom practice.

#### Late Submissions:

Work that is submitted after the due date will not receive full credit. If there are extenuating circumstances that warrant late submission of work, you are expected to contact your instructor to develop a plan for submission or makeup. Acceptance of late work is at the discretion of the instructor.

#### Synthesis Activity (Online Discussion and Community Contribution) Rubric:

Timely participation in the discussions is intended to maximize your learning and is a key requirement of the course. Your response to the Synthesis Online Discussion Forum 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 about how the concepts can be applied to problems of practice. They are also informed by the Try It activity each week that is related to the new topic from the readings and media. 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. This course will also build a tool and resource bank that participants will contribute to.

The following rubric will be used to assess your participation in the introductory face to face, midterm, and final sessions.

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| **Criteria** | **Unacceptable**  | **Acceptable**  | **Target**  |
| **Participation in the face to face or video streamed session** | **0 Points:**Does participate in the face to face or video streamed session. |   | **1 Point:**Participates in the face to face session |
| **Post Reflection**  | **0 Points:**Does not post a reflection to the online discussion forum. |  | **1 Point:**Posts a reflection related to the focus questions. |
| **Community Contribution** | **0 Points**Does not post to the community forum. |  | **1 Point:**Posts to the community forum. |

The following rubric will be used to assess your participation in the Synthesis Online Discussion

|  |  |  |  |
| --- | --- | --- | --- |
| **Criteria** | **Unacceptable**  | **Acceptable**  | **Target**  |
| **Reflect upon media and readings** | **0 Points:**Does not reference readings or activities and/or shows minimal or superficial consideration and understanding of the content presented. | **1 Point:**References the readings or activities and/or shows consideration and understanding of the content presented.  | **2 Points:**References the readings or activities and shows in-depth consideration and understanding of the content presented. |
| **Synthesis of subject matter with instructional application** | **0 Points**Demonstrates minimal consideration of how the content presented can be used to address a challenge of instructional practice. | **1 Point:** Demonstrates consideration of how the content presented can be used to address a challenge of instructional practice.. | **2 Points:**Demonstrates innovative consideration of how the content presented can be applied to instructional practice. |
| **Community Contribution**  | **0 Points**Does not offer insightful or relevant feedback to peers and/or does not share resources to the community site. |  | **1 Point:**Offers relevant, insightful feedback to peers and/or resources to the community site. |
| **Quantity and timeliness** | **0 Points:**Synthesis and/or comments to peers are **not** posted on time. |  | **1 Point:**Synthesis and comments to peers are posted on time. |

#### Multiple Means of Representation, Action & Expression, and Engagement

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| The learner will demonstrate the ability to evaluate an existing lesson to determine whether it includes elements of UDL as outlined in the UDL framework and will explain why. |
|  | *Does not meet expectations* | *Meets some expectations* | *Meets all expectations* |
| ***There is a clearly defined GOAL that is purposeful about the means.*** | **0 Points:** There is not a clear goal defined. | **1 Point:**The goal is defined but it is not clear whether the means is purposeful | **2 Points:**The goal is clearly defined and the means is purposefully considered in relation to that goal. |
| ***Access Guidelines: Provide options for perception (week 6), for physical action (week 9), to recruit interest (week 11)*** | **0 Points:**Demonstrates little understanding of how the lesson does or does not provide options for access or does not tie to the goal(s). | **1 Point:**Demonstrates a limited or partial understanding of how the lesson provides options for access or is not clearly tied to the goal(s). | **2 Points:**Demonstrates an in-depth understanding of how the lesson does or does not provide options for access relevant to the goal(s). |
| ***Building Skill Guidelines: Provide options for language, mathematical expressions, and symbols (week 6), expression and communication (week 9), for persistence & motivation (week 11)*** | **0 Points:**Demonstrates little understanding of how the lesson does or does not provide options for building skills or does not tie to the goal(s). | **1 Point:**Demonstrates a limited or partial understanding of how the lesson provides options for building skills or is not clearly tied to the goal(s). | **2 Points:**Demonstrates an in-depth understanding of how the lesson does or does not provide options for building skills relevant to the goal(s). |
| ***Intrinsic Guidelines: Provide options for comprehension (week 6), executive function (week 9), self-regulation (week 11)*** | **0 Points:**Demonstrates little understanding of how the lesson does or does not provide options for intrinsic learning or does not tie to the goal(s). | **1 Point:**Demonstrates a limited or partial understanding of how the lesson does or does not provide options for intrinsic learning or is not clearly tied to the goal(s). | **2 Points:**Demonstrates an in-depth understanding of how the lesson does or does not provide options for intrinsic learning relevant to the goal(s). |

 **Final Assignment Scoring Rubric:**

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| --- | --- | --- | --- |
|  | **Incomplete Understanding** | **Basic Understanding** | **Target Understanding** |
| ***Goals*** | **0 Points:**Goals are not conveyed. |  | **1 Point:**Goals are conveyed. |
| ***EVALUATE: What elements of the UDL Guidelines exist in this lesson (may include the assessments, methods and materials used in the original lesson).***  | **0 Points:** Demonstrates a **weak or no** understanding of elements of the UDL components of the lesson for Representation, Action & Expression, and Engagement (including assessments, materials and methods).  |  | **2 Points:** Demonstrates **a good** understanding of the UDL components for Representation, Action & Expression, and Engagement that exist in the lesson (including assessments, materials and methods). |
| ***DESIGN: Briefly describe how you will adjust lesson using the UDL Guidelines.*** | **0-3 Points (0 Points-1 Point *per each* UDL guideline):** Demonstrates a **weak or no** understanding of how to adjust goals, assessments, materials and methods because no or very few adjustments were made using the UDL guidelines. | **6-9 Points (2-3 Points *per each* UDL guideline):**Demonstrates **a basic** understanding of how to adjust goals, assessments, materials and methods using the UDL guidelines because few adjustments were made and/or the adjustments do not align well to the UDL guidelines. | **12-15 Points (4-5 Points *per each* UDL guideline):**Demonstrates **complete** understanding of how to adjust goals, assessments, materials and methods by making several key adjustments that allow for alignment with the UDL guidelines. |
| ***SUMMARIZE: Provide a summary of the revised plan; include challenges, solutions and a vision of success that includes thinking about learner variability.*** | **0 Points-1 Point:**The summary of the revised plan is difficult to follow. It is not clear what revisions were made or it is not at all clear why revisions were made. The challenges and solutions are not considered. You **do not** describe how the adjustments made in the goals, assessments, methods and materials in the revised lesson using the checkpoints **address learner variability.** | **2-3 Points:**The summary of the revised plan **does not** describe the revised lesson **completely**. It is only somewhat clear what revisions or made or why revisions were made. Some challenges and solutions may be considered.You describe how the adjustments made in the goals, assessments, methods and materials in the revised lesson using the checkpoints **address learner variability, but it is not clear that they do address the needs of all (most) students.** | **3-4 Points:**The summary of the revised plan **adequately** describes the revised lesson. It also states the potential challenges you might encounter if teaching this lesson and solutions.The summary of the revised plan **adequately** describes the revised lesson. It also states the potential challenges you might encounter if teaching this lesson and solutions. |
| ***Share: Presentation of deliverable*** | **0 Points:** The project presentation or media is **difficult to follow** (is disorganized or does not include enough explanation). The presentation **does not** help to demonstrate understanding of how to use UDL to address learning variability. | **1 Point:** The project presentation or media is **adequately** displayed. The presentation helps to demonstrate a **good** understanding of how to use UDL to address a wide range of learner variability. | **2-3 Points:** You **thoroughly** describe how the adjustments made in the goals, assessments, methods and materials in the revised lesson using the checkpoints **address learner variability but there are not specific examples included in your description.** |

## COURSE CONTENT

### Session 1: Introduction to the Course – Face to face session with optional video streaming and office hours

**Introductory session:** This session includes a face-to-face introduction to the course and the opportunity to learn about the different resources and technologies that will be used in this course. The session will include a tour of Blackboard (separate video) and beginning discussions of building an online community of practice to support all learners, including those from diverse backgrounds, socioeconomic, linguistic, cultural, racial, and genders.

**Session Goal:**
Participants will understand the way that neural networks vary across individuals, including those from diverse backgrounds, socioeconomic, linguistic, cultural, racial, and genders. There will be a review of UDL as a topic learned in the pre requisite UDL: Addressing Learner Variability 101 and an overview of the goals, scope, and sequence for this course.

**Synthesis: Online Discussion**

Following the synchronous session, please post a short reflection to the course website answering the following: 1) What have you learned about UDL that you did not already know? 2) What are you looking forward to in the course? 3) Are there any questions that you have about UDL at this point in the course? 4) What are some specific math-related focus areas you want to explore and discuss in this course?

**Community Contribution:**

In the online format that is used for this course, it is difficult to get to know one another. In order to develop this learning community, please go to Blackboard and add your profile. Please take the time to describe details that are relevant to this course. For example, please let the other participants know if this is your first online course, what your goal is in taking the course and what your role in the school is (e.g. 4th grade general educator, music teacher, principal, special education director) and your reason for taking the course. How do you currently integrate UDL into your work? What particular challenges do you face as a math educator? You can also tell people a little about your interests and hobbies and upload a picture of yourself. Read and familiarize yourself with the profiles of others before the web conference. **Pause and Reflect:** After reading some of the profiles of other participants,consider the makeup of this group. How much variability exists among the different people in the group?

### Session 2: Review of Universal Design for Learning: A Paradigm Shift

UDL maintains that the primary impediment to achievement of many learners is an inflexible, “one-size-fits-all” curriculum that is 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. In this session, you will be asked to review the new way of viewing ability as existing at the intersection of the resources the person has and the demands of the instructional math environment. You will be asked to reflect on unique sources of variability in math contexts that are barriers to learning math.

#### Session Goals:

* Participants will examine their current beliefs about the nature of ability, specific to math.
* Participants will understand that ability is determined by the interaction of individual variability and the learning context (math classroom learning environment, materials, methods, and assessments).

#### Build Background - Session Materials

#### Choose at least two of the following to refresh your understanding of UDL:

* [UDL Theory & Practice, Chapter 1](http://udltp.cast.org/reading?loc=intro.xml_l1969950) - Revisioning Education through UDL (pp. 1-4)

**Questions to guide your understanding:** How did early education develop into a one-size-fits-all approach? How did CAST’s view of students and ability change over time? How did technology play a role in that?

* [The Future is in the Margins: the Role of Technology and Disability in Educational Reform](http://www.udlcenter.org/resource_library/articles/margins). 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?
* [Special Education and the Concept of Neurodiversity](http://thomasarmstrong.com/blog/2010/01/01/special-education-and-the-concept-of-neurodiversity/). Thomas Armstrong. First published 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 talking about?

* [UDL Brief: UDL and DI](http://www.udlcenter.org/sites/udlcenter.org/files/UDL-DI%20BRIEFfinal.pdf)- A frequent misconception is that UDL and differentiated instruction are the same.
**Question(s) to guide your understanding:** What are some of the similarities and differences of UDL and differentiated instruction?
* The story of colonial Martha’s Vineyard:
1. 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](http://d)
2. Wikipedia article [Martha’s Vineyard Sign Language](http://en.wikipedia.org/wiki/Martha%27s_Vineyard_Sign_Language)

**Questions to guide understanding:** This story provides an example of ways that people in the margins influenced an entire community. How did fully including the deaf individuals in island life expand the community’s view of ways to represent knowledge, to use varied strategies for expression and to engage everyone?

#### Try It: Session Activity:

Reflect on one of the math lessons you are doing this week. What are sources of learner variability you observe during that math lesson? Think about how you currently address learner variability in math. How difficult is it? How does it make you feel when some learners are successful and some are not? Use your reflections from this activity for your online discussion.

**Synthesis: Online Discussion**

Describe the variability and current context of your classroom. How does UDL support learner variability and put the onus on redesigning the learning environment? How does thinking about variability differ from differentiated instruction (DI)? What was new for you about UDL? Is there a source of variability that is especially challenging for you as a math educator?

**NOTE:** Be sure to explore and apply the concepts you are learning from the readings, the activities, and your own experience in answering the questions, include what resonated with you and/or what you found puzzling, are wondering or curious about as a result of the new information. Finally, be sure to include how you think you can apply what you have learned in your practice. You can construct your discussion post using a video (such as [Vimeo](https://vimeo.com/)), audio (such as [Vocaroo](http://vocaroo.com/)), upload a document or Power Point that has images or tables, or use the written format.

#### Community Contribution

Review, reflect, and respond to two other participants’ posts this week. Include a deeper discussion of how ability is determined by the interaction of individual variability and the learning context (which includes math classroom learning environment, materials, methods, and assessments).

### Session 3: Math Goals and the UDL Guidelines

UDL is based on research in the learning sciences that has shown that learner variability is universal. This provides the rationale for why learning should be a flexible process (“tight goal, flexible means.”) This session examines ways that math educators can focus on target learning goals and design curriculum that accommodates the widest spectrum of learners from the beginning, rather than retrofitting it to accommodate individual learners. The result is math curricula that can respond to learner variability to reduce barriers to learning high-level learning goals. To do this, there must be clear goals presented in math classrooms, both about the math concepts that are to be learned as well as engagement in learning processes related to math.

#### Session Goals:

* Participants will review math-specific standards and sources of both content-driven and engagement-related goals.
* Participants will share math-related skills and engagement-related goals that expand across the grades for learning math across the curriculum.

#### Build Background - Session Materials:

Choose at least two of the following to build background about goals:

* Sources of math standards: [Common Core Content Standards for Math](http://www.corestandards.org/Math/)
* Learning Targets and Success Criteria, [http://www.ascd.org/publications/books/109031/chapters/Leveling-the-Playing-Field@-Sharing-Learning-Targets-and-Criteria-for-Success.aspx](http://www.ascd.org/publications/books/109031/chapters/Leveling-the-Playing-Field%40-Sharing-Learning-Targets-and-Criteria-for-Success.aspx)
* SMART goals: <http://topachievement.com/smart.html> or <http://www.edutopia.org/blog/smart-goal-setting-with-students-maurice-elias>
* Goalbook (note, this product requires subscription): <https://goalbookapp.com/>
* How to have students set their own math goals: <http://www.mathnasium.com/settingmathgoalsfor2016>

**Try It: Session Activity:**

Choose **one** of the lessons you are doing this week. Analyze the goals.

* Post the goals for that part of your lesson clearly in the learning environment.
* Make sure to use language that students can understand when you post that goal.
* Discuss the math content goals with students. What are the core skills you hope your students achieve? What is the core content you expect them to master?
* What behaviors and/or engagement components do you want to also achieve through this lesson (for example, group collaboration or persistence through a challenging math problem or transferring skills from the classroom to an real world problem)?
* Additional Option: Ask students to reflect on a goal they have for this math lesson. How do you offer students the opportunity to add their own math learning goals?

**Synthesis: Online Discussion**

What was new about how you posted and shared your lesson goals in the Try It Activity this week? How did you clarify the goals? What options did you include for students to achieve those goals? How did you find the means (“how”) was flexible when the goals are clear? How did you invite students to make their own goals for the lesson? What did you observe and what was different during this lesson with this focus on goals? Are there additional barriers your students face in this lesson to achieve these goals?

**NOTE:** Be sure to explore and apply the concepts you are learning from the readings, the activities, and your own experience in answering the questions, include what resonated with you and/or what you found puzzling, are wondering or curious about as a result of the new information. Finally, be sure to include how you think you can apply what you have learned in your practice. You can construct your discussion post using a video (such as [Vimeo](https://vimeo.com/)), audio (such as [Vocaroo](http://vocaroo.com/)), upload a document or Power Point that has images or tables, or use the written format.

### Community Contribution

Go to the course community site (such as Padlet or Google drive). Post one resource idea you have related to goals and math content, skills, and behaviors. Note that you can share on the community site through flexible ways, such as type, upload, video, hyperlink, or photo.

### Session 4: Analyze a video and lesson using the UDL framework.

In this session, participants use the Universal Design for Learning (UDL) framework to analyze the learner variability to infuse additional supports and options into a lesson that align to the learning goals and are achievable by the widest range of learners in your math environment. Consideration for re-design of this lesson will include the curricular materials, methods, and/or assessments as well as the learning environment.

#### Session goals:

* Participants will understand the way that neural networks vary across individuals and are reflected in the UDL Guidelines.
* Participants will use the UDL guidelines to address learner variability for a math lesson, including thinking about the goals, assessment, materials, methods, and learning environment.

#### Build Background - Session Materials:

Choose at least two of the following:

* [UDL Guidelines](http://www.udlcenter.org/aboutudl/udlguidelines) (read this brief introductory page and take a look at the graphic of the guidelines. This will come up multiple times in the course, so it is a good idea to take a long look at the way the guidelines are set up)
* [UDL Theory and Practice, Chapter 4 – Universal Design for Learning](http://udltp.cast.org/reading?1&loc=chapter3.xml_l1970032)
* [UDL Organizer with Links to Examples](https://sites.google.com/site/udlguidelinesexamples/home)
* [UDL Learning Wheel](http://udlwheel.mdonlinegrants.org/)
* [UDL Educator Worksheet](https://padlet.com/aposey/udlguidelines)
* [Research on the UDL Guidelines](http://www.udlcenter.org/aboutudl/udlguidelines)
* Rose, D.H., Hasselbring, T.S., Stahl, S., and Zabala, J. [Assistive Technology and Universal Design for Learning: Two Sides of the Same Coin](http://smcmtechintheclassroom.pbworks.com/w/file/fetch/86565400/AT_UDL.pdf).

#### Try It: Session Activity:

* Watch one of these short videos of a math classroom:
	+ [Math as a Social Activity](http://www.edutopia.org/math-social-activity-cooperative-learning-video) OR [Jonathan Winn Makes Calculus Cool](http://www.edutopia.org/masterful-teacher-jonathan-winn-calculus-video) OR use a 5-7 video clip from your own classroom or a classroom from a colleague.
* Pause and reflect:
	+ What were the goals set forth by this teacher (or you)? Notice that there are math content goals, group learning goals, and behavioral goals. Choose lesson goals, for example, Jonathan Winn’s example could include a goal could be for students to learn how to track variables in equations or getting students to share their thinking process about math.
	+ In what ways did you see evidence of UDL lesson design that purposefully supported the intended learning goal? What options did you see for how the information was represented, how students could act and express (how they could show their understanding), and for how students could engage with towards the intended goal(s)?
	+ What barriers still were present?

 **Synthesis: Online Discussion**

Summarize your observations from the Try It classroom example you chose this week. How were there clear goals and flexible means in this lesson? Broadly, what options did you observe there for representation, action & expression, and engagement? What barriers did you observe still in the learning environment that could prevent all learners from achieving the intended learning goal? What is new so far in this course in applying the UDL guidelines for thinking about math contexts?

**OR**

Some people feel that digital media and technology are a requirement for UDL implementation. In what ways do you agree or disagree, specifically from the perspective of math classrooms? Provide examples for some non-digital or digital-ways that you might alter materials and methods in your math classroom. How do calculators, for example, figure into your thinking about technology? How do the identified goals help you think about which resources, such as calculators, may be incorporated into the learning environment?

**NOTE:** Be sure to explore and apply the concepts you are learning from the readings, the activities, and your own experience in answering the questions, include what resonated with you and/or what you found puzzling, are wondering or curious about as a result of the new information. Finally, be sure to include how you think you can apply what you have learned in your practice. You can construct your discussion post using a video (such as [Vimeo](https://vimeo.com/)), audio (such as [Vocaroo](http://vocaroo.com/)), upload a document or Power Point that has images or tables, or use the written format.

#### Community Contribution

Review, reflect, and respond to two other participants’ posts this week. Include a deeper discussion of how UDL options for representation, action & expression, and engagement can support high level learning goals in a math context. If there are resources you would like to share to the online community site from this discussion, please post those as well.

#### Survey:

At this point in the course, take a poll (see link on Blackboard) to give your instructor some feedback on how the course is going so far answering the following questions:

* Overall, how do you feel about the course so far (such as workload, content, options available for learning)? (scale of 1-10)
* Do you feel that you are getting: enough, too much or not enough feedback?
* Do you feel that the feedback is instructive enough to be helpful in improving your work in the discussions? If not, how can it be improved?
* Do you feel the interaction in the discussions is helping you to think more deeply about the content?

### Session 5: Learner Variability in the Recognition Networks for Math

This session will explore the recognition networks - parts of the brain that are involved in pattern recognition. Focus will be on 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. These skills are essential for expert learning math.

#### Session Goals:

Participants will be able to explain how the recognition networks of the brain are involved in how we gather information, integrate it into concepts, make connections between them. They will make specific connections to how this happens for expert math learning.

* Participants will be able to describe the way that recognition networks vary across individuals and the challenges that this presents for math educators as they present complex, abstract ideas in math.

#### Build Background - Session Materials:

 Choose at least two media to explore:

* [UDL Theory and Practice - Universal Design for Learning & Multiple Means of Representation (p. 54)](http://udltp.cast.org/reading?69&loc=chapter3.xml_l16)
**Questions to guide your understanding:** What impact could representing information in multiple ways have on students' understanding or on their engagement with the subject?
* [Mathematics and the Brain](http://www.mathematicalbrain.com/pdf/MALECTURE.PDF) – paper by Brian Butterworth
**Questions to guide your understanding:** Review this article to think about the role of genes and the brain for understanding math.
* Number Sense, Hans the counting horse? <https://www.nytimes.com/books/first/d/dehaene-number.html>
**Questions to guide your understanding:** Use this article to think about how students build understanding about what they know about math?
* [Discourse: Using Open Ended Question](https://www.sas.com/content/dam/SAS/en_us/doc/event/math-summit/2014/104M.pdf)

**Question(s) to guide your understanding:** In what ways can you use discussion prompts and facilitate discussions to build student background and support relevant vocabulary understanding?

* [“Science Finds New Patterns,”](http://www.news.ucdavis.edu/search/news_detail.lasso?id=7510) UC Davis News & Information. (2005)

**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?

#### Try It: Session Activity:

* Choose one part of a lesson (such as an activity, worksheet, or problem set) this week to observe your students to think about variability in representation. How is there variability in how they perceive the information, build language comprehension, and in the background understanding they have for this lesson? In what ways do you already represent information to support learner variability, specifically for the one part of the lesson you chose?

**Synthesis: Online Discussion**

**Choose ONE:**

* How do you think experience and prior background knowledge impacts variability in the recognition networks, especially in math-related skills and concepts? How does learner variability in the recognition networks present challenges for math educators as they iteratively build upon math skills each year?

OR

* Consider the importance of the recognition networks to learning math. Can you think of ways that you have provided or observed another educator who provided an alternate representation that helped more learners develop concepts, understand meaning and connect new learning to their own background knowledge of math concepts? What was that representation? How did it support the intended learning goal?

**NOTE:** Be sure to explore and apply the concepts you are learning from the readings, the activities, and your own experience in answering the questions, include what resonated with you and/or what you found puzzling, are wondering or curious about as a result of the new information. Finally, be sure to include how you think you can apply what you have learned in your practice. You can construct your discussion post using a video (such as [Vimeo](https://vimeo.com/)), audio (such as [Vocaroo](http://vocaroo.com/)), upload a document or Power Point that has images or tables, or use the written format.

**Community Contribution**

Review, reflect, and respond to two other participants’ posts this week. Include a deeper discussion of how the role of variability in the representation networks of students in math contexts. How is this variability an asset and something that can be designed for proactively?

### Session 6: Multiple Means of Representation for Math Contexts

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 throughout their math lessons. During this session you will learn about identifying barriers to representation and providing options that give learners various ways of acquiring information and knowledge. Specific focus will be on building tools and resources to infuse into math lessons that provide options for perception, language, and comprehension. This can include how we present graphs, data tables, space for constructing math solutions, and calculations.

#### Session Goals:

* Participants will be able to design options into math learning contexts that support the UDL principle Multiple Means of Representation to reduce barriers in a math lesson (goal, materials, methods, assessments).
* Participants will demonstrate understanding of how the principle Multiple Means of Representation can be used as a lens to evaluate curricula for barriers and elements of UDL to proactively plan for all learners in a tier one, general education setting.

#### Build Background - Session Materials:

**Choose at least 2 media to explore towards the learning goals this week:**

* Making materials accessible, AIM website: <http://aem.cast.org/>
	+ An overview of Accessible Instructional Materials (AIM) and the National Instructional Materials Accessibility Standard (NIMAS) an [interview with Skip Stahl at CAST](https://www.dropbox.com/sh/k9ouiztfpfghk2a/IhOfZmobRW) (6:54).
* AIM: Simply Said (3:43): this [video](http://www.youtube.com/watch?v=JcPIMlOJJkc) is the product of collaboration between the PACER Center and the AIM Center. It's a quick video on Accessible Instructional Materials (AIM): <http://www.youtube.com/watch?v=JcPIMlOJJkc>

**Question(s) to guide your understanding:** How can AIM provide access to instructional content to learners for who printed text is a barrier? Do you think AIM could be useful to learners other than those who qualify for copyright exemption? For whom and how so, especially related to math curricula?

* [Accountable Talk Toolkit](http://www.ces.rcs.k12.tn.us/web_uploads/203_accountable_talk_toolkit_10-09.pdf) **[Question(s) to guide your understanding: How can using common language around how students build background comprehension support learning math complex vocabulary and concepts?](http://www.ces.rcs.k12.tn.us/web_uploads/203_accountable_talk_toolkit_10-09.pdf)**
* [Teaching Math Vocabulary](https://luminouslearning.com/blogs/luminous-learning/12670237-teaching-math-vocabulary)
**Question(s) to guide your understanding: Which of these strategies could you add to your math context or lesson to support vocabulary?**
* [Hand Gestures: Make Math Memorable](https://www.teachingchannel.org/videos/teaching-math-hand-gestures)
**Question(s) to guide your understanding: How does using hand gestures (at all ages, even high school) support learner variability?**
* UDL Theory & Practice: [Recognition Networks](http://udltp.cast.org/reading?17&loc=chapter2.xml_l1969841) (pp. 37-40)
**Question(s) to guide your understanding: Review the discussion about variability in the recognition networks used to perceive information from the environment, build language and symbol comprehension, and background comprehension. What is new to this information since you first saw it in the UDL101 course?**

**Try It: Session Activity**

**Lesson Analysis:**

* Choose a lesson you are doing this week or observe a part of a colleague’s lesson or use the lesson listed below:
	+ - **Math:** Adjustable Spinner from the Project Interactivate website: <http://www.shodor.org/interactivate/activities/AdjustableSpinner/>
* Identify the target learning goal or objective (related to math content and you can also include additional goals related to math skills or behaviors- just be sure to be explicit about the intended goals).
* Use the [UDL Guidelines Lesson Analysis Worksheet for Representation](http://sde.ok.gov/sde/sites/ok.gov.sde/files/Guidelines_2.0_Educator_Worksheet_0-2.pdf) to **add at least two additional options for Representation to your lesson to reduce a barrier for students to achieve the intended goal.** For example, you could add an additional option to support for language, vocabulary, and symbol understanding. You could make the content available through one additional representation; for example, add one video of a problem in addition to what you already do in that math lesson, you could close caption a video, you could offer image descriptions to graphs or tables. You could offer one option for building background such as a graphic organizer or concept map.
* Observe how this new components to your lesson impacted students learning towards the learning goal. What was the addition to your lesson? How was the option used? How do you think it supported variability in representation?

**Synthesis: Online Discussion**

Post a reflection to your lesson analysis; note that you can use the UDL Educator Worksheet to post your reflection. What did you do differently? What did you observe? Be sure you included the goal for the lesson and which UDL Representation guideline you focused on for this lesson. How did you use the Multiple Means of Representation to infuse an option into the learning environment to support the target math learning goals and objectives?

How is offering Multiple Means of Representation challenging for math, specifically? How can making material accessible through options for perception, language, and background comprehension lead to higher level, expert math learning around complex math topics?

**NOTE:** Be sure to explore and apply the concepts you are learning from the readings, the activities, and your own experience in answering the questions, include what resonated with you and/or what you found puzzling, are wondering or curious about as a result of the new information. Finally, be sure to include how you think you can apply what you have learned in your practice. You can construct your discussion post using a video (such as [Vimeo](https://vimeo.com/)), audio (such as [Vocaroo](http://vocaroo.com/)), upload a document or Power Point that has images or tables, or use the written format.

**Community Contribution**

Post at least one resource to the Padlet or Google drive that supports the UDL Guideline Multiple Means of Representation that you find useful or valuable to support the variability of learners into tier one general education classrooms.

### Session 7: Reflection on Sessions 1-6: Synchronous video session

This online webinar session (1 hour) is intended to allow you review Sessions 1-6, go over the Recognition Principle, lesson design, variability in recognition networks, and how you are specifically applying UDL to applications in your math contexts. This webinar will include a summary of the discussions, highlight the structure of the guidelines and math focus areas from participant discussions. An overview of the second part of the course will also be provided.

 **Session Goals:**

* Participants will reflect on how the UDL guidelines are levers for addressing learner variability in representation towards math goals for the development of expert learners in math.
* Participants will think about specific math-related skills and proactively design accessibility in perception, options to build comprehension of language and symbols in math, and options to build background comprehension so there is transfer of math skills to real-world application.
* Participants will share a specific math-related “problem of practice” to focus on during the second part of the course.

**Synthesis: Online Discussion**

Following the webinar, please post a short reflection to the course website answering the following:

1. 1) What have you learned about UDL in sessions 1-6 that you did not already know, specifically related to your math-related focus area? 2) What are you looking forward to learning next in the course? 3) Are there any questions that you have about UDL at this point in the course?
2. Share a specific math-related “problem of practice” that challenges you in your math classroom and that you would like to focus on during the second part of the course?

**Pause and Reflect:** How has any of the content so far impacted your teaching, the preparation of your lessons, or your thinking about your students? What do you observe in your class; do you observe your students differently? What does it mean to be an expert learner in math? What do expert mathematicians know, do, and care about when they approach or reflect on a math concept or problem?

### Session 8: Learner Variability in the Strategic Networks for Math

This session will explore variability in individual strategic networks: the parts of the brain involved in planning and performing tasks: e.g. 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. These concepts will be applied to the identified challenging focus area of math identified by each participant.

#### Session Goals:

Participants will be able to explain how the strategic networks of the brain are involved in how we act on information, develop strategies, set goals and express what we know specifically about math-related content and concepts.

Participants will be able to describe the way that strategic networks vary across individuals and the challenges that this presents for math educators in specific examples of math. Specific focus will be on variability in executive function and working memory for math problem-solving.

#### Build Background - Session Materials:

 Choose at least two of the following to build your background:

* [How to Get Students Talking](http://www.mathsolutions.com/documents/how_to_get_students_talking.pdf) : Math Solutions
**Question(s) to guide your understanding:** How can classroom participation go beyond students raising their hand to verbally respond or answering a problem on the board?
* [Demystifying Math Struggles, Poor Working Memory and Math](http://dyslexia.yale.edu/Edu_memorychallenges.html):
**Question(s) to guide your understanding:** How can thinking about working memory help you think about variability in executive function? What can this help you design into math environments and make available for all students?
* 8 Working Memory Boosters: <https://www.understood.org/en/school-learning/learning-at-home/homework-study-skills/8-working-memory-boosters>
* Go to the following sites and try at least **TWO** of the activities.

[iSolveIt](http://isolveit.cast.org/p/squared/)

[KenKen](http://www.kenkenpuzzle.com/)
**Questions to guide your understanding:** 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? How can you related the examples you tried to math problem solving skills you have in your classroom?

* Video about the life of [Paul Smith](http://www.youtube.com/watch?v=XiHyQhf9qAY). Born in 1921 with cerebral palsy, Paul Smith was kept out of school, but not out of learning; this biographical video 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?

* UDL Theory and Practice -[The Variability of Learners: Strategic Networks (pp. 41-44)](http://udltp.cast.org/reading?loc=chapter2.xml_l1969938)
**Question(s) to guide your understanding:** What kinds of options could support a class with predictable variations in organizational, executive functioning, and working memory skills?

**Try It: Session Activity:**

Choose one part of a lesson this week to observe your students for how there is variability in action & expression. How is there variability in how they can show what they know and demonstrate understanding of the information they need to know in your lesson? How is there variability in how they show what they know, use of communication and expression options, and executive function skills? How is there variability in how they set goals and progress monitor specific problem solving skills in the lesson you are analyzing?

OR

Choose one math problem, for example, a multi-digit multiplication problem or a word problem. Analyze the math problem in terms of the demands that it places on students’ working memory or progress monitoring skills. What skills are required to solve the problem that relate to the UDL Action & Expression guidelines (physical action, expression & communication, and executive function)? What cognitive demands are needed, for example, what do students have to “hold in mind” as they solve the problem?

**Synthesis: Online Discussion**

**Choose ONE:**

How do you think variability in physical action and executive function impacts learning math-related skills and concepts? How does learner variability in the strategic networks present challenges for math educators as they show what they know related to the targeted math skills and concepts of a lesson? How did you observe variability in action & expression in one of your lessons? What do you think are “expert” skills students should build in math?

OR

How did analyzing one math problem help you think about the demands required for students to solve math problems? For example, what were demands on working memory or progress monitoring or for physical action that were required? How might providing options to support progress monitoring or memory help learners develop strategies to achieve the instructional goal?

**NOTE:** Be sure to explore and apply the concepts you are learning from the readings, the activities, and your own experience in answering the questions, include what resonated with you and/or what you found puzzling, are wondering or curious about as a result of the new information. Finally, be sure to include how you think you can apply what you have learned in your practice.

You can construct your discussion post using a video (such as [Vimeo](https://vimeo.com/)), audio (such as [Vocaroo](http://vocaroo.com/)), upload a document or Power Point that has images or tables, or use the written format.

**Community Contribution**

Review, reflect, and respond to two other participants’ posts this week. Include a deeper discussion of how the role of variability in the strategic networks of students in math contexts. How is this variability in action & expression an asset and something that can be designed for proactively?

### Session 9: Multiple Means of Action and Expression for Math Contexts

This session connects learner variability in the strategic networks with the UDL Action & Expression principle that addresses how information is acted on or expressed (the ‘how’ of learning). This principle guides math educators to provide multiple means of action and expression for math. This session will help you identify barriers to action and expression within a lesson or curricula (goals, assessments, methods, materials) 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 be able to explain how the UDL principle: Multiple Means of Action and Expression helps educators address the variability in learners’ strategic networks for math-related tasks.
* Participants will demonstrate understanding of how the principle: Multiple Means of Action and Expression can be used as a lens to evaluate math curricula (goals, methods, materials, assessments) for barriers and elements of UDL, especially in consideration of assessments in math.

#### Build Background - Session Materials:

 Choose at least two of the following to build background:

* [“What is executive function?”](http://www.aboutkidshealth.ca/En/News/Series/ExecutiveFunction/Pages/Executive-Function-Part-One-What-is-executive-function.aspx) 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?

* [At a Glance, 8 Keys to Executive Function](https://www.understood.org/en/learning-attention-issues/child-learning-disabilities/executive-functioning-issues/key-executive-functioning-skills-explained):
**Question(s) to guide your understanding**: What do you do to support executive function in your math lessons and in your math classroom environment?
* [Strategies to Improve Math Skills and Executive Functions](http://learningworksforkids.com/2013/10/strategies-to-improve-math-skills-executive-functions/):
**Question(s) to guide your understanding:** What new ideas could you incorporate into your math curriculum to support executive function (remember the frontal lobes that support executive function are not fully formed until people are in the 20s)?
* [40 Alternative Assessment Ideas for Learning](http://www.teachhub.com/40-alternative-assessments-learning)
**Question(s) to guide your understanding:** In what ways does having clear learning goals help you offer alternative assessments? What new ideas could you try?
* [How do Rubrics Help?](http://www.edutopia.org/assessment-guide-rubrics) **Question(s) to guide your understanding:** How can you make sure your learning rubrics are targeting the intended learning goals?
* [UDL Theory and Practice: Provide Multiple Means of Action and Expression](http://udltp.cast.org/reading?loc=chapter3.xml_l20) (p. 55)

**Question(s) to guide your understanding:** How can providing students with options for expression help them learn what strategies work best for them in different contexts?

* [UDL Guidelines – Multiple Means of Action and Expression (National Center for UDL)](http://www.udlcenter.org/aboutudl/udlguidelines/principle2) **Question(s) to guide your understanding:** What research and resources can you find that support your thinking about math lesson design and options for action & expression?

####  Try It: Session Activity:

**Lesson Analysis:**

* Choose a lesson you are doing this week or observe a part of a colleague’s lesson or use the lesson listed below:
	+ - **Math:** Adjustable Spinner from the Project Interactivate website: <http://www.shodor.org/interactivate/activities/AdjustableSpinner/>
* Identify the target learning goal or objective (related to math content).
* Use the [UDL Guidelines Lesson Analysis Worksheet for Action and Expression](http://sde.ok.gov/sde/sites/ok.gov.sde/files/Guidelines_2.0_Educator_Worksheet_0-2.pdf) to **add at least one additional option for Action & Expression to your lesson to reduce a barrier for students to achieve the intended goal.** For example, you could add an additional option for students to show what they know (such as build a model, make a video, diagram their process), an additional option for students to express their understanding (such as summarize, use a graphic organizer, or move to different stations), an additional option to support executive function (such as set a personal goal, have a checklist to monitor progress, etc), an alternative assessment, or a rubric for group or project work.
* Observe how this new component of your lesson impacted students learning. How did students use the option? How do you think it supported variability in action & expression and supported the intended math-learning objective?

**Synthesis: Online Discussion**

Post a reflection to your lesson analysis. What did you do differently? What did you observe? Be sure you included the goal for the lesson and which UDL Action & Expression guideline you focused on for this lesson. How did you use the Multiple Means of Action & Expression to infuse at least one option into the learning environment to support the target math learning goals and objectives and to support the variability of student strategic networks?

How is offering Multiple Means of Action & Expression challenging for math, specifically? How can having options for physical action and expression & communication lead to higher level, intrinsic learning such as executive function? What additional barriers related to action and expression do you still think about in terms of your math classroom?

Optional discussion: Is it possible to assess learners equitably when they use multiple means of action and expression to show what they know? What are some options for assessments that you can provide that are still rigorous?

**NOTE:** Be sure to explore and apply the concepts you are learning from the readings, the activities, and your own experience in answering the questions, include what resonated with you and/or what you found puzzling, are wondering or curious about as a result of the new information. Finally, be sure to include how you think you can apply what you have learned in your practice.

You can construct your discussion post using a video (such as [Vimeo](https://vimeo.com/)), audio (such as [Vocaroo](http://vocaroo.com/)), upload a document or Power Point that has images or tables, or use the written format.

**Community Contribution**

Post at least one resource to the community site (such as Padlet or Google drive) that supports the UDL Guideline Multiple Means of Action & Expression that you find useful or valuable to support the variability of learners into tier one general education classrooms.

#### Survey:

At this point in the course, take another poll (see link on Blackboard) to give your instructor some feedback on how the course is going so far answering the following questions:

* Overall, how do you feel about the course so far? (scale of 1-10)
* Do you feel that you are getting: enough, too much or not enough feedback?
* Do you feel that the feedback is instructive enough to be helpful in improving your work in the discussions afterward? If not, how can it be improved?
* Do you feel the interaction in the discussions is helping you to think more deeply about the content?

### Session 10: Learner Variability in the Affective Networks in Math

This session will explore affective networks, parts of the brain involved in motivation and engagement in learning. You will explore the variability that exists in how individuals’ recruit interest and how individuals are challenged, motivated, and persistent - especially in math-related contexts. These networks are important for developing and sustaining interest and attention for learning in all subjects, but focus for this discussion will be on math. There are often preconceived notions of being “good” or “bad” at math that needs to be addressed for building expert learners in math.

#### Session Goals:

Participants will be able to explain how the affective networks of the brain are involved in motivation and engagement, especially related to math.

Participants will be able to describe the way that affective networks vary across individuals and the challenges that this presents for educators, especially related to math anxiety and stereotype threat.

#### Build Background - Session Materials:

Choose at least two of the following to build background:

* “[We Feel, Therefore We Learn: The Relevance of Affective and Social Neuroscience to Education](http://www-bcf.usc.edu/~immordin/papers/Immordino-Yang%2BDamasio_2007_RelevanceofNeurotoEdu.pdf),” Immordino-Yang, M.H. & Damasio, A. in Mind, Brain, and Education. (2007). Volume 1, Number 1. (PDF download)

**Question(s) to guide your understanding:** How is emotion tied to cognition?

* [Math Anxiety: Can Teachers Help Reduce It :](http://www.aft.org/sites/default/files/periodicals/beilock.pdf)**[Question(s) to guide your understanding:](http://www.aft.org/sites/default/files/periodicals/beilock.pdf)** [What is math anxiety? How can you look for it or recognize it?](http://www.aft.org/sites/default/files/periodicals/beilock.pdf)
* [When the Classroom Feels Hostile](https://www.gse.harvard.edu/news/uk/15/08/when-classroom-feels-hostile):

**Question(s) to guide your understanding:** What are subtle ways students may feel “threat” in the classroom environment? How can having flexible workspaces support variability in the perception of these threats?

* [CAST Top 5 Tips to mitigate Stereotype Threat](http://castprofessionallearning.org/project/top-5-udl-tips-for-reducing-stereotype-threat/):
**Question(s) to guide your understanding:** What do you do in your classroom to mitigate stereotype threat?
* [“Kids Master Mathematics When They’re Challenged but Supported”](http://www.edutopia.org/math-underachieving-mathnext-rutgers-newark) **Question(s) to guide your understanding:** How can you offer options for the cognitive demands, but still have a high level of challenge and rigor?
* [UDL Theory and Practice: Affective Networks](http://udltp.cast.org/reading?loc=chapter2.xml_l1969929) (pp. 33-36)

**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?

#### Try It: Session Activity

Try one of the [Tips to mitigate stereotype threat](http://castprofessionallearning.org/project/top-5-udl-tips-for-reducing-stereotype-threat/) in one of your lessons this week. Reflect on what you observe that is different when you integrated this tip into your learning environment. What do you observe in students in terms of learning, behavior, or persistence?

#### OR

Making math relevant is essential for motivation, self-reflection, and learning in math. Often math students ask, “why do I have to learn this.” Take one of your lessons this week and think specifically about making the lesson more relevant. What did you do to make the lesson authentic and/or relevant?. Be sure to also connect your strategies to recruit interest to your learning goal so it is supported by authentic, relevant examples you offer (e.g., this may include thinking about culturally relevant materials).

**Synthesis: Online Discussion**

What strategy did you try or did you do this week to mitigate stereotype threat OR to make a math concept more relevant? How does this strategy address the variability in engagement in your class? How does this strategy support high level learning concepts and goals for the math lesson? What worked well, what did not?

OR

How do you think educators can impact motivation and engagement in math? Reflect back to your stated challenging focus area. In what ways do you see stereotype threat in math having a role in your challenge focus area? How do you see UDL to be a framework to mitigate or to design to support this challenge focus area? Do stereotype threat or math anxiety play a role?

**NOTE:** Be sure to explore and apply the concepts you are learning from the readings, the activities, and your own experience in answering the questions, include what resonated with you and/or what you found puzzling, are wondering or curious about as a result of the new information. Finally, be sure to include how you think you can apply what you have learned in your practice. You can construct your discussion post using a video (such as [Vimeo](https://vimeo.com/)), audio (such as [Vocaroo](http://vocaroo.com/)), upload a document or Power Point that has images or tables, or use the written format.

#### Community Contribution

Review, reflect, and respond to two other participants’ posts this week. Include a deeper discussion of how the role of feedback on engagement and motivation. Share specific ideas you have for ways you can offer meaningful feedback that influence student motivation and engagement – and ultimately learning.

### Session 11: Multiple Means of Engagement and Math Learning

This session connects learner variability in the affective networks with the UDL Engagement 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 in their math learning environments and curricula (goals, assessments, methods, and materials). During this session you will identify barriers to learner engagement in math and suggest options for learning that recruit interest, sustain effort and persistence, and promote self-regulation in a math lesson or learning environment.

#### Session Goals:

* Participants will be able to explain how the UDL principle: Multiple Means of Engagement helps educators address the variability in learners’ affective networks in a math lesson and build more expert math learners.
* Participants will demonstrate understanding of how the principle Multiple Means of Engagement can be used as a lens to evaluate curricula for barriers and elements of UDL towards high level learning goals in math.

#### Build Background - Session Materials:

Choose at least two of the following to build background:

* [UDL guidelines – Multiple Means of Engagement](http://www.udlcenter.org/aboutudl/udlguidelines/principle3). UDL Guidelines. CAST (2013).
**Question(s) to guide your understanding:** What does UDL mean by developing expert learners? See also, [UDL Guidelines Structure](http://www.udlcenter.org/resource_library/videos/udlcenter/udl#video1)
* [Engagement and Mathematics: What it means and what it looks like](http://files.eric.ed.gov/fulltext/EJ978128.pdf):
**Question(s) to guide your understanding:** How do the authors look for engagement in math lessons? How do they define motivation and engagement?
* [Engaging Students in Math](http://www.edutopia.org/blog/engaging-students-in-math-jose-vilson)
**Question(s) to guide your understanding:** Which of these strategies do you already use? Which ones do you think you could incorporate into lessons? How do they align with the UDL guidelines?
* [Importance of Self Regulation in the Classroom](https://www.kaplanco.com/blog/post/2013/11/05/The-Importance-of-Self-Regulation-in-the-Classroom.aspx)
**Question(s) to guide your understanding:** What is self-regulation? How is it important for learning? How can you design for it in a lesson or classroom?
* [UDL Theory and Practice: Provide Multiple Means of Engagement (pp. 52-53)](http://udltp.cast.org/reading?loc=chapter3.xml_l8)

**Questions to guide your understanding:** How does the UDL principle Multiple Means of Engagement help educators address learner variability in the affective networks of learners?

* [Developing Young Children’s Self-Regulation](http://www.naeyc.org/files/yc/file/201107/Self-Regulation_Florez_OnlineJuly2011.pdf):
**Question(s) to guide your understanding:** What is self-regulation? How is it important for learning? How can you design for it in a lesson or classroom?

#### Try It: Session Activity

**Lesson Analysis:**

* Choose a lesson you are doing this week or observe a part of a colleague’s lesson or use the lesson listed below:
	+ - **Math:** Adjustable Spinner from the Project Interactivate website: <http://www.shodor.org/interactivate/activities/AdjustableSpinner/>
* Identify the target learning goal or objective (related to math content).
* Use the [UDL Guidelines Lesson Analysis Worksheet for Engagemen](http://sde.ok.gov/sde/sites/ok.gov.sde/files/Guidelines_2.0_Educator_Worksheet_0-2.pdf)t to **add at least one additional option for Engagement to your lesson to reduce a barrier for students to achieve the intended goal.** For example, you could add an additional option to recruit student interest and make the content authentic and relevant. Clarify the goals and offer additional resources to meet the demands. You could offer mastery-oriented feedback in a new way or offer an option for students to self-reflect on their learning and progress in the lesson that day.
* Observe how this new component of your lesson impacted students learning. How was the resource used? How do you think it supported variability in engagement through the UDL framework?

**Synthesis: Online Discussion**

Post a reflection to your lesson analysis. What did you do differently? What did you observe in your students and their math learning? Be sure you included the goal for the lesson and which UDL Engagement guideline you focused on for this lesson. How did you use the Multiple Means of Engagement to infuse an option into the learning environment to support the target math learning goals and objectives?

How is offering Multiple Means of Engagement challenging for math, specifically? Is it possible to challenge learners when using Multiple Means of Engagement? How can you recruit interest through authentic relevant examples and offer mastery-oriented feedback to build higher level, intrinsic learning such as self-regulation for math learning?

What additional barriers related to engagement do you still think about in terms of your math classroom?

**Community Contribution**

Post at least one resource to the online site (such as Padlet or Google drive) that supports the UDL Guideline Multiple Means of Engagement that you find useful or valuable to support the variability of learners into tier one general education classrooms.

### Session 12: The UDL Lesson Planning Process and Your Challenging Math Focus Area

This session consists of practical applications of the UDL framework to instructional practice by reviewing the UDL Lesson Planning Process and offering the opportunity to make final connections to the math focus area you identified as a challenge. This session unpacks the four elements of curriculum, which CAST defines as goals, assessments, methods and materials. 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. It is also possible to offer assessments that purposefully and sometimes flexibly measure the intended learning goal(s).

#### Session Goals:

* Participants will be able to support the goals, methods, materials, and assessments in a math lesson plan using the UDL Guidelines using resources and ideas from discussions and resources they have gained in this course.
* Participants will reflect on how UDL can be a framework that can inform their identified challenging focus area.
* Participants will reflect on what it means to be an expert math learner and how UDL supports students to become more purposeful, strategic, and engaged.

#### Build Background - Session Materials:

 Choose at least two of the following resources to build background:

* [UDL Theory and Practice, Designing for All: What is a UDL Curriculum?](http://udltp.cast.org/reading?loc=chapter5.xml_l1970046) (pp. 68-83)
**Question(s) to guide your understanding:** How does UDL define curricula? What does this include in your learning environment?
* [What does it mean to say the curricula are Disabled?](http://www.udlcenter.org/aboutudl/udlcurriculum/disabledcurricula)
Question(s) to guide your understanding: Focus on changing the learning environment (not the learner) is central to UDL. How has this concept evolved or changed for you during this course?
* [Explore some Math-related tools and resources:](http://udltechtoolkit.wikispaces.com/Math%2Btools)
**Question(s) to guide your understanding:** What tools and resources are “must haves” that you can share with others in this course? What tools and resources will you try?
* Review the PAL Process Summary page (available on Bb).

#### Try It: Session Activity:

* Review the online resource site (such as Padlet of Google drive) for this course that we have been developing related to math resources that align with the UDL guidelines. What is one that you want to try in a lesson this week?

OR

* Review the [Math K-5 math](http://www.theudlproject.com/math-k-5.html) lessons. From what you have learned in this UDL course, what could be improved in this UDL informed lesson? Is the learning goal clear for each part of the lesson so that purposeful UDL options for representation, action & expression, and engagement are infused?

**Synthesis: Online Discussion**

Reflect on expert learning: Now that you have almost completed the course, think about the readings and activities for this week in light of everything you have learned, the discussions we have had, and the resources we have built. Have your ideas about the ability of the curricula to meet the needs of all learners in your math class changed? How so? How does the design of curricular materials support expert learners?

OR

Reflect on sharing with your school: How do you see what you learned related to math classrooms may overlap with other content areas, such as literacy, graphing, assessments, or other areas? How will lesson examples (for example, from the Try It Activities) that you have gathered from your math class be able to be shared with others in your school as exemplars that support learner variability? Be sure to reflect on your experiences in the readings and activities and incorporate that into your answer.

OR

Reflect on lesson design: 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 math educators. What challenges are unique to math classrooms? Return to your focus area. Offer a brief summary of how you now intend to design and plan to address this focus area. How can UDL support educators to design learning experiences- in the classroom and in the curricula- and that address challenges for math? Be sure to reflect on your experiences in the readings and activities and incorporate that into your answer.

**NOTE:** Be sure to explore and apply the concepts you are learning from the readings, the activities, and your own experience in answering the questions, include what resonated with you and/or what you found puzzling, are wondering or curious about as a result of the new information. Finally, be sure to include how you think you can apply what you have learned in your practice. You can construct your discussion post using a video (such as [Vimeo](https://vimeo.com/)), audio (such as [Vocaroo](http://vocaroo.com/)), upload a document or Power Point that has images or tables, or use the written format.

**Community Contribution**

Review, reflect, and respond to two other participants’ posts this week. Include a deeper discussion of how the role of feedback on engagement and motivation. Share specific ideas you have for ways you can offer meaningful feedback that influence student motivation and engagement – and ultimately learning.

### Session 13: Putting it All Together: Application

In this session, you will choose a lesson you’ve taught, or observed, or from a website (suggested below), analyze it using all of the UDL Guidelines, and create a plan for adjusting or revising the lesson to better address the learner variability in your math classroom to achieve the high level learning goals that are targeted for that lesson. Use the instructions below for details.

#### Session Goals:

* Participants will demonstrate the ability to use the UDL framework to analyze and evaluate math lessons and learning environments proactively in a tier one general education setting for barriers and elements of UDL.
* Participants will demonstrate the ability to use the UDL framework to improve the lesson design to address learner variability and support the development of expert math learners.

#### Build Background - Session Materials:

Choose at least one new digital resource to explore:

* Optional: [Introduction to UDL Exchange](http://udlexchange.cast.org/home). Watch “What is CAST UDL Exchange?” Go to: [UDL Exchange Feature Guide](http://udlexchange.cast.org/getstarted). Read the UDL Exchange Feature Guide. UDL Exchange is a place to **browse and build** resources, lessons and collections. You can use and share these materials to support instruction guided by the UDL principles.
* [UDL BookBuilder](http://bookbuilder.cast.org/) or [UDL Studio](http://udlstudio.cast.org/): Explore these sites as optional platforms to post and share your final project.
* [PowToon](https://www.powtoon.com/), [Vocaroo](http://vocaroo.com/), [Vimeo](https://vimeo.com/home), [Prezi](https://prezi.com/): Explore these sites as optional platforms to post and share your final project.

**Try It: Session Activity**

The Try It session activity this week is to work on your final assignment.

#### Final Assignment:

**Directions:**

1. **CHOOSE** a lesson you’d like to adjust or revise to better meet the needs of the learner variability in your math classroom. This can be a lesson you’ve observed or taught yourself, or you can pick one from the following websites:
	1. [Illuminations](http://illuminations.nctm.org/) (Math)
	2. [Thinkfinity](http://www.readwritethink.org/about/news/explore-thinkfinity-24.html) (Other lesson sites including arts, economy and more)
2. **IDENTIFY the GOAL:** identify the target math goal. Note that this should include a cognitive math goal (what you want students to learn related to math content) and an affective or behavioral goal that might relate to your identified focus area (such as participate in group learning, persist through a challenging problem, etc.)
3. **EVALUATE** the existing lesson:
	1. Indicate the goals, methods, materials, and assessments used in the original lesson. \*Note the importance of the goal- and how your changes to the goal may change the way you think about the resources you incorporate into the lesson and learning environment.
	2. Using the UDL Guidelines and their associated checkpoints ([Provide Multiple Means of Engagement, Provide Multiple Means of Representation and Provide Multiple Means of Action & Expression](https://sites.google.com/site/udlguidelinesexamples/)), describe which checkpoints are present. Reflect on where there may still be barriers to the learning.
4. **DESIGN** the new lesson: Develop a plan for how you might adjust or revise the lesson.
	1. Describe how you will adjust the goals, assessments, methods and materials in the revised lesson **and how these changes address and support learner variability towards the identified goals.**
	2. Explain which checkpoints will be included or revised in the lesson. **NOTE:** Designing instruction is a thoughtful process. All choices should be made deliberately as a means of helping learners achieve the instructional goal. Although it is not necessary for all checkpoints to be addressed in any particular lesson, each checkpoint should be considered in terms of how it might reduce barriers towards the intended learning goal.
5. **SUMMARIZE**: Provide a summary of your redesigned lesson; include the challenges you might encounter in the revised lesson and ideas about how you will address those challenges.
6. **SHARE** your work: The way you choose to present your work is up to you, but remember that the purpose of this assessment is for you to demonstrate your understanding of how to use the UDL framework. Be sure that the medium you choose is selected carefully and set up to clearly to demonstrate your understanding. Choose **ONE** of the options below, or email your instructor to discuss alternatives:
	* Fill out the guided UDL worksheet
	* Use [UDL Exchange](http://udlexchange.cast.org/browse.3) (a tool for developing UDL lessons) or Padlet ([www.padlet.com](http://www.padlet.com))
	* Create a PowerPoint or [Prezi](http://www.prezi.com) presentation (no longer than 10 slides or transitions).
	* Create a [Glogster](http://www.glogster.com) web poster.
	* Create a wiki or website.
	* Produce a video (no longer than 5 minutes).
	* Write a paper (no longer than 5 pages).
	* [UDL BookBuilder](http://bookbuilder.cast.org/) or [UDL Studio](http://udlstudio.cast.org/):
	* [PowToon](https://www.powtoon.com/), [Vocaroo](http://vocaroo.com/), [Vimeo](https://vimeo.com/home)

**NOTE:** See the rubric for the criteria that your instructor will use to assess your work.

**Optional (not graded) Online Discussion**

Post questions about the final assignment, readings, etc. to the Cafe Forum this week. Check to see if you can help answer any of your peers’ questions.

#### Additional Resources:

* Meo G. (2008). [Curriculum planning for all learners; applying universal design for learning (UDL) to a high school reading comprehension program](http://www.udlcenter.org/sites/udlcenter.org/files/CurriculumPlanningforAllLearners_0.pdf). Preventing School Failure 52(2), 21-30.
* [Beyond the Text](http://www.csb-cde.ca.gov/Documents/Electronic%20Book%20Access%20Handout.doc): Comparison chart of e-book and digital talking book (DTB) hardware and software.

### Session 14: Final Session: Face to face session with optional video

This video session is intended review the course, including the UDL framework and focus areas related to math that were discussed. It will serve as a way to share final projects, reflections about the identified focus area challenges and to highlight the resources and strategies that were built throughout the course.

### Session Goals:

### Participants will understand that the UDL guidelines are levers for addressing learner variability and supporting the development of expert learners in math.

### Participants will showcase highlights from their lessons through an online platform (such as Padlet or Google drive) with the growing community of practice.

**Synthesis: Online Discussion**

Following the final face to face (or video streamed) session, please post a short reflection to the course discussion forum answering the following: 1) What have you learned about UDL that you did not already know and that has helped you think specifically about math learning and/or your math classroom? 2) How has your learning process that you experienced in this course impacted your perspective of your students and variability in learning in math? 3) Are there any questions that you have at this point in the course?

**Assignment:**

Your final project is due to your facilitator next week.