Connecticut Core Standards for Mathematics

Grades 6–12

Systems of Professional Learning

Table of Contents

Today's Agenda

Morning Session

- Welcome and Introductions

- Sharing Implementation Experiences

- Building a Teaching and Learning Framework through Universal Design for Learning (UDL)

- Teaching and Learning with the UDL Principles

Afternoon Session

- Supporting Teachers with UDL

- Assessing Learning Progress

- Students' Role in the Formative Assessment Process

- Moving Forward with the CCS-Math Implementation

- Next Steps

Post-Assessment, Session Evaluation, and Wrap Up

Introductory Activity

Introductory Activity

Pre-Assessment–CCS-Math

Instructions: Check the box on the scale that best represents your knowledge or feelings about implementing the Connecticut Core Standards for Mathematics (CCS-Math) in your classroom.

Self-Assessment Questions	Strongly Disagree	Disagree	Agree	Strongly Agree
	1	2	3	4
I am familiar with the Principles of Universal Design for Learning and the importance of flexibility and removing barriers to instruction.				
I understand the importance of incorporating UDL practices into lessons.				
I understand the difference between assessments of learning and assessments for learning.				
I know how to use formative assessment practices to make decisions about the next steps in instruction.				
I have a plan to support the implementation of the CCS-Math in my school and have identified solutions to potential challenges.				

Section 1

Section 1: Sharing Implementation Experiences

Moving Forward with the Content Standards

Instructions: Discuss with your table group one positive highlight, one challenge, and one lesson learned from your personal implementation of the Content Standards thus far. Each table group will then determine two positive highlights, one common challenge, and one common lesson learned that they will present to the larger group. Use the space on the next page to record "new ideas" generated during the sharing of experiences implementing CCS-Math Content Standards.

Positive Highlights

Ongoing Challenges

Lessons Learned

New Ideas for Implementing the CCS-Math Content Standards

Instructions: Use the space below to record "new ideas" generated during the sharing of experiences implementing CCS-Math Content Standards.

New Ideas

Section 2

Section 2: Building a Teaching and Learning Framework through UDL
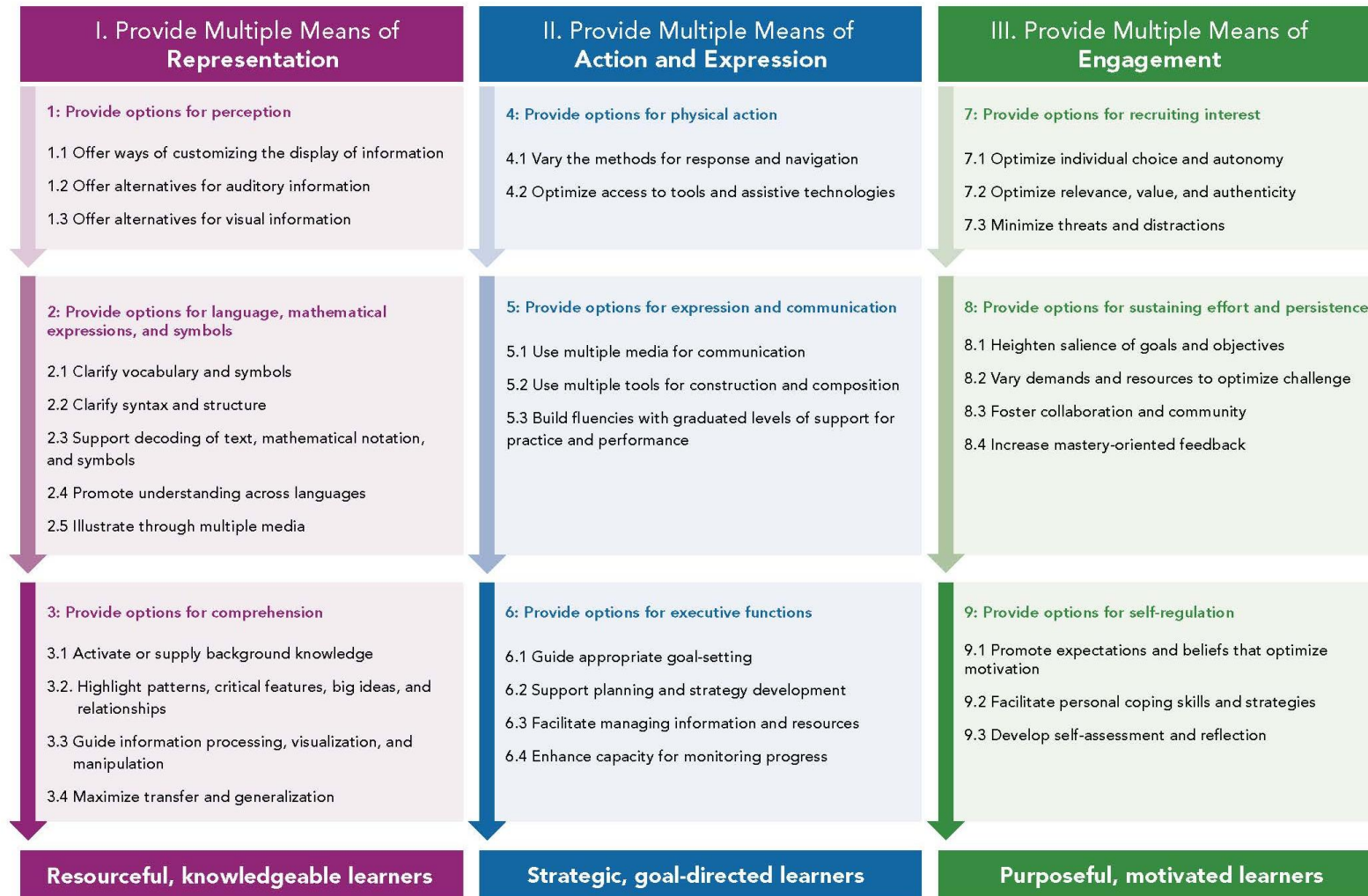
What is Universal Design for Learning?

Instructions: *Use the space below to take notes on the foundations of Universal Design for Learning.*

The UDL Principles		
Principle 1: Provide Multiple Means of Representation	**Principle 2:** Provide Multiple Means of Action and Expression	**Principle 3:** Provide Multiple Means of Engagement

Universal Design for Learning Guidelines

***Instructions**: Use the chart below as a reference for the Principles, Guidelines, and Checkpoints of Universal Design for Learning.*

I. Provide Multiple Means of **Representation**	II. Provide Multiple Means of **Action and Expression**	III. Provide Multiple Means of **Engagement**
1: Provide options for perception 1.1 Offer ways of customizing the display of information 1.2 Offer alternatives for auditory information 1.3 Offer alternatives for visual information	**4: Provide options for physical action** 4.1 Vary the methods for response and navigation 4.2 Optimize access to tools and assistive technologies	**7: Provide options for recruiting interest** 7.1 Optimize individual choice and autonomy 7.2 Optimize relevance, value, and authenticity 7.3 Minimize threats and distractions
2: Provide options for language, mathematical expressions, and symbols 2.1 Clarify vocabulary and symbols 2.2 Clarify syntax and structure 2.3 Support decoding of text, mathematical notation, and symbols 2.4 Promote understanding across languages 2.5 Illustrate through multiple media	**5: Provide options for expression and communication** 5.1 Use multiple media for communication 5.2 Use multiple tools for construction and composition 5.3 Build fluencies with graduated levels of support for practice and performance	**8: Provide options for sustaining effort and persistence** 8.1 Heighten salience of goals and objectives 8.2 Vary demands and resources to optimize challenge 8.3 Foster collaboration and community 8.4 Increase mastery-oriented feedback
3: Provide options for comprehension 3.1 Activate or supply background knowledge 3.2. Highlight patterns, critical features, big ideas, and relationships 3.3 Guide information processing, visualization, and manipulation 3.4 Maximize transfer and generalization	**6: Provide options for executive functions** 6.1 Guide appropriate goal-setting 6.2 Support planning and strategy development 6.3 Facilitate managing information and resources 6.4 Enhance capacity for monitoring progress	**9: Provide options for self-regulation** 9.1 Promote expectations and beliefs that optimize motivation 9.2 Facilitate personal coping skills and strategies 9.3 Develop self-assessment and reflection
Resourceful, knowledgeable learners	**Strategic, goal-directed learners**	**Purposeful, motivated learners**

CAST

Universal Design for Learning Guidelines Worksheet

Instructions: *Use the space below to organize your findings around your assigned guideline and to make notes about the other eight guidelines as they are presented.*

Guideline 1: Provide options for perception	
Explanation	Examples

Guideline 2: Provide options for language, mathematical expressions, and symbols	
Explanation	Examples

Guideline 3: Provide options for comprehension	
Explanation	Examples

Guideline 4: Provide options for physical action	
Explanation	Examples

Guideline 5: Provide options for expression and communication	
Explanation	Examples

Guideline 6: Provide options for executive functions	
Explanation	Examples

Guideline 7: Provide options for recruiting interest	
Explanation	Examples

Guideline 8: Provide options for sustaining effort and persistence	
Explanation	Examples

Guideline 9: Provide options for self-regulation	
Explanation	Examples

Section 3

Section 3: Teaching and Learning with the UDL Principles

Identifying UDL Strategies–Video Observation

Instructions: As you watch the video, Conjecturing About Functions, look for the instructional strategies being used to address the UDL Principles. Record the teacher actions and student actions you observed.

Note: The video can be found here: https://www.teachingchannel.org/videos/conjecture-lesson-plan.

Did you see evidence of the following and if so, what was the teacher doing and what were the students doing?

Principle	Strategy Used
Principle 1: Provide Multiple Means of Representation	
Principle 2: Provide Multiple Means of Action and Expression	
Principle 3: Provide Multiple Means of Engagement	

Geometry Performance Task

Instructions: Use the following information as you discuss the geometry performance task on the next page.

Task Description: This performance task asks students to visualize geometric shapes, identify plane figures and their attributes, prove triangles are congruent, determine the area of quadrilaterals, make geometric conjectures, and justify geometric arguments.

Standards being addressed:

G.CO.10: Prove theorems about triangles. Theorems include: measures of interior angles of a triangle sum to 180°; base angles of isosceles triangles are congruent; the segment joining midpoints of two sides of a triangle is parallel to the third side and half the length; the medians of a triangle meet at a point.

G.SRT.5: Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

*G.CO.6: Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.

*G.CO.7: Use the definition of congruence in terms of rigid motions to show that two triangles are congruent if and only if corresponding pairs of sides and corresponding pairs of angles are congruent.

*G.CO.9: Prove theorems about lines and angles. Theorems include: vertical angles are congruent; when a transversal crosses parallel lines, alternate interior angles are congruent and corresponding angles are congruent; points on a perpendicular bisector of a line segment are exactly those equidistant.

*Depending on the student's solution path they may not demonstrate understanding of these standards.

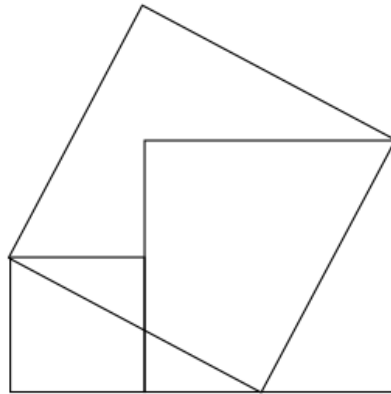**SMP 1:** Make sense of problems and persevere in solving them.

SMP 3: Construct viable arguments and critique the reasoning of others.

SMP 6: Attend to precision.

Company Logo
From NYC Department of Education

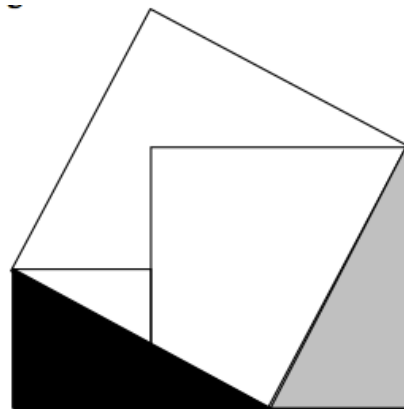A company has designed a new logo using overlapping squares.

1. How many squares do you see in the logo? _____
    Describe where you see the squares.

2. The logo designer colored two triangles in the logo.

    How are the two triangles related? Justify
    your answer.

3. What are the relationships between the
    sizes of the three squares in the original logo? Explain your findings.

Grade High School Math
Company Logo
Common Core Learning Standards/Universal Design for Learning
From NYC Department of Education

Below are some ideas of how this Common Core Task is aligned with the three principles of UDL; providing options in representation, action/expression, and engagement. As UDL calls for multiple options, the possible list is endless. Please use this as a starting point. Think about your own group of students and assess whether these are options you can use.

REPRESENTATION: *The "what" of learning.* How does the task present information and content in different ways? How students gather facts and categorize what they see, hear, and read. How are they identifying letters, words, or an author's style?

In this task, teachers can...

Make explicit links between information provided in texts and any accompanying representation of that information in illustrations, equations, charts, or diagrams by reviewing mathematical definitions and have the students create accompanying examples.

ACTION/EXPRESSION: *The "how" of learning.* How does the task differentiate the ways that students can express what they know? How do they plan and perform tasks? How do students organize and express their ideas?

In this task, teachers can...

Use social media and interactive web tools (e.g., discussion forums, chats, web design, annotation tools, storyboards, comic strips, animation presentations) by asking students to find examples of logos and advertisements, as well as incorporate software to identify, measure, and manipulate geometric shapes.

ENGAGEMENT: *The "why" of learning.* How does the task stimulate interest and motivation for learning? How do students get engaged? How are they challenged, excited, or interested?

Optimize relevance, value and authenticity by including activities that foster the use of imagination to solve novel and relevant problems, or make sense of complex ideas in creative ways**.**

Note: This activity can also be accessed from Connecticut Core Standards website**:**
http://ctcorestandards.org/?page_id=2016

Instructions: Use the chart below to record at least one option that might be provided when implementing the Company Logo task to address each of the nine UDL guidelines.

Provide Multiple Means of Representation	Guideline 1	
	Guideline 2	
	Guideline 3	
Provide Multiple Means of Action & Expression	Guideline 4	
	Guideline 5	
	Guideline 6	
Provide Multiple Means of Engagement	Guideline 7	
	Guideline 8	
	Guideline 9	

Outlining a Lesson

Instructions: Use the questions below to guide your thinking as you plan a lesson outline around an identified set of CCS-Math Standards.

Questions to Guide Your Thinking
Adapted from NYC Department of Education

Concepts and Skills to Consider

- What *CCS-Math Standard(s)* for this grade is/are being addressed?

- What task is being used in the lesson?

- What concepts does the student need to know—*so that they will be able to complete the task successfully?*

- How will I prepare students who have not yet mastered these concepts—*so that they will be able to complete the task successfully*?

- What concepts will the student learn after the completion of task?

- What prerequisite skills does the student need to have mastered—*so that they will be able to complete the task successfully*?

- How will I prepare students who have not yet mastered these skills—*so that they will be able to complete the task successfully*?

- What new skills will the students have mastered upon completion of the task?

Provide Multiple Means of Representation

- How am I going to ensure that key information is equally perceptible by **all** students—*so that they will be able to complete the task/unit successfully?*

- How am I going to ensure accessibility, clarity, and comprehensibility for **all** students—*so that they will be able to complete the task/unit successfully?*

- How am I going to provide the necessary scaffolds to ensure that **all** students have access to knowledge and can assimilate new information—*so that they will be able to complete the task/unit successfully?*

Provide Multiple Means of Action and Expression

- Have materials been provided with which all students can interact, navigate, and express what they know—*so that they will be able to complete the task/unit successfully?*

- Have I provided alternative modalities for expression, to level the playing field and to allow all students the opportunity to express knowledge, ideas, and concepts in the learning environment—*so that they will be able to complete the task/unit successfully?*

- How have I provided necessary strategies and scaffolds for students to be more plan-full and strategic—*so that they will be able to complete the task/unit successfully?*

Provide Multiple Means of Engagement

- Have I provided alternative ways to recruit student interest, ways that reflect inter- and intra-individual differences among students—*so that they will be able to complete the task/unit successfully?*

- Have I provided options for students who differ in motivation and self-regulation skills—*so that they will be able to complete the task/unit successfully?*

- Have I provided alternatives to support students with different aptitudes and prior experience to effectively manage their own engagement and affect—*so that they will be able to complete the task/unit successfully?*

Section 4

Section 4: Supporting Teachers with UDL

Goal Setting and Next Steps

Instructions: *Use the chart below to set goals for teachers around UDL and to plan the steps needed to help teachers meet the goal.*

Key Idea of UDL

Implementation Goal 1

Steps to take to help teachers with meeting the goal

Key Idea of UDL

Implementation Goal 2

Steps to take to help teachers with meeting the goal

Additional Resources

Instructions: *Use the resources below to further your understanding about Universal Design for Learning.*

- Center for Applied Special Technology http://www.cast.org

- National Center on Universal Design for Learning http://www.udlcenter.org/

- The Universal Design for Learning Implementation and Research Network http://udl-irn.org/

- NYC Tasks, Units, & Student Work
  http://schools.nyc.gov/academics/commoncoreLibrary/tasksUnitsStudentWork/default.htm

Reflect

Instructions: *Answer the questions below as you reflect on your own CCS-Math implementation and your work with teachers at your school.*

1. What questions and/or concerns do you anticipate coming from the teachers you work with?

2. What are teachers doing now that you want to build off of as you introduce UDL?

Section 5

Section 5: Assessing Learning Progress

7.RP Track Practice

Instructions: *Solve the task below. Work first by yourself and then with your group. Be ready to present your solution strategy.*

7.RP Track Practice
from Illustrative Mathematics

Alignment: **7.RP:** Ratios and Proportional Relationships

Cluster A: Analyze proportional relationships and use them to solve real-world and mathematical problems.

Standard 1: Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.

Angel and Jayden were at track practice. The track is $\dfrac{2}{5}$ kilometers around.

- **Angel ran 1 lap in 2 minutes.**

- **Jayden ran 3 laps in 5 minutes.**

a. **How many minutes does it take Angel to run one kilometer? What about Jayden?**

b. **How far does Angel run in one minute? What about Jayden?**

c. **Who is running faster? Explain your reasoning.**

Identifying UDL Strategies

Instructions: *Identify the UDL strategies that were/can be used when solving the Two Interpretations of Division task.*

What UDL strategies did you observe as you worked on the Two Interpretations of Division task?

Describing Assessment Goals

Instructions: *Use the space provided to describe your goals for classroom assessment.*

What are your goals for assessment?

Assessments 'of' and Assessment 'for' Learning

Instructions: Use the space provided to take notes on Assessments 'of' Learning and Assessments 'for' Learning.

NOTES:

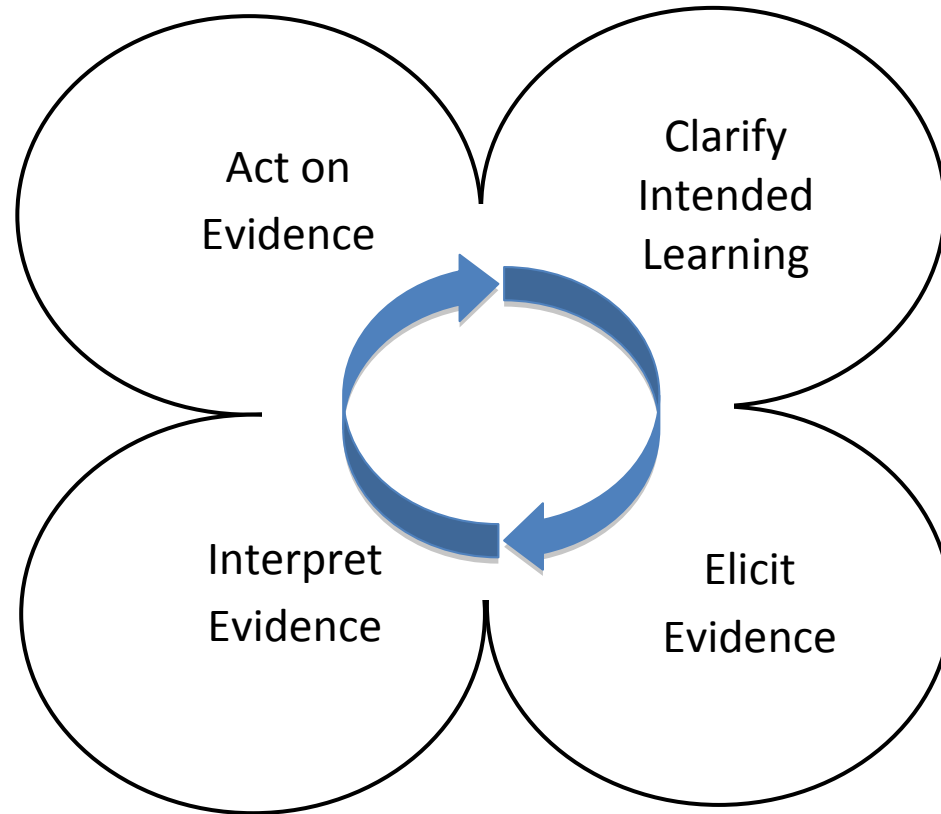| ASSESSMENTS of LEARNING	ASSESSMENTS for LEARNING

Attributes of Formative Assessment

Instructions: *Use the space provided to take notes on the four attributes of formative assessment.*

Four Attributes of Formative Assessment

NOTES:

NOTES:

NOTES:

NOTES:

Act on Evidence

Clarify Intended Learning

Interpret Evidence

Elicit Evidence

Reflecting on Formative Assessment

Instructions: *Reflect on the Track Practice task that you did earlier and the tasks/questioning used in the Conjecturing About Fractions video. Jot down some notes below.*

Were targets and success criteria made clear?

Was the facilitator/teacher effective in eliciting evidence of student learning?

After evidence was interpreted, was actionable feedback given?

Section 6

Section 6: Students' Role in the Formative Assessment Process

Activating Students as Instructional Resources for One Another

Instructions: Review the techniques below to familiarize yourself with strategies that can be used to activate students as instructional resources for one another.

Practical Techniques:

1. **C3B4ME:** Before a student is allowed to ask the teacher for help, assistance must have been sought from at least three other students.

2. **Peer Evaluation of Homework:** Involve students in checking of homework. Possibilities that can be mixed up from day to day: students grade their own (rubric may be needed); students/groups swap papers/notebooks with another student/group.

3. **Homework Help Board:** Students indicate on the board any questions they had about the homework. Students who think they can help students who have questions about the homework are then encouraged to seek those students out and provide help.

4. **Two Stars and a Wish:** When a student gives feedback on another student's work, he has to provide two things he/she thinks were good about the work (the two stars) and a suggestion for improvement (the wish). These comments can be written on sticky notes and collected by the teacher.

5. **End-of-Topic Questions:** The teacher asks, "In your group, decide if there are any questions?" The teacher collects the questions, sorts them quickly, and deals with all the questions on the same issue at the same time.

6. **What Did We Learn Today?:** Break the class into groups 5 minutes before the end of class and ask each group to produce a list of things they have learned during the lesson. Each group then reports one thing they have learned to the class.

7. **Student Reporter:** A student is appointed as a reporter for the lesson. At the end of class, the student gives a summary of the main points of the lesson and tries to answer any questions that students in the class may have. If she/he can't answer the questions, then the reporter asks members of the class to help out.

8. **Preflight Checklist:** If there are a number of requirements for submitted work to satisfy, each student has their work signed off by a buddy who checks that all the required features are present.

9. **Group-Based Test Prep:** To prepare for a test, distribute to each member of a group a card on which a problem is written. The following day, each member presents their solution to the group and the rest of the group decides what needs to be added to the explanation to make it a good one.

Adapted from Wiliam, D. (2011). Embedded Formative Assessment. Solution Tree Press. Bloomington, IN. (pp. 137-144).

Technique Sharing

Instructions: *Answer the questions below and determine which techniques you will bring back to the teachers at your school.*

Students' Role in the Formative Assessment Process

1. Activating students as learning resources for one another.

Which of the techniques indicated do you want to bring back to your setting? Others?

2. Activating students as owners of their own learning.

Which of the techniques indicated do you want to bring back to your setting? Others?

Section 7

Section 7: Moving Forward with the CCS-Math

Needs for Supporting the Implementation of the CCS-MATH

Instructions: Work collaboratively to identify coach and teacher needs around supporting the implementation of the CCS-Math. In the table below, write down implementation and support questions that you have–up to three needs for each stakeholder. You may want to refer back to those challenges you listed at the beginning of this module and support questions that were listed in the previous modules. As a group, write any common needs on a sticky note and place them on the appropriate chart paper.

COACH NEEDS	1.
	2.
	3.
TEACHER NEEDS	1.
	2.
	3.

Closing Activities

Closing Activities

Post-Assessment–CCS-Math

Instructions: Check the box on the scale that best represents your knowledge or feelings about implementing the CCS-Math in your classroom.

Self-Assessment Questions	Strongly Disagree	Disagree	Agree	Strongly Agree
	1	2	3	4
I am familiar with the Principles of Universal Design for Learning and the importance of flexibility and removing barriers to instruction.				
I understand the importance of incorporating UDL practices into lessons.				
I understand the difference between assessments of learning and assessments for learning.				
I know how to use formative assessment practices to make decisions about the next steps in instruction.				
I have a plan to support the implementation of the CCS-Math in my school and have identified solutions to potential challenges.				

Session Evaluation

Thank you for attending today's session. Your feedback is very important to us! Please fill out a short survey about today's session.

The survey is located here: http://surveys.pcgus.com/s3/CT-Math-Module-3-6-12

References

Black, P. & Wiliam, D. (1998). Assessment and classroom learning. *Assessment in Education: Principles, Policy & Practice, 5*(1).

CAST. (2014). *About UDL.* Retrieved from http://www.cast.org/udl/

CAST. (2014). *Universal design for learning guidelines.* Retrieved from http://www.udlcenter.org/sites/udlcenter.org/files/updateguidelines2_0.pdf

Chappuis, J. (2009). *Seven strategies of assessments for learning.* Portland, OR: Educational Testing Service.

Common Core State Standards for Mathematics (2011). Retrieved from http://www.corestandards.org/assets/CCSSI_Math%20Standards.pdf

Council of Chief State School Officers. (2012). Distinguishing Formative Assessment from Other Educational Assessment Labels. Retrieved from http://www.ccsso.org/Documents/FASTLabels.pdf

Illustrative Mathematics. (2014). *7.RP Track Practice.* Retrieved from http://www.illustrativemathematics.org/illustrations/82

National Center on Universal Design for Learning (2014). *UDL guidelines 2.0.* Retrieved from http://www.udlcenter.org/aboutudl/udlguidelines/principle1

New York City Department of Education. (2014). *Company Logo.* Retrieved from http://www.oercommons.org/courses/hs-geometry-company-logo

New York City Department of Education. (2014). *Questions to guide our thinking when creating universally-designed curriculum.* Retrieved from http://schools.nyc.gov/Academics/CommonCoreLibrary/ProfessionalLearning/UDL/default.htm

Scriven, M. (1991). Beyond Formative and Summative Evaluation. In In M. W. McLaughlin & D. C. Phillips, (Eds.), *Evaluation and Education: At Quarter Century*. Chicago: University of Chicago Press.

Stiggins, R. J., Arter, J. A., Chappuis, J., & Chappuis, S. (2007). *Classroom Assessment for Student Learning: Doing it Right–Using it Well*. Upper Saddle River, NJ: Pearson Education, Inc.

Wiliam, D. (2011). *Embedded Formative Assessment*. Bloomington, IN: Solution Tree Press.

Wiliam, D. (2013). Assessment: The bridge between teaching and learning. *Voices from the Middle, 21*(2), 15-20. Retrieved from http://www.ncte.org/library/NCTEFiles/Resources/Journals/VM/0212-dec2013/VM0212Assessment.pdf

Video

Teaching Channel (2014). *Conjecturing About Functions.* Retrieved from: https://www.teachingchannel.org/videos/conjecture-lesson-plan