

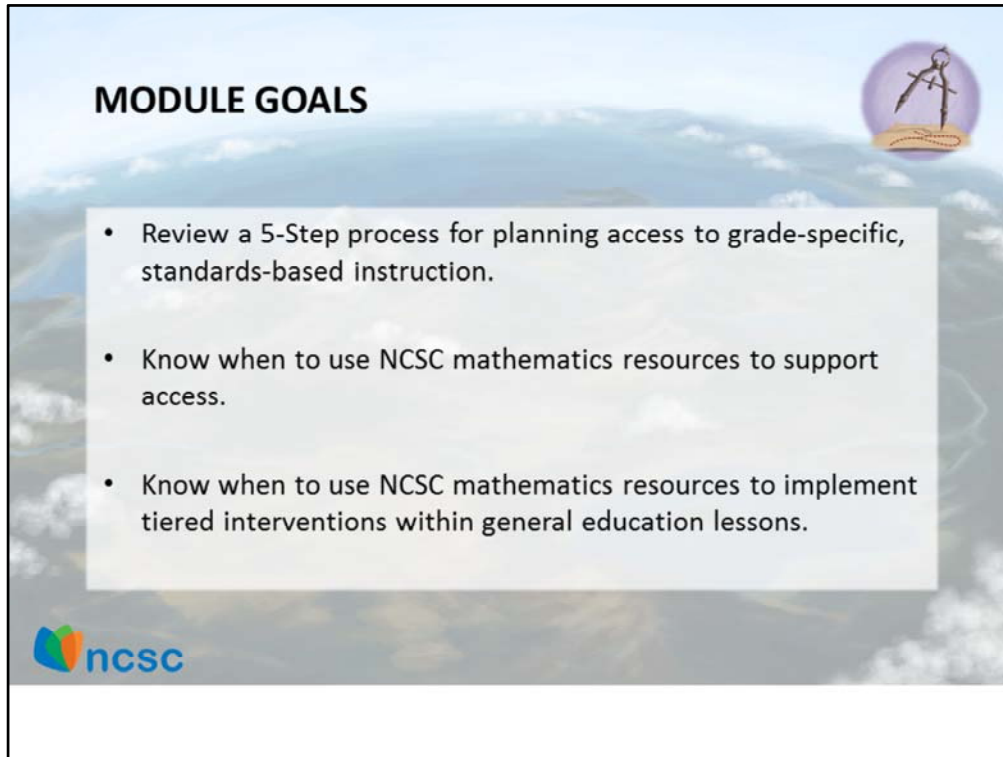
Welcome to the NCSC Developing Mathematics Lessons Using the 5-Step Process module. This module will guide you through a 5-step process for planning access to standards-based math instruction.



This printable PDF version of a NCSC module has been provided for your convenience. The PDF version of the module will be very similar to the online module, with a few revisions to eliminate features that are only necessary in the online learning environment. Because the PDF presentations are the content of the online courses and retain the formatting and some of the features of the modules, we have included the following description.


The NCSC professional development courses each consist of one or more modules. To help the learner navigate in the courses, the modules have a uniform design and format. All learning modules follow four themes: plot the course, explore the terrain, check the map, and expand your horizons. In plot the course learners discover what is covered in the module, including their learning objectives and other steps they will follow while viewing the module. In explore the terrain, the learner will engage with the content and learn about the topic covered in the module. In check the map the learner has the opportunity to review and self-assess their understanding.

Some of the PDF presentations (printable versions of the modules) will not contain Check the Map sections as there are no self-assessments in the printable PDFs. Finally, expand your horizons offers ways in which the learner can explore the content further, or apply what they have learned. Theme Indicators appear on most slides to tell the user what type of content is contained in the slide.



**MODULE GOALS**

- Review a 5-Step process for planning access to grade-specific, standards-based instruction.
- Know when to use NCSC mathematics resources to support access.
- Know when to use NCSC mathematics resources to implement tiered interventions within general education lessons.



This module will help you understand how to use the NCSC Wiki resources and how to use the 5-Step Process to plan instruction. The goals of this module are to:

Review a 5-Step process for planning access to grade-specific, standards-based instruction.

Understand when to use NCSC mathematics resources to support access to and involvement in general education lessons for students with significant cognitive disabilities.

Understand when to use NCSC mathematics resources to implement tiered interventions within general education lessons for students with significant cognitive disabilities.

## RELATED CONCEPTS



Here are some concepts that will be discussed in this module. If you would like background on these concepts, click forward on the playbar. If you are familiar with the concepts and do not need additional background, click on the button labeled skip definitions.

- CCSS – Common Core State Standards or your state standards
- UDL – Universal Design for Learning
- LPF – Learning Progressions Frameworks
- CCC – Core Content Connectors



In this module reference is made to the following concepts:


- The Common Core State Standards or Grade level content standards from your state
- Universal Design for Learning
- Learning Progressions Frameworks
- Core Content Connectors

If you would like to know more about these concepts, click Forward on the gray playbar. If you are familiar with the concepts and do not need additional background click on the button labeled skip definitions.

**RELATED CONCEPTS - CCSS  
COMMON CORE STATE STANDARDS**

Your State has either developed their own grade level state standards or has adopted the Common Core State Standards to establish guidelines for learning in Math and English Language Arts from kindergarten through 12<sup>th</sup> grade.

Achieving the learning goals put forth in the standards will prepare students for college and career.



We based our work in the modules on the CCSS and the College and Career Readiness Standards. You can apply the same process with your state standards. The NCSC Wiki has a link to the Common Core.

Your State has either developed their own grade level standards or has adopted the Common Core State Standards to establish guidelines for learning in Math and English Language Arts from kindergarten through 12<sup>th</sup> grade. These standards are based on the **College and Career Readiness Standards**.

The actual implementation of the standards, including how they are taught, the curriculum developed, and the materials used to support teachers as they help students reach the standards, is led entirely at the state and local levels.

**RELATED CONCEPTS - UDL**  
**UNIVERSAL DESIGN FOR LEARNING**

Universal Design for Learning (UDL) is a set of principles that guide development of curriculum.

- Multiple Means of Representation
- Multiple Means of Action and Expression
- Multiple Means of Engagement

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Universal Design for Learning (UDL) is a set of principles that guide development of curriculum. When implemented, UDL provides opportunities for learning to all individuals by utilizing the following:

- Multiple Means of Representation focusing on big ideas, themes, and patterns to provide options for comprehension. Customizing the display of information, using auditory methods and other alternatives to visual presentation for conveying content, using multimedia presentations, clarifying symbols, vocabulary, and structures are all examples of multiple means of representation.
- Multiple Means of Action and Expression to provide options for demonstrating understanding and strategizing. Providing multimedia and other mediums to students for their work, providing tools and strategies for conveying learned information, scaffolding or graduated levels of support for instruction and practice, and optimizing access to tools and assistive technology are all examples of multiple means of action and expression.
- Multiple Means of Engagement to provide options to self-regulate, develop reflective skills and sustain interest. Promoting motivational techniques, fostering collaborative learning, providing feedback and opportunities to participate in class-wide activities, and using incentives to encourage effort are all examples of multiple means of engagement.

## RELATED CONCEPTS - LPF LEARNING PROGRESSIONS FRAMEWORKS

The Learning Progressions Frameworks:

- describe pathways for learning that focus on the big ideas of a discipline
- help educators design instruction and assessments that move students toward deeper and broader understanding of the content
- include progress indicators; descriptions of observable learning along the learning continuum in each strand

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The Learning Progressions Frameworks, or LPF, present a broad description of the essential content and general sequencing for student learning and skill development (Hess, 2010).

The LPF is a hypothesized pathway that typical peers may take, and is meant to inform what typical peers will be working on grade by grade. In the past, we have struggled to understand how to choose content grade by grade to ensure inclusion of students with the most significant cognitive disabilities in grade AND age appropriate content, even though they may not have built all the skills in a previous grade. The pathways focus on the big ideas of a discipline.

- The LPFs give us the educational logic to help move these students along with their peers in a logical, educationally sound way.
- The LPFs contain learning targets and progress indicators that are referenced in the NCSC Curriculum and Instruction materials.
  - Learning targets (general/broad performance descriptors) are defined by grade spans, K-4, 5-8 and high school.
  - The related specific skills and concepts are called the progress indicators

(PIs).

The NCSC Wiki has a link to the Learning Progressions.



## RELATED CONCEPTS – CCCs CORE CONTENT CONNECTORS

The Core Content Connectors (CCC's) identify -  
the most salient grade-level, core academic content in ELA  
and Mathematics found in both the [Common Core State  
Standards](#) and the [Learning Progression Frameworks](#).

CCCs have been formatted into 2 subgroupings under an  
umbrella term [Graduated Understandings](#). They are the  
[Instructional Families](#) and [Element Cards](#).

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The Core Content Connectors (CCC's) identify the most salient grade-level, core academic content in ELA and Mathematics found in both the [Common Core State Standards](#) and the [Learning Progression Frameworks](#) and similar content can be found in your state standards.

Using the LPF, NCSC identified the “big ideas” from Common Core State Standards needed to make progress through the grades. The same process can be duplicated with any state’s grade level content standards.

These “big ideas” were then broken down into more frequent benchmarks called CCCs that provide a pathway to the grade level standards-not extended standards.

CCCs are the basis for the assessment, but not the starting point for instruction. The original format for the CCCs is a list by grade and content that has been reformatted into Instructional Families; a graphic representation of the relationships between the CCC's, the CCSS, and the LPFs. In addition Element Cards have been developed that tie together key components and provide ideas for instruction, supports and scaffolds.



All of the NCSC resource materials will be available on line. We will demonstrate the steps for planning access to the CCSS through the resource materials and the NCSC WIKI. The main page of the WIKI will bring up the schema, a graphic representation of the relationships between NCSC resources. Here, you will find links to the instructional resources (pink area) and the curriculum resources (the purple area).

## INSTRUCTIONS FOR COMPLETING THE MODULE

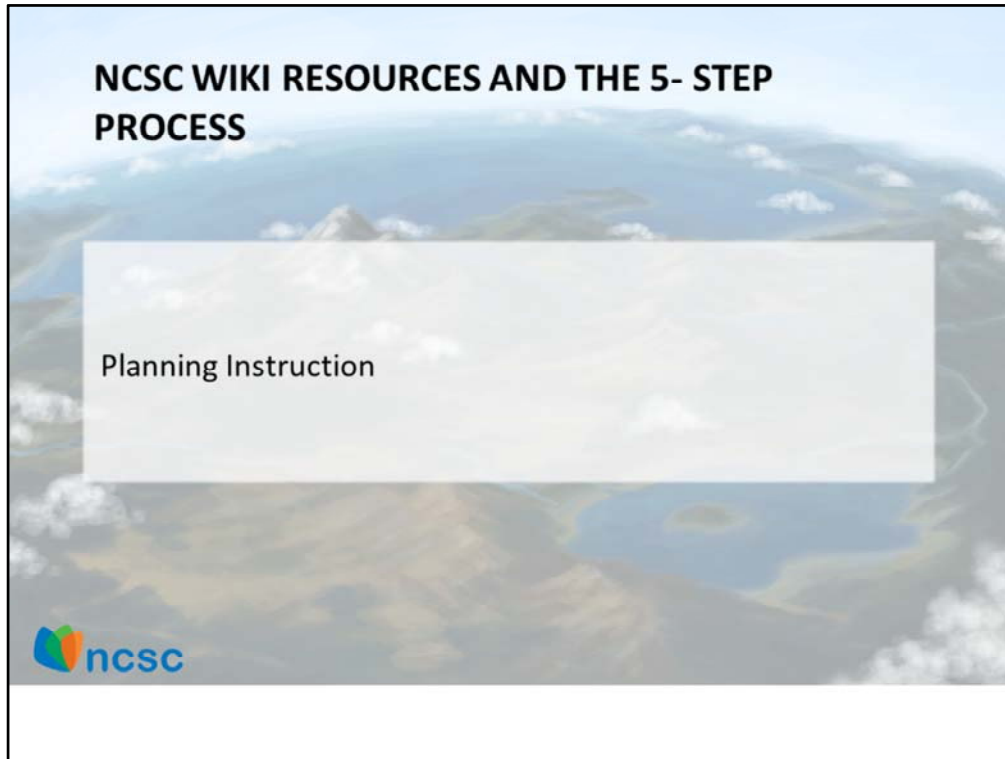


- Review the Main Page of the Wiki and have this link open as you view the module.
  - Click on the Curriculum Resources link and read through the descriptions of each resource.
  - Click on the Instructional Resources link and read through the descriptions of each resource.
- Complete the 5 Self Assessment items by the end of module and review the Self Assessment Summary.

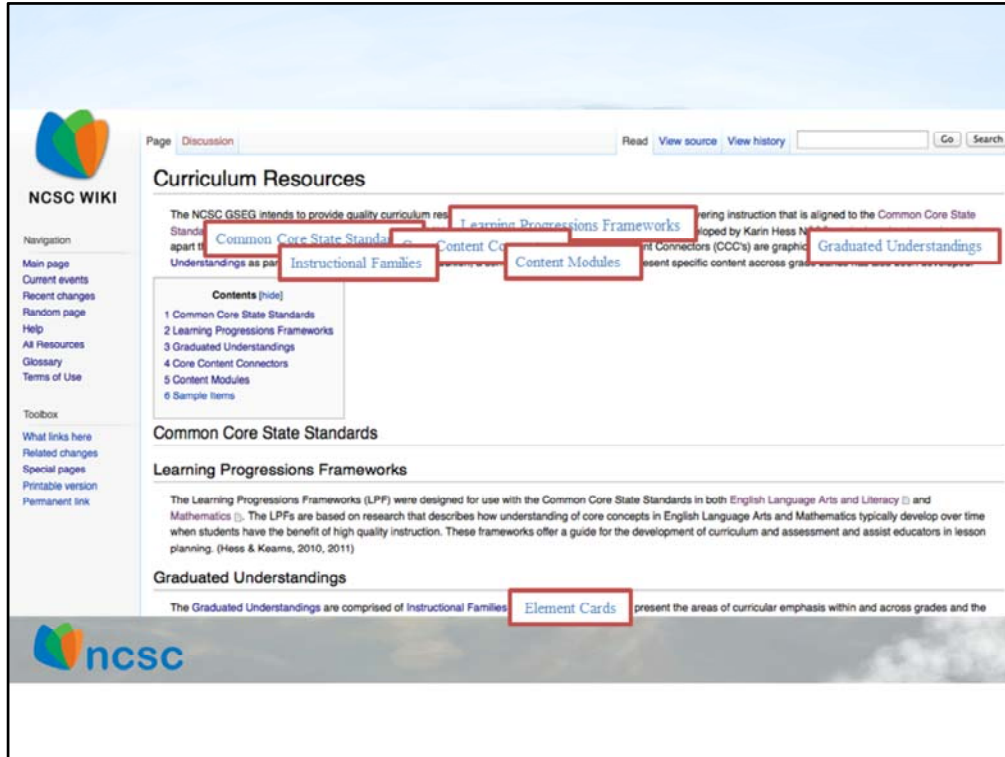


Before you begin this module, you may want to review the Main Page of the Wiki and have this link open as you view the module. For a quick overview:

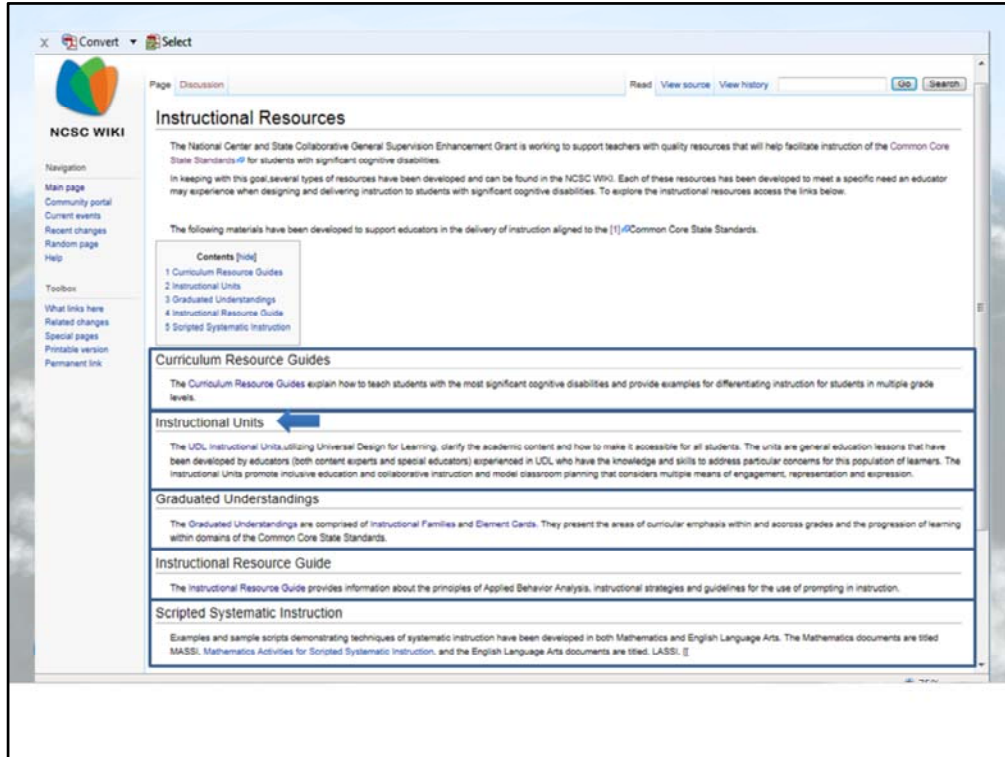
- Click on the Curriculum Resources link and read through the descriptions of each resource.
- Click on the Instructional Resources link and read through the descriptions of each resource.
- In order to proceed through the entire module you must complete the 5 Self Assessment items. Be sure to review the information in the Self Assessment Summary.



To begin the planning process, let's take a look at 3 screen shots from the Wiki so that you can find pertinent links as we discuss the resources.  
Let's start with the Curriculum Resources.

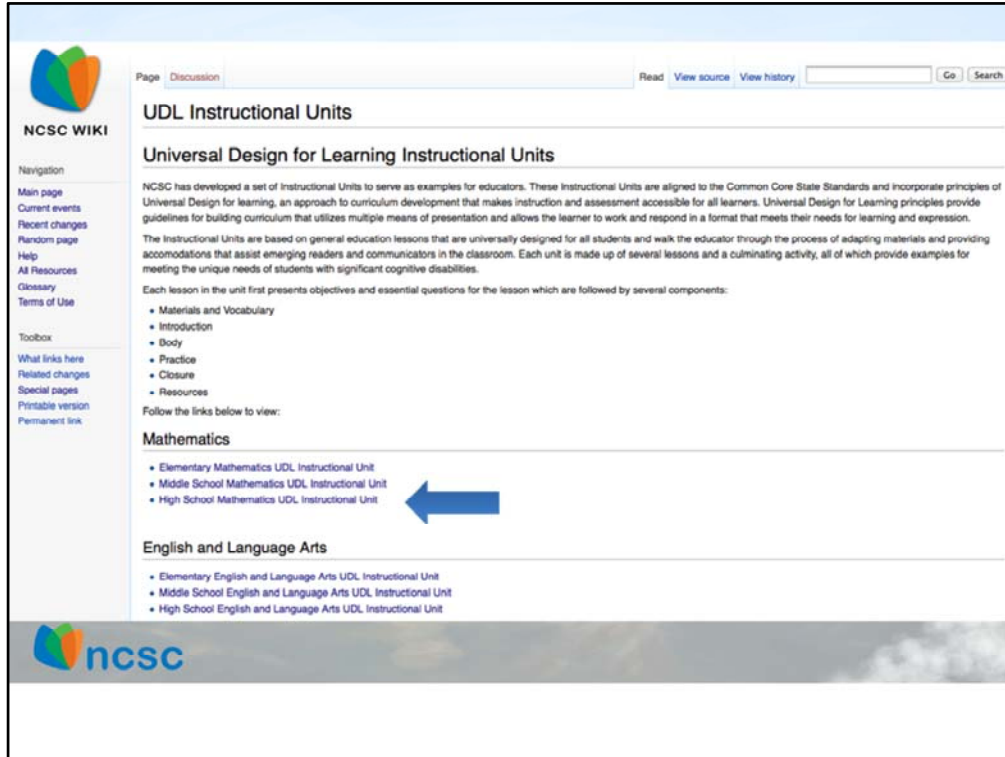


From the Main page, there are 2 sections under Wiki Resources: Curriculum Resources and Instructional Resources. The curriculum resources link provides links to all the curriculum resources or “what” to teach section of the schema including the Common Core State Standards, the Learning Progressions Frameworks, the Core Content Connectors organized under the umbrella term Graduated Understandings, which houses the Instructional Families and Element Cards, and the Content Modules. There are professional development modules available for each of these resources. Now let’s look at the Instructional Resource link. You get to this page by going back to the Main page and clicking on Instructional Resources under the heading of Wiki Resources.



The instructional resources link provides links to all the instructional resources in the “how” to teach section of the schema which includes the Curriculum Resource Guides, the Instructional Units (which we’ll be looking at in this module), the Graduated Understandings, the Element Cards, the Instructional Resource Guide and the Scripted Systematic Instruction for Mathematics activities (MASSI) and Language Arts activities (LASSI).

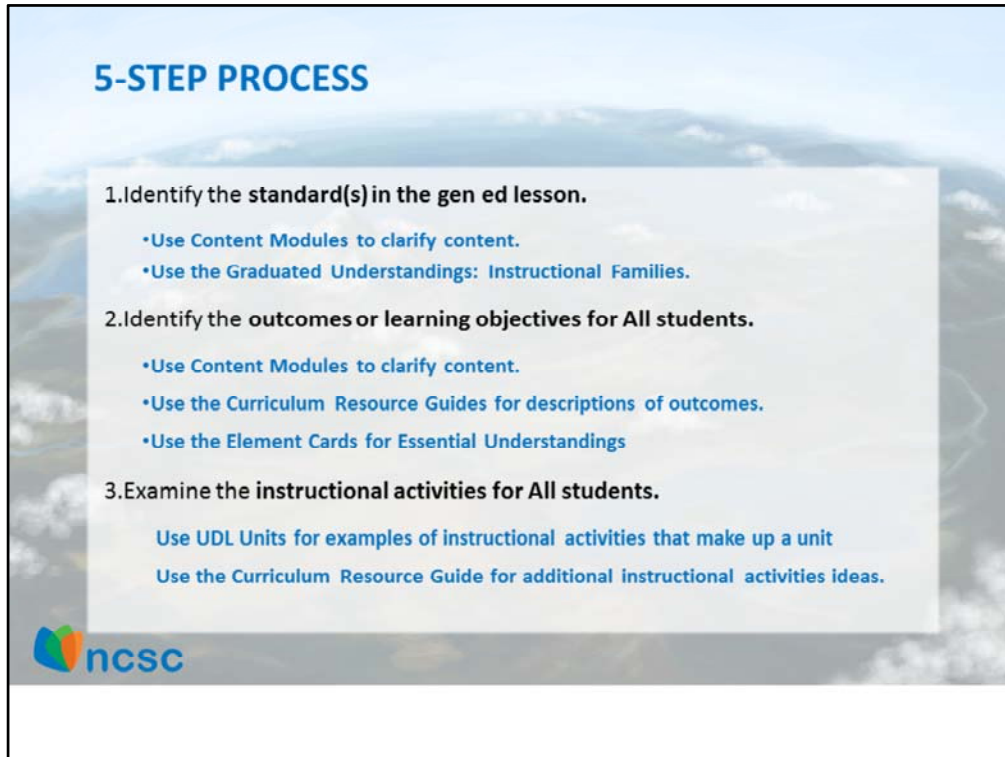
A short description of each resource is provided in the WIKI. We will use the Instructional Units as the framework for walking through the 5step process and looking at how the materials work together.



Under the Instructional Resources, click on the UDL Instructional Units. All 3 units were developed using the principles of Universal Design for Learning. If this is a concept you are not familiar with you can review it on the CAST.org website. There are 3 units for both Mathematics and English Language Arts – elementary, middle and high school. Each unit has multiple lessons. At the beginning of each lesson in the unit are the objectives and essential questions for the lesson which are followed by several components:

- Materials and Vocabulary
- Introduction
- Body
- Practice
- Closure
- Resources

We'll use the High School Mathematics Unit to show how the 5-step works. Each instructional unit begins with a list of the Common Core State Standards, Learning Targets from the Learning Progressions Frameworks, and the Core Content Connectors organized in the Instructional Families, on which this unit is based. This leads us to the information we need to complete step 1.



In this module, we will go through one process for planning instruction and ensuring access to the Common Core State Standards.

Here are steps 1 through 3 of the 5-Step process.

1. Identify the **standard(s) in the gen ed lesson.**

- **Use the Content Modules to clarify content.**
- **Use the Graduated Understandings: Instructional Families.**

2. Identify the **outcomes or learning objectives for All students.**

- **Use the Content Modules to clarify content.**
- **Use the Curriculum Resource Guides for descriptions of outcomes.**
- **Use the Element Cards for Essential Understandings**

3. Examine the **instructional activities for All students.**

**Use UDL Units for examples of instructional activities that make up a unit**



**Use the Curriculum Resource Guide for additional instructional activities ideas.**



Here are steps 4 and 5 of the 5-Step process.

4. Determine **supports** for SCD.

- **Use the UDL Units for multiple means of representation, expression, and engagement and for additional support considerations.**

5. Use NCSC curriculum and instructional resources as needed.

- **Use the Element Cards for instructional strategies.**
- **Use the MASSIs to reinforce specific skills and concepts.**
- **Use the Instructional Resource Guide to design systematic instructional strategies.**

As you can see, step 5 is actually embedded throughout the entire process. We will discuss each of these steps in detail by modeling the process through one activity of a sample general education lesson.

## STEP #1: IDENTIFY THE STANDARD(S)



### #1. Identify the **content standard(s)**.

Grade level of the standard

Specific State Standard(s) or CCSS

#### Suggestions:

Use the link within the NCSC WIKI to access the CCSS or have your state grade level standards available.

Use UDL Units for examples of standards addressed.

Use Content Modules for content clarification.

Use the Core Content Connectors to see how the CCSS can be unpacked.

Use the Instructional Families to identify how CCCs are grouped together to build concepts.



Although the first step is to identify the grade level content standards, what teachers need before this is a grade level standards-based general education lesson. These lessons may be obtained through general education teachers in the local school or district, district level content specialists, state curriculum guides, and websites such as San Diego School district <http://www.sandi.net/Page/33501>). Prior to any instruction, it is important to identify and understand the concepts and skills in the standard(s) to be taught in this lesson.

## STEP #1: THE STANDARD(S)



### Common Core State Standard:

#### HSN-Q Number and Quantity

**HSN-Q.A** Reason quantitatively and use units to solve problems.

**HSN-Q.A.1** Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.

**HSN-Q.A.2** Define appropriate quantities for the purpose of descriptive modeling.

#### HSG-MG Geometry

**HSG-MG.A** - Apply geometric concepts in modeling situations.

**HSG-MG.A.1** Use geometric shapes, their measures, and their properties to describe objects.

**HSG-MG.A.2** Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot).

**HSG-MG.A.3** Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical constraints or minimize cost; working with typographic grid systems based on ratios).



Let's look at Step 1 – Identify the Standards in greater detail using the UDL units. This is an example of the list of standards from the High School Mathematics unit. Each list associated with an instructional unit begins with the Common Core State Standards. When planning instruction, if you begin with a general education lesson this part should already be done for you or at least made easier through collaboration with a general education teacher or accessing an instructional unit from a reliable instructional website.

## STEP #1: THE STANDARD(S)



### Learning Progressions Frameworks Progress Indicator

**H.ME.1a** Making decisions about units and scales that are appropriate for problem-solving situations involving mathematics within or across mathematics disciplines or real-world context.

**H.ME.1b** Investigating the results when linear dimensions of objects change by some factor (e.g., area and volume change disproportionately: area in proportion to the square of the factor and volume in proportion to its cube)

### Instructional Family: Problem solving using measurement process.

Core Content Connectors addressed:

- **H.ME.1a1** Determine the necessary unit(s) to use to solve real world problems.
- **H.ME.1a2** Solve real world problems involving units of measurement.
- **3.ME.1g1** Identify a figure as getting larger or smaller when the dimensions of the figure changes.

### Instructional Family: Perimeter, Area, Volume

Core Content Connectors addressed:

- **H.ME.1b1** Describe the relationship between the attributes of a figure and the changes in the area or volume when 1 attribute is changed.
- **8.ME.1e2** Compare area and volume of similar figures.
- **6.ME.1a1** Identify the appropriate formula (i.e., perimeter, area, volume) to use when measuring for different purposes in a real life context.
- **4.ME.2h1** Apply the formulas for area and perimeter to solve real world problems.
- **3.ME.2h** Use addition to find the perimeter of a rectangle.



Once you know which CCSS(s) or state standard(s) you are working toward, consider what is most helpful for you after that: the Learning Progressions Frameworks for the concept of learning progressions, or the CCCs for the specific skills related to the CCSS. Remember, the Instructional families include both the Learning Progressions and the CCCs.

## STEP #2: IDENTIFY STUDENT OUTCOMES

### #2. Identify the **outcomes or learning objectives for All students.**

#### Guiding Questions:

- What are the desired outcomes for all students?
- How will students demonstrate their knowledge and skills?
- What is the observable student performance?



There are several guiding questions to consider when completing step two of the process. First, ask, “What are the desired outcomes for all students?” When considering the answer to this, remember we are thinking of all students, not just students with a significant cognitive disability. Once the desired outcomes have been determined, then we must consider How students will demonstrate those desired outcomes. What must the student do to demonstrate their knowledge and skills? What is the observable student performance? And finally, What would be an appropriate expectation for a student without a disability? Next, think about the complexity of the standard. Is the standard focused on recall and knowledge of information and/or skills? Or, is the standard asking that the student apply more complex skills such as application, analysis, and/or evaluation? Finally, consider what the standard is really about. What is the most important piece or big idea in the standard. In our example, the big idea is using measurement concepts in geometry to solve real world problems.

The screenshot shows a web browser window displaying the NCSC Wiki page for 'High School Mathematics UDL Instructional Unit-Lesson 1'. The page layout includes a navigation sidebar on the left, a main content area with a table of contents, and a detailed view of 'Lesson 1: Objective' with associated metadata and text. Blue arrows point to various elements: the 'Lesson 1: Objective' link in the table of contents, the 'Lesson 1: Objective' section header, the 'Objective' text box, and the 'Essential Question' text box.

**Table of Contents:**

1 Lesson 1: Objective
2 Lesson 1: Materials
3 Lesson 1: Introduction – 10 minutes
4 Lesson 1: Body – 15 minutes
5 Lesson 1: Practice – 20 minutes
6 Lesson 1: Closure – 5 minutes
7 Lesson 1: Resources

**Lesson 1: Objective**

Grade Span: 9-10	Content Area: Mathematics – Measurement Investigating Measurement in the Real World
Lesson 1 of the Unit	Approximate Time Needed: 50 minutes

**Objective:** Student will make decisions about units and scales that are appropriate for problem solving situations involving mathematics within mathematics or across disciplines or contexts.

**Essential Question:** What are the relationships among the measurements of dimensions, area, and perimeter in problem solving situations?

All the lessons of the UDL Instructional units follow the same format. Each lesson begins with the objectives of that lesson. Then provides a list of materials needed to implement the lesson as well as the content vocabulary that will be used throughout the lesson. Consideration of the most salient vocabulary to include in a communication system should be considered prior to instruction. Instruction for the lesson starts with an introductory activity to help the student orient to and connect with the concepts taught. The introduction should also activate the student's prior knowledge. The body is the primary presentation of the concept, then there is guided practice on the concept, ending with the closure, which includes a review of the lesson objectives and a formative assessment. There is also a resources tab for handouts, examples, or ppts used within the lesson. Let's take a look at the lesson objectives.

## STEP #2: STUDENT OUTCOMES/LEARNING OBJECTIVES

NCSC Sample Instructional Unit  
Grades 9-10 Mathematics: Measurement

<b>Grade Span:</b> 9-10	<b>Content Area:</b> Mathematics – Measurement Investigating Measurement in the Real World
<b>Lesson 1 of the Unit</b>	<b>Approximate Time Needed:</b> 50 minutes



**Objective:** Student will make decisions about units and scales that are appropriate for problem solving situations involving mathematics within mathematics or across disciplines or contexts.

1. Convert units using standard/known conversion units.
2. Use appropriate known formulas for the area.
3. Solve multistep problems involving one unit of measure.

**Essential Question:** What are the relationships among the measurements of dimensions, area, and perimeter in problem solving situations?



In our example, the student outcomes are to:



1. Convert units using standard/known conversion units
2. Use appropriate known formulas for the area.
3. Solve multistep problems involving one unit of measure.

The NCSC UDL Units provide many examples of tying measurable observable objectives to the appropriate grade level standards. Let's now look at the resource material on the Wiki that will help in developing concepts.



## CURRICULUM RESOURCE GUIDES



Grade 8	Performance Example	Essential Understandings
<b>CCC</b> <b>Measurement:</b> 8.ME.1e2: Describe the changes in surface area, area, and volume when the figure is changed in some way (e.g., scale drawings)	<p>"Shelly's bedroom has a closet where she keeps all her clothes. Here is a picture of her closet. Shelly's closet was 3 feet by 4 feet. She used a formula to calculate area. The formula for area is area equals length times width. You can also figure out area by counting the boxes."</p>  <p>"Her closet is too small, so her Dad built an addition and made it bigger. This shows Shelly's new closet. Her new closet is 4 feet by 8 feet. How much bigger is Shelly's new closet when compared to her old closet?"</p> 	Recognize how the space inside a figure increases when the sides are lengthened.



The Curriculum Resource (CR) Guides, located in the 'How' section of the schema, is another resource intended to be a support for teachers. They were designed to help teachers understand how a concept (such as teaching area and surface area in the middle school grades) can be taught to students with different instructional support needs and initial understandings and how that concept changes (and therefore the instruction changes) across the grades within the grade span. Each guide covers a range of Core Content Connectors for grades 3 through high school. These guides focus on five topics that were derived from the priorities identified by NCSC for the Assessment. These guides should support teachers in preparing students for the NCSC alternate assessment.

This example for grade 8 in measurement shows a performance example for area.

## STEP #3: EXAMINE THE INSTRUCTIONAL ACTIVITIES FOR ALL STUDENTS

### 3. Examine **instructional activities for All students.**

Identify the instructional activities that move students toward achievement of the objectives.

Typical classroom activities, i.e., lecture, taking notes, small and large group work, etc.

Determine if activities are designed with all students in mind

Universal Design for Learning:

- Multiple means of representation,
- Multiple means of expression, and
- Multiple means of engagement



Step 3 is to examine instructional activities for All students. This includes identifying the instructional activities that move students toward achievement of the objectives, such as typical classroom activities (i.e., lecture, taking notes, small and large group work, etc.).

What types of activities might lead to the instructional outcome?

**Multiple Means of Representation** give learners various ways of acquiring information and knowledge and provide options for expressive skills and fluency.

**Multiple Means of Expression** provide learners alternatives for demonstrating what they know and provide options for recruiting interest, sustaining effort, and self regulation.

**Multiple Means of Engagement** give learners various ways of acquiring information and knowledge and provide options for comprehension by the highlighting of critical features.

Teaching requires designing instructional plans that promote learning for **all** students – whatever their entry point is into the content. The UDL Units contain lesson plans that illustrate how to target the CCCs, based on the CCSS, within

general education lessons that are accessible to ALL students using Universally Designed for Learning lessons, providing equal opportunities for ALL students to learn the content. The design and content of the UDL Instructional Units and lessons promote co-teaching and collaborative planning between general and special educators. The lessons provide models of universally designed planning for an entire class of students that address representation, expression, and engagement. They offer a model for how to engage **ALL** students in well-designed instruction based on the CCSS.

## STEP 3A INSTRUCTIONAL ACTIVITIES FOR ALL STUDENTS

**Step 3a:** Determine areas within the instructional activities that require consideration of **specific, individual support needs to ensure** all students have **access** to the instruction and materials and a way to demonstrate learning.

- Examine all activities.
- Consider all students.
- Use the principles of UDL.
- Consider additional specific student support needs on an individual basis.
- Add activities as necessary.



**Note:**

Review [sample UDL Units of instruction to examine activities.](#)

Step 3 examines all the activities in the lesson that would require additional specific student support on an individual basis. This will ensure that all students have access to the instruction and materials and a way to demonstrate learning. Key guidance includes:

- Examine all activities.
- Consider all students.
- Use the principles of UDL.
- Consider additional specific student support needs on an individual basis.
- Add activities as necessary.

## GUIDING QUESTIONS: STEP 3A

### What are the general requirements to participate in each activity?

- Listen to a lecture
- Read information
- Discuss with class or small group
- Write observations

### What specific skills may need additional supports

- Note taking during lecture (i.e. writing specific vocabulary heard)
- Reading or accessing print
- Communication on topic
- Modeling a mathematics problem



As we look at the general education lessons, we need to look at how each student is actively participating in each part of the instructional activity. Does the student need to listen to a lecture, read information, discuss the information with the class or a small group? Do they need to write their observations?

How will the student *access* instruction?

What is needed to ensure targeted information is provided in student's mode of communication?

What will *engage* the student in the activity?

## IDENTIFYING SKILL GAPS

When students are struggling with a grade level skill, determine foundational skills that may need to be added to instruction by consulting one of the following resources:

- General education content teacher
- Curriculum resource person
- Previous grades' benchmarks

Foundational skills should supplement, not supplant, instruction on grade level skills.



This is where we can bring in the instructional families and element cards. After we have analyzed a lesson using the principles of UDL, we realize that for many of our students, learning the standards and benchmarks still seems far away. Even when using accommodations and an accessible learning environment, some gaps might still exist. When students are struggling with a grade level concept or skill, we can determine foundational skills that may need to be stressed during instruction. Consult with people who know the content to determine if there are foundational skills essential to learning a concept. You can plug some of those gaps and build toward the benchmarks by addressing some foundational skills within grade appropriate content, making sure it leads to the performance of the grade level concept. Take, for example, the math problem about the garden with a perimeter of 140 feet. Once area is determined, the numbers can go up into the thousands. If you have a student who works with smaller numbers, say numbers up to 20, you can then take the same word problem with the same concept but reduce the number size, so the student is using smaller numbers. However, the student is still working on area and perimeter and moving toward the concept of density. Remember, foundational skills should supplement, not supplant, instruction on grade level skills.

## STEP #4: INSTRUCTIONAL SUPPORTS

Determine access **supports needed** for SCD.

Consider all aspects of the lesson

What supports are needed for students to participate in and learn from the instructional activities?

Communication

- How does the student communicate with the teacher, small group partners, others?
- Is the salient vocabulary for the lesson included in the student's communication system?

Supports

- Are the student's typical supports in place?
- Are additional supports, specific to the activity or content, needed?



Once the general requirements of an activity are determined and a menu of supports has been created, then consider whether there are any additional supports a student may need specific to an activity or concept in the lessons (Supports beyond those identified in the menu of supports). What specific vocabulary needs to be included in a student's communication system? Does the student need to build some background knowledge before the start of any lesson or activity within the lessons? Are there considerations for physical or sensor access, positioning and/or Positive Behavior Supports? The sample instructional units provide examples of multiple means of representation, expression, and engagement and for additional support considerations.

## Additional Considerations for Emerging Readers and Emerging Communicators

1. Provide picture and/or tactile representations of relevant vocabulary, paired with the written word, each time a salient concept/vocabulary word for rectangle, area, and perimeter is mentioned during the presentation or discussion, as well as the meanings of each word.
2. Create math journals to record vocabulary, formulas, and notes.
3. Provide the formulas for area and perimeter as the concepts of each are discussed.
4. During discussion, provide picture representation of real world uses for area and perimeter.
5. Student may be presented with manipulatives of a unit and the rectangle drawn on grid paper.
  - Students determine area and perimeter by placing the manipulative units on each unit around the rectangle on the grid paper to demonstrate perimeter as well as within the rectangle to demonstrate area.
  - Using manipulatives may be demonstrated electronically, using a computer program or PowerPoint, to count units virtually to determine area and perimeter.



The lessons also include additional support considerations in reading and communication for students who may require more intensive support needs. These additional considerations are provided in each part of each activity. The considerations above are just a few for this part of the lesson. Take a minute and read through them.

**Emerging Readers** may be students who consistently and predominately communicate through words, pictures, symbols and tactile representations –and can make meaning of each within the concept taught.


**Emerging Communicators** may be students who are learning a communication system or do not presently have a consistent system in place.

Click on the pause button and read through these considerations.

Sometimes, additional resources are provided as examples of support for representing or demonstrating the content.




Find the perimeter of the figure below.

$$6u + 6u + 5u + 5u = 22u$$


	1	2	3	4	5	6	
22							7
21							8
20							9
19							10
18							11
	17	16	15	14	13	12	

6 units

5 units



This is an example of a resource included in the Mathematics High School Instructional Unit for:

Lesson 1 Introduction: Activate Previous knowledge

This is one way perimeter may be presented/explored by a student. Watch as we see how it works.

## STEP #5: INSTRUCTIONAL RESOURCES

Use **Instructional Resources** as needed.

1. **UDL Units** - Models of universally designed instruction that illustrate how to target the CCCs within general education lessons
2. **Content Modules** – Explanation of difficult or complex mathematical/ELA concepts
3. **Curriculum Resource Guide (CR)** - Examples of how academic content is taught in general education
4. **Element Cards** - Description of how to teach specific concepts and skills for remediation of skills
5. **Instructional Resource Guide** - Evidence-based prompting and instructional strategies
6. **MASSIs** – Intensive scripted instructional lessons that include evidence-based practices for remediation of skills



Step 5 of the planning process, 'Use Instructional Resources as needed', is incorporated within each lesson, but may also be considered for tiered interventions. These are a few of the resources that can be utilized when planning instruction.

1. **UDL Units** - Models of universally designed instruction that illustrate how to target the CCCs within general education lessons
2. **Content Modules** – Explanations of difficult or complex mathematical /ELA concepts
3. **Curriculum Resource Guide (CR)** - Examples of how academic content is taught in general education
4. **Element Cards** - Descriptions of how to teach specific concepts and skills for remediation of skills
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The next several slides will review the materials that are available on the NCSC WIKI.

## ELEMENT CARDS

This is an example of an 8<sup>th</sup> grade Element Card for Measurement and Data.

CCSS: A.REI.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.		
CCC:	H.ME.1b	Solve a linear equation to find a missing attribute given the area, surface area, or volume and the other attribute
Strand: Measurement <b>Family: Perimeter, Area, and Volume Problems</b>		
Progress Indicator: H.ME.1b Investigating the results when linear dimensions of objects change by some factor (e.g., area and volume change disproportionately; area is proportional to the square of the factor and volume is proportional to its cube)		
Key Understandings	Concrete Understandings:	Representations:
	<ul style="list-style-type: none"> <li>Understand the concept of</li> <li>Area, volume, width, length, height, square</li> <li>Identify the unknown quantity when given an equation and labeled figure (e.g., Provide a labeled prism and the equation <math>V=L \cdot W \cdot H</math>. Ask the student to draw/indicate the label on the prism to the letter in the equation.)</li> <li>Identify the unknown quantity when given an equation and labeled figure</li> </ul>	<ul style="list-style-type: none"> <li>Understand formula representation (e.g., "h" in the equation means height)</li> <li>Use letters to represent numbers</li> <li>Use letters to represent variables</li> <li>Recognize symbols for equal, addition (+) and multiplication (<math>\times</math>)</li> </ul>
Suggested Instructional Strategies:		
<ul style="list-style-type: none"> <li>Using 8<sup>th</sup> in space and context</li> <li>Sequence 1: Area 2: Volume 3: Missing attribute</li> <li>"If the area of a rectangle is 24cm<sup>2</sup> and it has a base of 6cm, what would the height be?"</li> <li>Task analysis with Least Invasive Prompts</li> <li>Replace a letter (variable representing an unknown quantity) with a number or representation of a number (symbols, manipulatives)</li> <li>Provide a labeled prism and the equation <math>V=L \cdot W \cdot H</math>. Ask the student to draw/indicate the label on the prism to the letter in the equation. Break down and isolate each step in solving the math task.</li> <li>Provide sets to be taken apart (subdividing) to illustrate three-dimensional objects. This process can also be used for the study of surface area of prisms.</li> </ul>		
Supports and Scaffolds:		
<ul style="list-style-type: none"> <li>Pre-made formula</li> <li>Use of calculator</li> <li>Manipulatives (prism, cube (e.g., box)</li> <li>Crosses (e.g., tally counter) and counting mechanism (e.g., number line)</li> </ul>		



This is a sample of an Element Card that details its structure and content. Now let's take a closer look at the element card. (Please note: the second module in the suite of the Mathematical Graduated Understandings describes in great detail the purpose, content, and use of the Element Cards).

The first component of the Element Card is the **CCSS**: This is the Common Core State Standard on which the CCC is based. For this particular card, we can see that the CCSS is the 8<sup>th</sup> grade, Measurement and Data standard #4;

- The second component is the **Core Content Connector**: The nomenclature used to identify the CCC is followed by a statement of the grade-specific CCC.
- The third row provides the related **LPF Strand** followed by the **Instructional Family** that contains this CCC. In this example, the strand is *Measurement* and the instructional family is *Perimeter, Area and Volume Problems*.
- The next row on this slide denotes the related **Progress Indicator** of the LPF. The Progress Indicator related to this particular CCC is H.ME.1b investigating the results when linear dimensions of objects change by some factor (e.g. area and volume change disproportionately: area in proportion to the

square of the factor and volume in proportion to its cube.

- The next row contains the **Essential Understandings** including Concrete and Representation.

- Mathematical Concrete:**

- Fundamental mathematical concepts and skills to address the content described in the grade-level CCCs.

- Mathematical Representation:**

- Specific symbols or referents related to the concepts and skills to apply when problem solving (e.g., mathematical symbols and operations of addition, subtraction, multiplication, division, fractions, equations).

- The final two rows provide examples of strategies and supports/scaffolds for teaching the concepts and skills found within the CCC:

- The **Suggested Instructional Strategies** section provides examples of evidenced-based strategies supporting instruction at varying levels of challenge; and

- The **Supports and Scaffolds** section provides suggestions of possible tools and materials that assist in the promotion of understanding and engagement with concepts. These suggested supports and scaffolds can provide a way for students to demonstrate what they know and can do.

# CURRICULUM RESOURCE GUIDE: MEASUREMENT & GEOMETRY

## Curriculum Resource Guide: Measurement and Geometry

[BACK TO Curriculum Resource Guides](#)

Curriculum Resource to Prepare Students for AA-AAS Mathematics Content: Measurement and Geometry **The purposes of the Curriculum Resource Guides are:**

- To provide guidance for teaching the Common Core State Standards (CCSS) to students with Significant Cognitive Disabilities (SWSCD) that both aligns with these standards and provides differentiation for individual student needs
- To serve as a companion document to the Progress Indicators for the CCSS found in the NCSC Learning Progressions
- To help educators build knowledge of the essential content reflected in these Progress Indicators of the CCSS
- To delineate the necessary skills and knowledge students need to acquire to master these indicators
- To provide examples for differentiating instruction for a wide range of SWSCD. These examples can be used in planning specific lessons, alternate assessment items, and professional development.

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### 1a. What is "perimeter" and how is it taught in general education settings?

#### 1a.1 Essential knowledge in this content area

The concept of perimeter refers to the distance around a polygon. (A polygon is a shape which is formed by line segments enclosing an area). The distance can be found by adding the lengths of all sides. Students first begin to explore this concept by laying a ruler around all of the sides of an object and then adding all of the lengths. Students can be encouraged to generalize perimeter into the following equation:

- For rectangles:
  - $P = 2l + 2w$  (where  $P =$  perimeter,  $l =$  length, and  $w =$  width)
- For triangles:
  - Add all sides or  $P = a + b + c$  (where  $P =$  perimeter and  $a, b, c =$  the sides of the triangle)

For circles:

- It is called circumference (the distance around a circle). To find circumference students must know: radius (connects the center to any given point on the circle) or diameter (connects two points on the circle and passes through the center).



The Curriculum Resource Guides offer examples of how the content is taught in general education, ideas for real life use, examples of what student performance may look like, and ways to promote college and career readiness. The guides are designed to help teachers develop the background knowledge they need to prepare students for the content, as well as the NCSC alternate assessment.

# INSTRUCTIONAL RESOURCE GUIDES

## Instructional Resource Guide

The Instructional Resource Guide serves as a source of information about evidence-based best practice in instruction for students with significant cognitive disabilities. The guide thoroughly reviews instructional strategies that are based on theories of Applied Behavior Analysis (ABA).

These evidence-based practices in instruction include strategies such as: prompting, systematic instruction, and use of feedback and data. The guide further explains the use of these practices in the Mathematics Activities for Scripted Systematic Instruction (MASSIs) and the LASSIs

### The purpose of the Instructional Resource Guide:

- To provide guidance for teachers regarding evidence-based prompting and instructional strategies to be used to teach students with significant disabilities
- To serve as a companion document to the MASSIs (Math Activities with Scripted Systematic Instruction) and LASSIs (Language Arts Scripted Systematic Instruction)
- To help educators build knowledge of the essential systematic instructional methods and prompting strategies that are used in the MASSIs and LASSIs to teach students targeted skills

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## Systematic Instruction

Teaching focused on specific, measurable responses that may either be discrete or a chained task, and that are established through the use of defined methods of prompting and feedback based on the principles and research of ABA.

Will include:

- Prompting
- Feedback
- Format of instruction
- Task Analysis
- Repeated Trial

## Time Delay

There are two types of time delay, constant time delay and progressive time delay. This Instructional Resource Guide focuses on Constant Time Delay; however, it does provide a brief explanation of Progressive Time Delay.

## Additional Prompting Strategies



Teaching effectively to a heterogeneous group of students, possibly in multiple grade levels, is challenging. To do so effectively, teachers need to build on their knowledge of instructional strategies that efficiently promote student learning. The Instructional Resource Guide helps educators to build knowledge of essential, evidence-based systematic instructional methods and defines the use of these strategies that are used in the Math Activities with Scripted Systematic Instruction (MASSIs) to teach students targeted skills.

## MASSI: 6.PRF.1D1

### MASSI: Math Activities with Scripted Systematic Instruction

**Activity:** Going Bowling

**Grade Band:** Grades 6-8

**Concept:** Equations



Common Core State Standard	Core Content Connectors	MASSI OBJECTIVES
6.EE.7 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which $p$ , $q$ and $x$ are all nonnegative rational numbers.	6.PRF.1d1 Solve real world single step linear equations	Write an equation given story problem and solve equation.
7.EE.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.	7.PRF.1g2 Use variables to represent quantities in real-world or mathematical problems, and construct simple equations and inequalities to solve problems by reasoning about the quantities.	Write an equation given story problem and solve equation.
8.EE.7 Solve linear equations in one variable.	8.PRF.1g3 Solve linear equations with 1 variable	Given multiplication equation solve for variable.

Be sure to provide specific practice to students on the skills that correspond to their grade level.

**Teaching Materials:** story problems (cut apart and laminated), equation template (one for teacher and each student, laminated), number line (one for teacher and each student, laminated), bowling photos, isolating and solving for variable template (one for teacher and each student, laminated). Note: Teachers may rewrite story problems using names of the students in the class.

**Other Materials:** calculators for each student; snack and other items students could practice buying and selling at a bowling alley concession stand; realistic looking pretend money or real money

**Worksheets:** worksheet for each section of lesson




[\(Back Button to Unit\)](#)



The MASSIs offer intensive instruction using evidence-based practices. The MASSIs are a resource for tiered interventions as needed throughout general instruction. Using scripts, the MASSIs offer a guide for instruction with **graduating levels of difficulty** – ranging from the first steps of teaching the content to students with little or no understanding of the content to building understanding of the target concepts of the CCCs using real-life word problems and using hand-on activities aligned to grade-level content. The MASSIs come with tools such as data sheets that can be used for monitoring progress toward mastery and a skills test to practice responding in a testing context. The MASSIs may be 3 to 5 pages long and are intended to build the student’s base knowledge and ready them to return to the lessons within the UDL instructional unit. There is a Back button in each MASSI that will return you to the last page visited in the lesson.


**CHECK FOR LEARNING**



Know a 5-Step process for planning access to grade-specific, standards-based instruction.

Know when to use NCSC mathematics resources to support access to and involvement in general education lessons for students with significant cognitive disabilities.

Know when to use NCSC mathematics resources to implement tiered interventions within general education lessons for students with significant cognitive disabilities.



Take a moment to think about the 5-Step Process and the NCSC resource material.  
Do you –

1. Know a 5-Step process for planning access to grade-specific, standards-based instruction?
2. Know when to use NCSC mathematics resources to support access to and involvement in general education lessons for students with significant cognitive disabilities?
3. Know when to use NCSC mathematics resources to implement tiered interventions within general education lessons for students with significant cognitive disabilities?



## NEXT STEPS

This concludes the Developing Mathematics Lessons Using the 5-Step Module.

Your next steps include:

- Review the resources in the next section.
- Review the Self Assessment Summary information.
- Claim your badge through the link at the end of the presentation.
- It is suggested, but not required, that you complete all modules in the Mathematics course.



This concludes the Developing Mathematics Lessons Using the 5-Step Module.

Your next steps include:

- Review the resources in the next section.
- Review the Self Assessment Summary information.
- Claim your badge through the link at the end of the presentation.
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## REFERENCES



- Center for Applied Special Technology (2005). *UDL Guidelines*. Retrieved from [www.cast.org](http://www.cast.org).
- Clayton, J., Burdge, M., Denham, A., Kleinert, H., & Kearns, J. (2006). A four-step process for accessing the general curriculum for students with significant cognitive disabilities. *Teaching Exceptional Children*, 38(5), 20-27.
- Denham, A. (2004). Pathways to Learning for Students with Cognitive Challenges: Reading, Writing and Presenting. Interdisciplinary Human Development Institute, University of Kentucky. [Online] Available: <http://www.ihdi.uky.edu/IEI/>
- Denham, A. & Lewis, P. (2006). *The Application of Universal Design for Learning in the Classroom for students with the most significant disabilities*. SPLASH Training. Human Development Institute, University of Kentucky. Lexington, KY.
- Denham, A., Land, L. & Taub, D. (2011). *Yes, We Can Support Grade Appropriate Academic Content in Inclusive Environments*. Presentation at the annual meeting of TASH, Atlanta, GA.
- Land, L., Pugalee, D., Denham, A., and Kleinert, H. (2010). Math Instruction and Assessment Linked to Grade-Level Standards. In H. Kleinert & J. Kearns, *Alternate Assessment for Students with Significant Cognitive Disabilities: An Educator's Guide*. Baltimore: Paul Brookes.



If you would like more information on the concepts we have presented today, here is a list of references.

## REFERENCES

<http://www.corestandards.org/what-parents-should-know/>

<http://www.naacpartners.org>

Kahn Academy video of area and perimeter

<http://www.khanacademy.org/math/geometry/basic-geometry/v/perimeter-and-area-basics>

Coolmath site - perimeter

[http://www.coolmath.com/reference/perimeters.html#The\\_perimeter\\_of\\_a\\_rectangle](http://www.coolmath.com/reference/perimeters.html#The_perimeter_of_a_rectangle)



Visit the websites noted for more general information.