GRADUATED UNDERSTANDINGS IN MATHEMATICS:
INSTRUCTIONAL FAMILIES AND ELEMENT CARDS

Produced by:
University of Kentucky,
Based on material developed by UNCC,
in partnership with the National Center State Collaborative (NCSC)
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Welcome to the NCSC Graduated Understanding in Mathematics Module for the National Center and State Collaborative (NCSC). This module covers the NCSC Graduated Understandings, information on the Instructional Families and Element Cards, and suggests ways in which the modules can be used.

MODULE ORGANIZATION

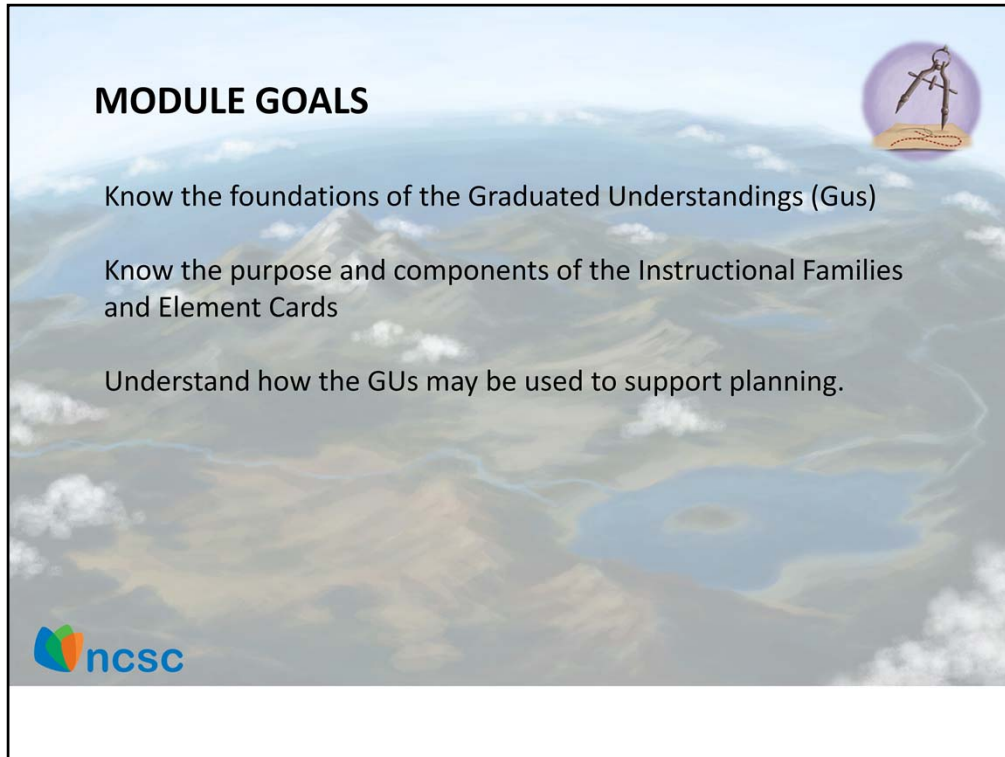Welcome to the NCSC Graduated Understandings in Mathematics module.

All learning modules are organized in four sections:
- Plot the Course,
- Explore the Terrain,
- Check the Map, and
- Expand Your Horizons.

Each of the icons on the left is a progress indicator which will appear in the upper right hand corner of the screen. The indicator corresponds with the section in which you are working.

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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. 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

Know the foundations of the Graduated Understandings (Gus)

Know the purpose and components of the Instructional Families and Element Cards

Understand how the GUs may be used to support planning.

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The "Graduated Understandings" were developed to support teachers providing meaningful and increased opportunities for students with significant cognitive disabilities to learn academic content. This module will provide an overview of the NCSC project instructional resources and their development consistent with the project's model of student cognition, the Common Core State Standards, and the pathway of the Learning Progression Frameworks and focus specifically on the purpose and uses of the Graduated Understandings. Many states have adopted their own grade level state content standards which have similar content emphasis as the CCSS. The process used to align content and skills across the Learning Progressions, Core Content Connectors and Graduated Understandings may be replicated with any state standards.
Our goal in this module is to help you:
Understand the foundations of the Graduated Understandings (GUs);

Understand the purpose and content of the Instructional Families and Element Cards; and

Understand how the GUs may be used to support planning.

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
- LPF – Learning Progressions Frameworks
- CCC – Core Content Connectors
- The NCSC Curriculum and Instructional Resources Schema

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In this module reference is made to the following concepts:

- CCSS - Common Core State Standards or Grade level content standards from your state.
- LPF - Learning progressions Frameworks
- CCC - Core Content Connectors

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 12th grade.

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

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We based our work in all these modules on the CCSS and the College and Career Readiness Standards. You can apply the same process with your 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 12th grade. These 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 - 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 LPF 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.

> Related specific skills and concepts are called the progress indicators (PIs).

RELATED CONCEPTS - CCC
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.

INSTRUCTIONS FOR COMPLETING THE MODULE

- Review the Common Core State Standards in mathematics
  - *http://www.corestandards.org/Math/*
  - *Or*
- Review your state's grade level content standards

- Complete 5 self assessment items throughout the module

- Review the additional resources listed at the end of this module

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Having a basic understanding of the Common Core State Standards in mathematics or your state's grade level content standards and the age appropriate grade level content that should be taught, will be helpful before starting this module. Remember to complete the 5 self assessment items and review the reference and resource documents for more detailed information.

WHAT TO TEACH AND HOW TO TEACH:
GRADUATED UNDERSTANDINGS

What are the Graduated Understandings?
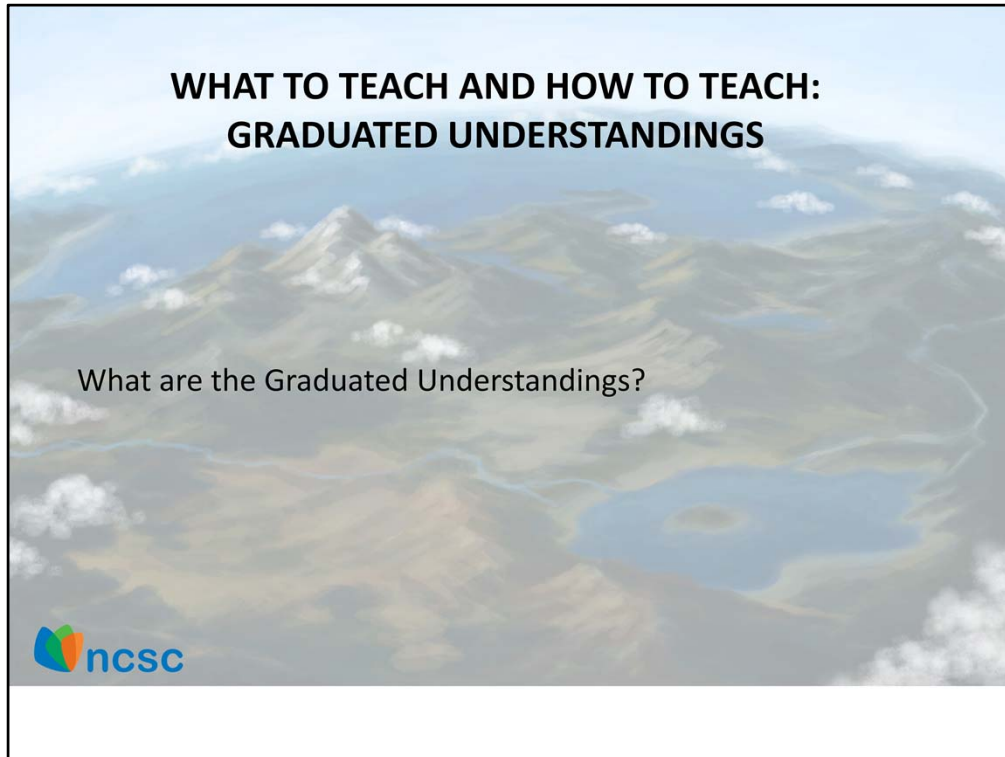
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Let's go through the purpose and use of the Graduated Understandings. First, let's see where they are located on the NCSC Wiki schema.

SCHEMA for Common Core State Standards Resources
NCSC Curriculum and Instructional Resources
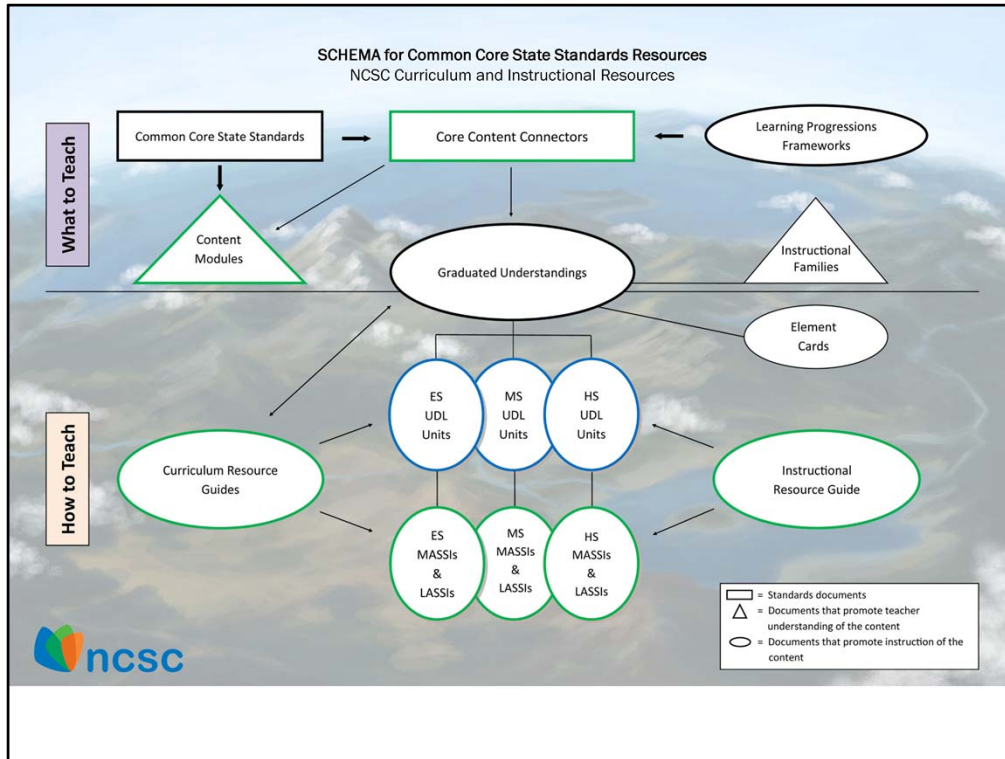
The NCSC Curriculum and Instructional Resources Schema is a graphic depiction of the materials developed through the NCSC grant. It shows the relationships between the NCSC materials. It also shows the relationships between NCSC materials and external resources such as the Learning Progressions Frameworks and the Common Core State Standards. The NCSC Schema separates resources into two primary categories: What to Teach (curriculum) and How to Teach (Instruction).

The Graduated Understandings are comprised of the Instructional Families and the Element cards. They are the only documents that are in both What to Teach – the Instructional Families and How to Teach – the Element Cards.

WHAT ARE THE GU's?

Curriculum and Instructional Resources

Curriculum:
- Instructional Families – visual depictions of related content

Instruction:
- Element Cards – instructional aids to help teachers plan lessons that include all students, move students toward understanding of content standards, and promote Universal Design for Learning

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The Graduated Understandings are sets of Instructional Families and Element Cards. The Instructional Families present related content in tables. The tables are color-coded by content and by grade band and thus make it easy to identify the progression of specific content areas across grades. The Element Cards are instructional aids that are designed to help teachers plan lessons that incorporate Universal Design for Learning, can be used with all students, and move all students toward an understanding of content standards.

PURPOSE OF THE GU's

- Provide visual representations of related content
- Help teachers target instruction
- Articulate big ideas
- Suggest instructional strategies

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High achievement and improved outcomes for students with significant cognitive disabilities require increased academic opportunities based on grade level content standards. Content standards are the building blocks for planning and designing rich evidence-based instructional resources and their use leads to acquisition, generalization and maintenance of knowledge, skills and abilities.

The Graduated Understandings (GU's), used in conjunction with the NCSC instructional resources, the Learning Progressions Frameworks and the Common Core State Standards or your state standards; provide a foundation for educators in their planning and provision of instruction.

The GU's:

•Provide challenging and attainable content and a thorough system of assessments
•Provide guidance on how to "unpack" the instructional and assessed content
•Promote suggested instructional strategies, supports and scaffolds
•Provide educators with easily interpreted visual representations of the areas of curricular emphasis within and across grades

"Graduated Understandings" is an umbrella term that includes the Instructional Families and the Element Cards.

To effectively plan instruction for students with significant cognitive disabilities in the Least Restrictive Environment (LRE), teachers need to understand and share a common language. Common language facilitates collaborative discussions, planning for instruction aligned to grade-level content, and implementation that utilizes effective teaching strategies and incorporates Universal Design for Learning. Least Restrictive Environments may include multi-grade, self-contained settings, resource settings and general education classrooms and students who participate in the Alternate Assessment based on Alternate Achievement Standards (AA-AAS) typically demonstrate a wide range of abilities and challenges.

UDL is a framework that can help teachers turn the challenges posed by rigorous academic standards and increasing learner diversity into opportunities to maximize learning for every student.

The Instructional Families and Element Cards are the tools that make-up the Graduated Understandingsnthat assist educators in targeting instruction in multiple settings by promoting teacher understanding of and student movement towards the content standards.

GRADUATED UNDERSTANDINGS

Instructional Families:
- Visual
- curricular emphasis within and across grades
- CCSS and LPF Learning Targets
- Element Cards:
  - Define the Essential Understandings
  - Instructional strategies, supports and scaffolds.

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The Instructional Families define the "what" – organizing the Core Content Connectors in easily interpretable visuals that illustrate the areas of curricular emphasis within and across grades by mathematics domains. They present the relationships between the Core Content Connectors, Learning Progressions Frameworks, and the Common Core State Standards.

The Element cards, when used in combination with other NCSC instructional tools, define the "how" by providing ways in which teachers can address grade-specific academic content for students with Significant Cognitive Disabilities, even if students have not had an opportunity learn this content previously. They define the Essential Understandings or big ideas, and they articulate suggested instructional strategies for teaching the content, focusing on Core Content Connectors, appropriate instructional strategies, supports and scaffolds.

These tools:
- Are to be used in conjunction with rich instructional resources (e.g., NCSC instructional resources, etc.) as indicated on the schema
- Provide challenging and attainable content for use in instruction and a thorough system of assessments that can be used to assess student understanding
- Provide guidance on how to "unpack" the instructional and assessed content
- Provide strategies for teaching challenging academic content

Before we look more closely at the Instructional Families and Element Cards, let's focus on key components.

GU's: KEY COMPONENTS

Common Core State Standards (CCSS) and your state standards:
Knowledge and skills needed to succeed in college

Learning Progressions Frameworks (LPF)
research-based pathways for learning that articulate the necessary core concepts and processes

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•The Common Core State Standards and your state standards, the Learning Progression Frameworks, and Core Content Connectors identify the knowledge and skills to be taught. They provide educators, parents, and students with clear, focused guideposts for teaching and learning.

•The grade level content standards prepare students with the knowledge and skills they need to succeed in college and work and ensure consistent expectations for all students.

•The CCSS define what all students are expected to know and be able to do; they do not determine the subjects or a course of study (" the curriculum") and do not determine how teachers should teach. While the Standards focus on what is most essential, they do not describe all that can or should be taught and they do not describe "how" to teach.

•The Learning Progressions Framework presents a broad description of the essential content and general sequencing for student learning and skill development (Hess, 2010).

•The LPFs give us the educational logic to help move students with significant cognitive disabilities along with their peers in an educationally sound way.

•The LPFs contain learning targets and progress indicators that are referenced in NCSC Instructional Resources. The progress indicators are also referenced in the Core Content Connector codes.

GU's: KEY COMPONENTS

Core Content Connectors (CCCs):

Identify the most salient grade-level, core academic content in mathematics and ELA found in both the CCSS and the LPFs

Illustrate knowledge and skills needed to reach the Learning Targets within the LPF and the CCSS

Focus on the core content, knowledge and skills needed at each grade to promote success at the next.

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Student understanding of core concepts and skills characteristically develops over time with effective instruction.   The CCCs pinpoint the primary content of the Common Core State Standards that follow the conceptual model of the Learning Progressions Framework.

The CCCs define the academic content "checkpoints" designed to frame the instruction and assessment of students with the most significant cognitive disabilities in Kindergarten through high school while retaining the grade level content focus of the CCSS and the LPFs.

The CCCs are not "extended." Rather, they are more frequent checkpoints along the learning progression pathways. The CCCs preserve the sequence of learning outlined in the Learning Progression Frameworks (LPF) to the extent possible while working the basic parts of the progress indicators into teachable and assessable segments of content.
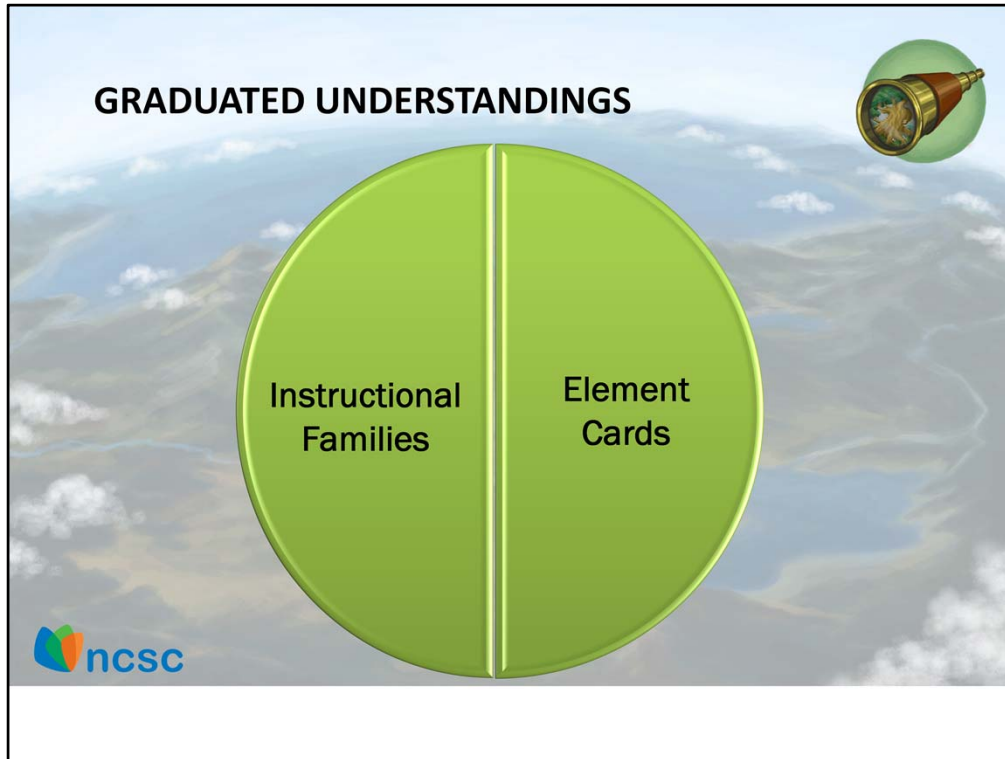
The CCCs were formatted into the Graduated Understandings which are comprised of the Instructional Families and the Element Cards. Let's first learn more about the Instructional Families – the resource that presents to teachers the Core Content Connectors and their relationship to the Common Core State Standards and the Learning Targets of the Learning Progression Frameworks.

INSTRUCTIONAL FAMILIES AND ELEMENT CARDS

Tools for teachers to:

Promote student movement (in combination with other instructional resources) toward achieving higher academic outcomes

Better understand the content of the Core Content Connectors within and across grades
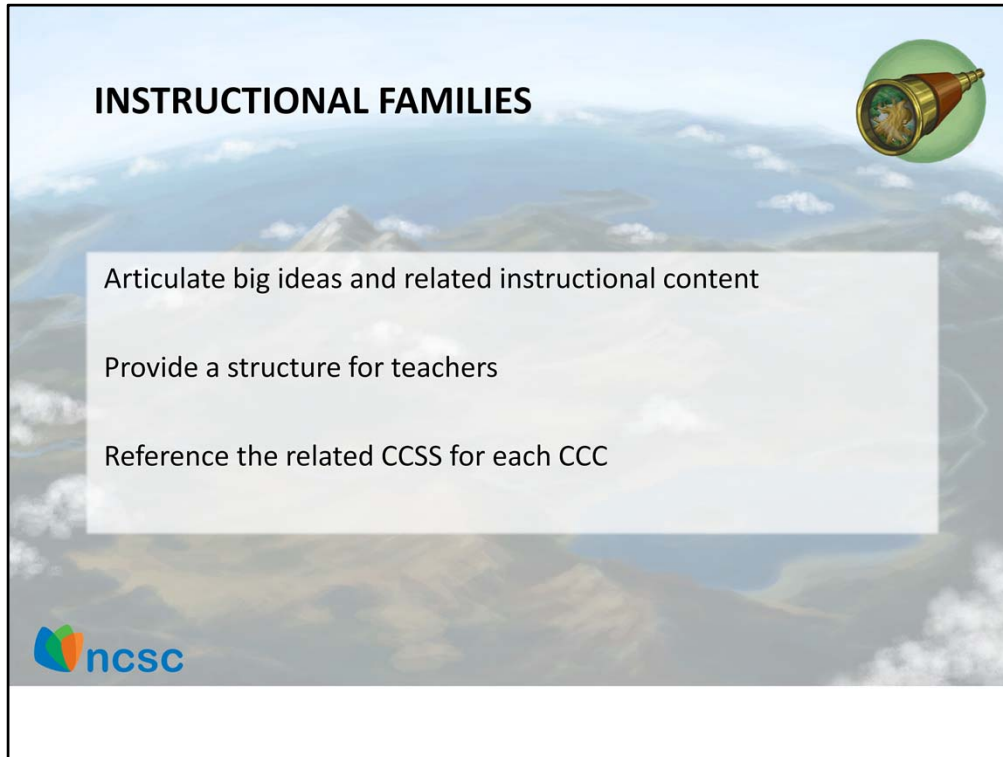
Build on their knowledge of how to address academic content with all SSCD.

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The Instructional Families and Element Cards (the Graduated Understandings) assist educators in targeting instruction by promoting understanding of and student movement toward the Common Core State Standards by:
•Reflecting the learning progressions within and across grades
•Articulating the big ideas, learning targets, and related instructional content and
•Suggesting instructional strategies, scaffolds and supports.

The Instructional Families provide educators with easily interpreted visual presentations of the areas of curricular emphasis within and across grades. Let's take a look at the three unique but related views of the families – each with a specific purpose and use.

INSTRUCTIONAL FAMILIES

Articulate big ideas and related instructional content

Provide a structure for teachers

Reference the related CCSS for each CCC

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The Graduated Understandings organize the CCCs into Instructional Families in Mathematics and English Language Arts. These families define areas of curricular emphasis and show the academic expectations within a grade and which skills (by family) are expected to develop over time to support academic success.

Instructional Families provide a way for teachers to design instructional lessons that incorporate multiple CCCs into the same lesson and address similar concepts and skills across grade levels. They are organized to aid teachers in vertical planning of instruction across multiple grades.

The Instructional Families promote student learning even when a student is just beginning to engage in and enter meaningful academic instruction; and
 promote content of the student's assigned grade level (which is chronologically age appropriate as well).

•Instructional Families are grouped to provide a structure/schema for teachers that articulate emphasized content within and across grades in mathematics. The CCCs (grade-specific knowledge, skills and abilities) are organized into Instructional Families based on the content students are expected learn.

INSTRUCTIONAL FAMILIES

Organized by LPF strand using three strategies:

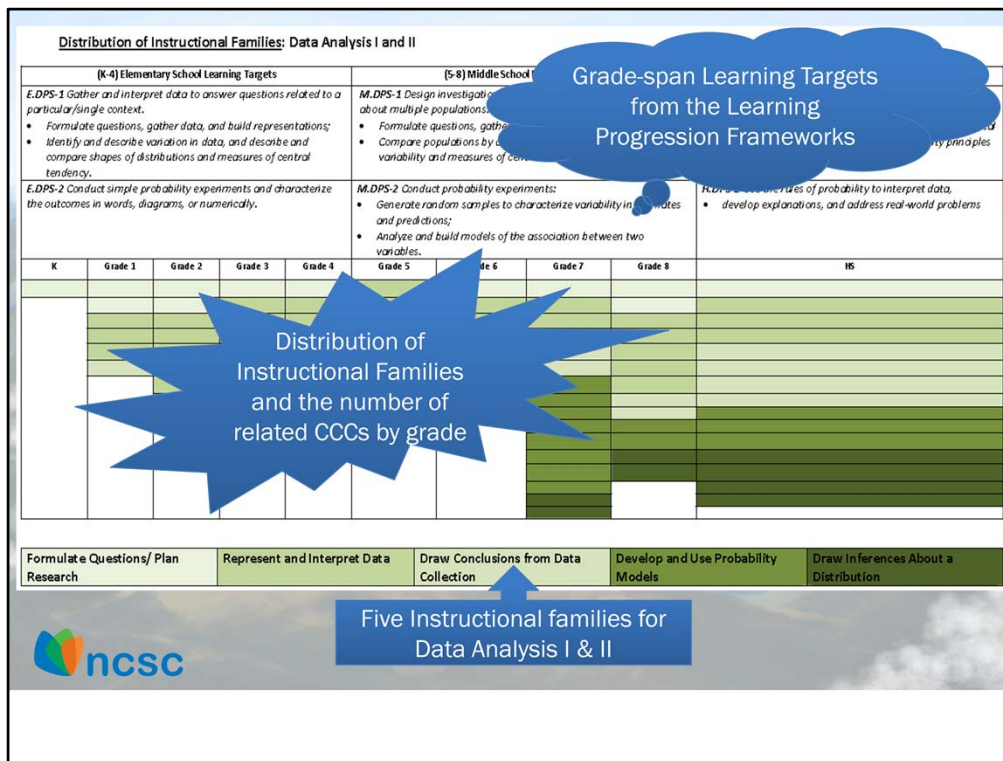By LPF Learning Targets and Instructional Families across grades

By LPF Learning Targets, Instructional Families, and CCCs by grade band

By CCSS domains, Instructional Families, and CCCs by grades K-8 and high school.

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The Instructional Families are presented in a series of tables. The tables organize information according to LPF content strands. The organization within each strand uses key pieces of information as organizing factors: the LPF learning target, the grade level or grade band, or the CCSS content domain.

Distribution of Instructional Families: Data Analysis I and II

(K-4) Elementary School Learning Targets	(5-8) Middle School...

E.DPS-1 Gather and interpret data to answer questions related to a particular/single context.
- Formulate questions, gather data, and build representations;
- Identify and describe variation in data, and describe and compare shapes of distributions and measures of central tendency.

M.DPS-1 Design investigatio... about multiple populations:
- Formulate questions, gathe...
- Compare populations by ... variability and measures of cen...

...ty principles

E.DPS-2 Conduct simple probability experiments and characterize the outcomes in words, diagrams, or numerically.

M.DPS-2 Conduct probability experiments:
- Generate random samples to characterize variability in ...ates and predictions;
- Analyze and build models of the association between two variables.

H.DPS-... use ...les of probability to interpret data,
- develop explanations, and address real-world problems

Distribution of Instructional Families and the number of related CCCs by grade

K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	...de 6	Grade 7	Grade 8	HS

Formulate Questions/ Plan Research	Represent and Interpret Data	Draw Conclusions from Data Collection	Develop and Use Probability Models	Draw Inferences About a Distribution

Five Instructional families for Data Analysis I & II

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The first view of the instructional families is a chart that illustrates the distribution and changes in emphasis of the core content, knowledge and skills that students with the most significant cognitive disabilities are expected to learn at each grade to promote success in the next grade and to reach the learning targets within the LPF and the CCSS.

As shown, the distribution of families and the **number** of CCCs in each family in a strand by grade clearly varies across grades kindergarten through high school.

This view provides for teachers an easily interpreted visual showing the areas of curricular emphasis in a strand of mathematics, by family, at each grade.

This sample view of Data Analysis I and II (DPS-1 and DPS-2) also connects the learning targets of the Learning Progressions Frameworks to the distribution of the Instructional Families and CCCs. Note that the Learning Targets become more sophisticated as you move up through the grades and that the emphasis (distribution of instructional families) changes as well.

•Students are expected to build their knowledge and be successful with more challenging concepts across the grade levels (for example, from representing and interpreting data toward drawing inferences about a distribution of data). Student mastery of skills at each grade level promotes student learning of more challenging concepts.

•The view shows the distribution and emphasis of the five instructional families and the number of related CCCs for Kindergarten through high school. For example, in grades 7 – HS, all five of the instructional families are indicated where as in grade 5, two instructional families are included.

•Given that students may receive instruction in multi-grade classrooms, a teacher can quickly see where there is an "overlap" of instructional families across grades. The teacher can then plan instruction that addresses related content within and across families at appropriate levels of instruction for different students within the same lesson.

•This view of the instructional families illustrates the distribution of families and the specific CCCs in each family by grade-band (K-4 in this example). It also reflects the instructional families and CCCs' relationship to the learning progressions by demonstrating the relationship to the elementary grade band learning target (big ideas). Additional charts in this view illustrate the overview of the CCCs by grade-bands 5 – 8 and high school.

•There is a difference in the number of CCCs in a family within and across the grade levels. This view clearly shows the instructional family emphasis and specific CCCs within and across grades
K - 4.

•In this example of the CCCs overview, the specific CCCs are indicated by families in the Strand of Data Analysis I (DPS-1).

•Three of the Instructional Families in Data Analysis, *Formulate Questions/ Plan Research; Represent & Interpret Data* and *Draw Conclusions from Data Collection*, are shown. Notice the relationship between the three families at the five grade levels (K-4).

•Note that for each CCC, there is a reference to the related CCSS.

INSTRUCTIONAL FAMILIES/CCSS DOMAINS VIEW

Related CCSS Domains for Data Analysis I

Instructional Families: Data Analysis I

CCSS Domain: Counting and Cardinality; Measurement and Data	CCSS Domain: Measurement and Data; Statistics and Probability	CCSS Domain: Measurement and Data; Statistics and Probability; Interpreting Categorical and Quantitative Data; Making Inferences and Justifying Conclusions
Formulate Questions/Plan Research	**Represent and Interpret Data**	**Draw Conclusions from Data Collection**
K.DPS.1a1 Select a question that is answered by collected data *K.CC.5*	1.DPS.1a4 Analyze data by sorting into 2 categories; answer questions about the total number of data points and how many in each category *1.MD.4*	1.DPS.1e1 Compare the values of the 2 categories of data in terms of more or less *1.MD.4*

Three Instructional Families in Data Analysis I

1.DPS.1a3 Identify 2 categories resulting from a selected question *1.MD.4*	1.DPS.1d1 Interpret a picture graph to answer questions about how many in each category *1.MD.4*	3.DPS.1k1 Apply results of data to a real world situation *No CCSS linked*
2.DPS.1a5 Select a question about 3 attributes that can be concretely represented *1.MD.4*	2.DPS.1a7 Analyze data by sorting into categories established by each question *2.MD.10*	4.DPS.1k2 Apply results of data to a real world situation *3.MD.4*
2.DPS.1a6 Identify up to 3 categories resulting from a selected question *1.MD.4*	2.DPS.1a8 Interpret the number of points in each category *linked*	5.DPS.1e1 Use measures of central tendency to interpret data including overall patterns in the data *6.SP.3*
3.DPS.1f1 Develop questions, make a plan for data collection *No CCSS linked*	Organize data by representing categorical data on a pictorial graph	6.DPS.1d5 Explain or identify what the mean represents in a set of data *6.SP.3*
4.DPS.1f2 Develop questions, make a plan for	representing continuous data on a line plot	6.DPS.1d6 Explain or identify what the mode represents in a set of data *6.SP.2*
6.DPS.1a2 Identify statistical questions and for data collection *6.SP.1*	of each category represented on picture graph t on a line plot *2.MD.9* *2.MD.10*	6.DPS.1d7 Explain or identify what the median represents in a set of data *6.SP.5*
7.DPS.1b1 Determine sample size to answer a given question *7.SP.1*	3.DPS.1g1 Collect data, organize into picture or bar graph *3.MD.3*	6.DPS.1e2 Use measures of central tendency to interpret data including overall patterns in the data *6.SP.5*

Reference to related CCSS (s)

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•The intent of this arrangement of the CCCs is to provide teachers with a clear and defined set of CCCs for each Instructional Family across **grades** (presented vertically).

•A teacher can readily see how many and which specific CCCs are identified at each grade within a family.

•In the actual document, each column contains all of the CCCs, as applicable in grades K – High School, for all of the families within a mathematics strand.

•This view also promotes planning and development of instruction with curriculum specialists within instructional families across the grades; the inter-relationships among the CCCs in a family become evident.

•This view is intended to aid teachers in vertical planning across grades to support instruction in multi-grade classrooms as appropriate and in the general education setting.

•Each Instructional Family is referenced back to the related CCSS Mathematics Domains.

ELEMENT CARDS

Intended Audiences:

Teachers, Test Developers

Element Cards provide:
- Description of the necessary knowledge and skills
- Suggested instructional strategies to teach the specific concepts and skills within CCC(s)
- Suggested supports and scaffolds

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Now let's take a look at the Element Cards.   To effectively address various entry levels for individual students into academic content across the domains of mathematics, teachers may find that the Element Cards, when used in conjunction with other instructional resources, are useful. They can be helpful when addressing grade-specific academic content for all students, planning and implementing instruction.

Test developers of both formative and summative assessments and teachers who want to develop remediation materials are challenged by the fact that SSCD are a heterogeneous group with varying entry skills/points/levels into the content standards. The intent of the element cards is to provide these test developers   and teachers with an understanding of student movement toward the CCSS.
- The element cards:
    - Identify a CCC in relation to a CCSS and a Progress Indicator of the LPF
    - Provide essential understandings that include the necessary knowledge and skills required to successfully address the content for use in intensive intervention ills and assessment development (formative and summative)
    - Provide suggested instructional strategies to teach the specific concepts and skills of the CCC
    - Provide suggested supports and scaffolds for students so they can demonstrate what they know and can do

ELEMENT CARDS

CCSS: 1.MD.4 Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another		
CCC:	1.DPS.1e1	Compare the values of the 2 categories of data in terms of more or less
Strand: Data, Probability and Statistics	Family: Draw Conclusions from Data Collection	
Progress Indicator: E.DPS.1e describing and comparing data and beginning to identify what the data do or do not show (e.g., bar graphs, line plots, picture graphs)		

Essential Understandings

Concrete Understandings:	Representation:
• Can identify groups of objects in terms of more and less • Can match numbers from a graph to numbers on a number line	• Identify and use the symbols for <, >, =

Suggested Instructional Strategies:
- Teach the concept of more or less using example, non-example; apply to data on graph
- Use or create a graph that provides a visual of the values in each category such as a bar graph
- Teach the concept of more or less using a number line

Supports and Scaffolds:
- Number line
- Snap cubes to create a concrete bar graph

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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.

Notice that we have now moved to the bottom half of the schema and are focusing on materials that support special educators in "How to teach".
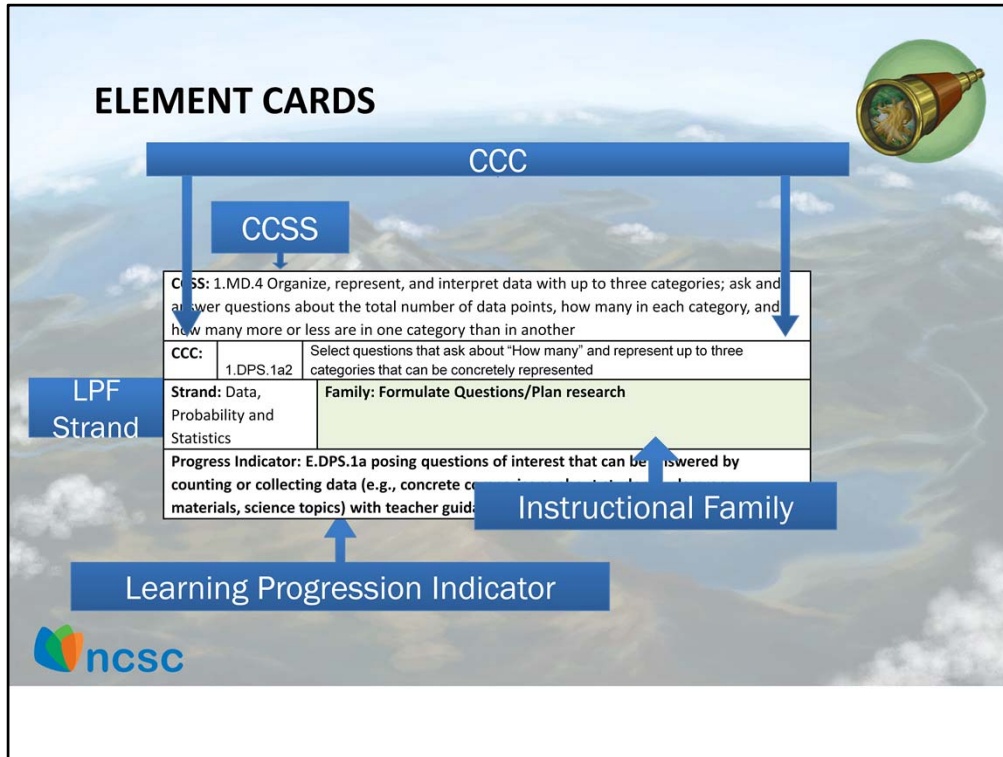
This is a example of a math **Element Card** that details its structure and content.
- •The first component of the Element Card is the **CCSS**: This is the Common Core State Standard on which the CCC is based. Remember that your state standards and the big ideas of the common core are probably very similar. For this particular card, we can see that the CCSS is1st Grade: Measurement and Data
- •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 (Data, Probability and Statistics);
- • Followed by the **Instructional Family** that contains this CCC. In this example, the instructional family is *Draw Conclusions from Data Collection*.
- •The next row on this slide provides the related **Progress Indicator** of the LPF;
- •The next row indicates the **Essential Understandings**: a **critical** component of the Element Cards.
    - •The *Essential Understandings* refer to the fundamental concepts and skills essential to entering the content and the specific symbols or referents related to the learning of these specific concepts and skills (e.g., mathematical operations of plus, minus, multiply, divide).
    - •Teachers must use their knowledge of individual learners and assessment data to determine the entry point for students to access the domain-specific content.
    - •This information is broken down into
        - •**Concrete Understandings**: the fundamental concepts and skills essential to entering the content described in the CCC at grade level.
        - •**Representation**: the application of mathematics concepts (skills) using specific representations (e.g., mathematical symbols and operations of plus, minus, multiply, divide used to solve a mathematics problem)
- •The final two rows include:
    - •**Suggested Instructional Strategies**: examples of evidenced-based strategies supporting instruction at varying levels of challenge
    - •**Supports and Scaffolds**: suggestions of possible tools and materials that assist in the promotion of understanding and engagement with concepts.

•Teachers can be challenged by the fact that SSCD are a heterogeneous group with varying entry skills and opportunities to learn the content standards; the purpose of the **Element Cards** is to provide teachers with an understanding of student movement towards the CCSS and provide guidance as to how to develop instructional lessons at varying levels of challenge that will include **ALL** students and will promote the use of Universal Design for Learning. Notice that we have now moved to the bottom half of the schema and are now focusing on materials that support special educators in "How to teach".

This is a sample of an Element Card that details its structure and content.

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 1st grade, Measurement and Data standard #4.

Next is the Core Content Connector. First we have nomenclature used to identify the CCC and following that we find the statement of the grade-specific CCC. The code for the CCC is derived from the larger grade band Progress Indicator (from the LPF).

The next row provides the related LPF Strand/Topic and the Instructional Family to which the CCC belongs. The instructional families provide the big ideas and related instructional concepts denoting a curricular emphasis

And the final row here denotes the related Progress Indicator. Progress indicators are specific skills and concepts related to the Learning Targets from the Learning Progressions Frameworks. This Progress Indicator related to this particular CCC is the Elementary Data, Probability and Statistics indicator #1a.

ESSENTIAL UNDERSTANDINGS ON THE ELEMENT CARDS

Skills to access CCSS

Mathematical Concrete:
concepts and skills to address the grade-level CCCs

Mathematical Representation:
Specific symbols or referents related to the concepts and skills (plus, minus, multiply, divide, etc.).

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The Essential Understandings are a **critical** component of the Element Cards and they refer to the necessary knowledge and skills required to successfully address the content identified in the CCSS. This information is broken down into the fundamental concepts and skills essential to address the content and the specific symbols or referents related to the learning of these specific concepts and skills (e.g., mathematical operations of plus, minus, multiply, divide).

Teachers must use their knowledge of individual learners and assessment data to determine the entry point for students to access the domain-specific content.

In this context, **Concrete Understanding** refers to the <u>fundamental mathematical concepts and skills essential to address the content described in the Core Content Connector</u> at grade level.

Representation refers to the <u>specific symbols or referents related to the learning of these specific concepts and skills</u> (e.g., mathematical symbols and operations of plus, minus, multiply, divide, etc.).

ELEMENT CARD 1.DPS.1E1

Essential Understandings

| Essential Understandings | Concrete Understandings:
• Can identify groups of objects in terms of more or less
• Can match numbers from a graph to numbers on a number line | Representation:
• Identify and use the symbols for <,>,= |

Content and Skills essential to entering CCC

Representation based learning of concepts/skills

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On the Element Cards, Essential Understandings follow the Learning Progressions Frameworks Indicators. This information tells the user what knowledge is required to successfully engage with the content. The row is entitled *Essential Understandings* on the far left.

Immediately to the right of the title, the Concrete Understandings tell the user which concepts and skills are essential for entering the content.

Immediately to the right of the Concrete Understandings, Representation notes specific symbols or referents related to the learning of these specific concepts and skills (for instance the symbols that represent the mathematical concepts of greater than, less than, and equal to).

ELEMENT CARD 1DPS.1E1

Strategies for Supporting Instruction

Suggested Instructional Strategies:
- Model selecting questions and creating categories
- Task analysis
  - Select a topic (e.g., ice cream)
  - Select a question (e.g., What is your favorite flavor of ice cream?)
  - Select categories based on your questions (e.g., chocolate, vanilla, strawberry)

Supports and Scaffolds:
- Graphic organizer with steps of task analysis
- Photos representing topics that can be the focus of the research questions (e.g.,1. ice cream, 2. animals in a zoo, 3. movies)
- Photos representing categories for topics (e.g., 1. Chocolate, vanilla, strawberry ice cream; 2. lions, monkeys, elephants; 3. Shrek, Spiderman, Journey to the Center of the Earth)

Tools/Materials that Promote Engagement

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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.
- The Supports and Scaffolds section provide 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.

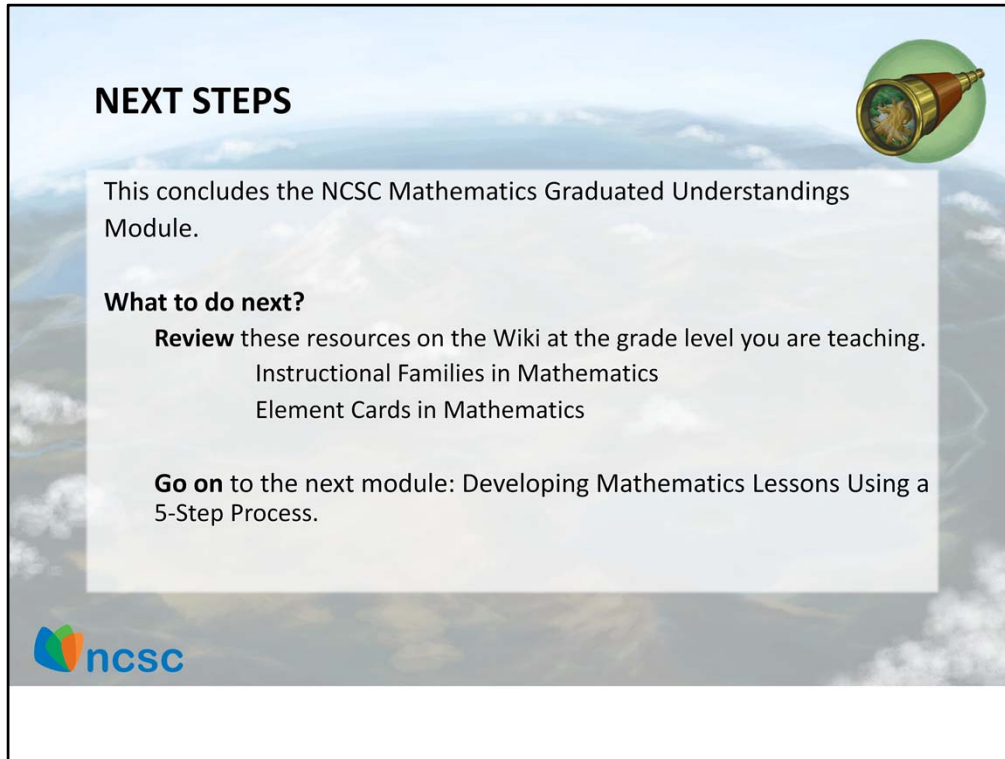**CHECK YOUR UNDERSTANDING ON ELEMENT CARDS**

Element Cards provide:

- Links to the CCSS and math content
- Links to the Progress Indicators of the Learning Progressions Frameworks
- Descriptions of grade-specific knowledge and skills
- Suggested instructional strategies
- Suggested supports and scaffolds

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The Element Cards provide teachers with a key resource to further explicate student movement toward the Common Core State Standards and math content when used as a supplement to other instructional resources.

- The Element Cards:
  - Identify a Core Content Connector in relation to a Common Core State Standard and a Progress Indicator of the Learning Progressions Frameworks
  - Provide essential understandings that include the necessary knowledge and skills required to successfully address academic skills and develop assessments (formative and summative);
  - Provide suggested instructional strategies to teach the specific concepts and skills of the Core Content Connector; and
  - Provide suggested supports and scaffolds for students to be able to demonstrate what they know and can do.

NEXT STEPS

This concludes the NCSC Mathematics Graduated Understandings Module.

What to do next?
    Review these resources on the Wiki at the grade level you are teaching.
        Instructional Families in Mathematics
        Element Cards in Mathematics

    Go on to the next module: Developing Mathematics Lessons Using a 5-Step Process.

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This concludes the NCSC Mathematics Graduated Understandings Module

What to do next?
    Review these resources on the Wiki at the grade level you are teaching.
        Instructional Families in Mathematics
        Element Cards in Mathematics
   Go on to the next module: Developing Mathematics Lessons Using a
        5-Step Process.

REFERENCES AND RESOURCES

Learning Progression Frameworks Designed for Use with the Common Core State Standards in Mathematics K-12. (Hess, Karin K., (Ed.) December 2010)

http://www.nciea.org/publications/Math_LPF_KH11.pdf

Kearns, J., Kleinert, H., Harrison, B., Sheppard-Jones, K., Hall, M., & Jones, M. (2010). *What Does 'College and Career Ready' mean for Students with Significant Cognitive Disabilities?* Lexington: University of Kentucky. (PDF : 735 Kb

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Please refer to the resources listed here for further information.