Mathematics Instruction for Students with Significant Cognitive Disabilities

VESOL Instruction Webinar

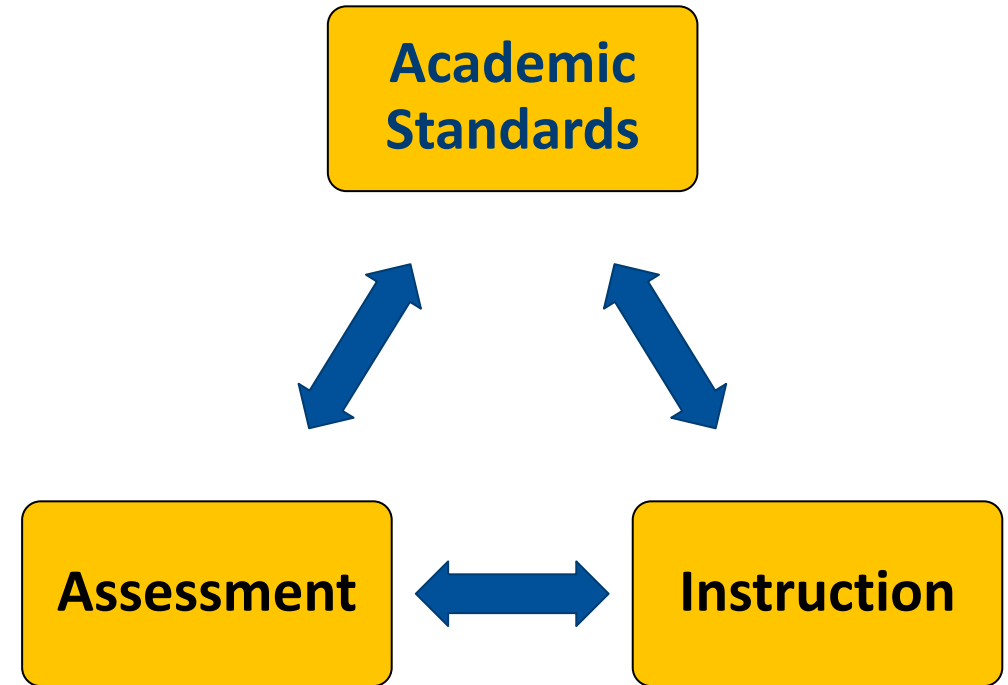**Module 4**

2022-2023

ACADEMIC EXPECTATIONS FOR STUDENTS WITH SIGNIFICANT COGNITIVE DISABILITIES

To meet academic expectations, classrooms must reflect the important connection and alignment between:

• Content (academic standards),

• Teaching of content (instruction) and

• Evaluation of learning (assessment).

Each element is inter-related, and they must be closely aligned, work together, and reinforce one another.

Virginia Essentialized Standards of Learning (VESOL)

- The VESOL are academic content standards for reading, mathematics and science that are derived from the SOL but reduced in depth, breadth and complexity.

- The VESOL were developed by VDOE staff in partnership with Behavioral Research and Teaching (BRT) at the University of Oregon and Virginia special educators from 27 school divisions.

- VESOL for reading and math are available for grades 3-8 and high school.

- VESOL for science are available for grades 5, 8, and high school.

- VESOL are available on the VAAP Page of the Virginia Department of Education website.

THE PURPOSE OF THIS WEBINAR

This webinar is designed to target math instruction for VESOLs.

Topics addressed in this webinar will include:

- Number Sense as a foundation for Mathematics
- Planning Instruction
- Math Instructional Strategies
- Using CRA with Students with Significant Disabilities
- Integrating Mathematics Throughout the School Day
- Instructional Resources
- Frequently Asked Questions

Module 4 Webinar Schedule 2022-2023

Wednesday, December 7, 2022   **3:00pm-4:30pm**

Tuesday, December 13, 2022   **10:00am-11:30am**

Wednesday, December 14, 2022   **12:30pm-2:00pm**

Thursday, December 15, 2022   **10:30am-12:00pm**
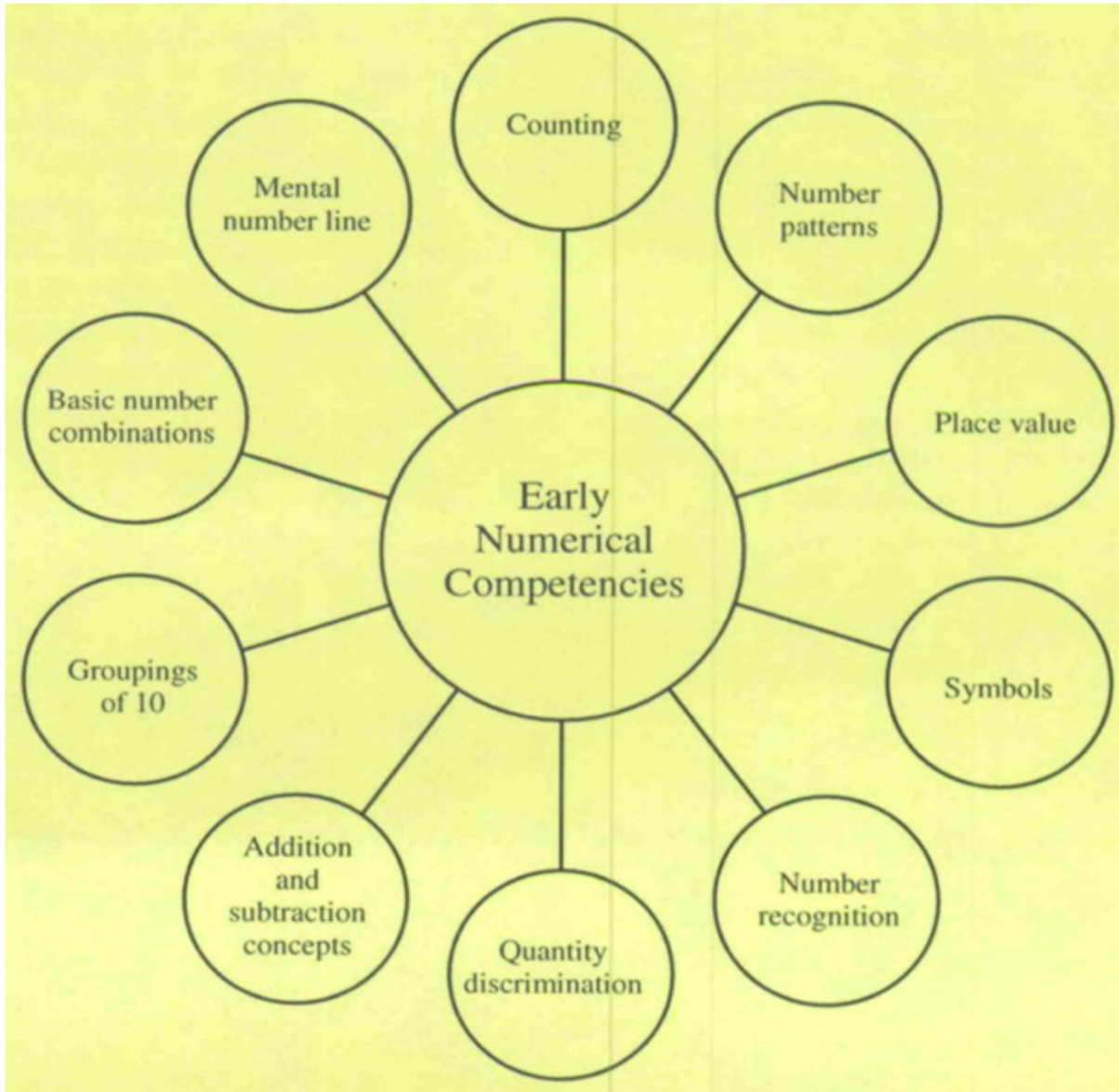
ABOUT MODULE 4 WEBINAR 2022-2023

- During this module, please wait until the end of the presentation to submit your questions since some may be answered during the presentation.

- Questions may be submitted to Virginia Department of Education (VDOE) staff using the Q & A feature located at the bottom of your screen.

- This module will be recorded and available on the VDOE website after all presentations are completed.

- Due to the number of participants, Certificates of Participation will not be issued by VDOE.

Number and Number Sense

The Foundation for Mathematics

NUMBER SENSE- WHAT IS IT?

Powell SR, Fuchs LS. Early Numerical Competencies and Students with Mathematics Difficulty. Focus Except Child. 2012 Jan;44(5) 1-16. PMID: 23997274; PMCID: PMC3756513.

- Understanding the meaning of numbers
- Recognizing the magnitude (size) of numbers
- Thinking about and representing numbers in multiple ways
- Organizing by sorting, comparing, ordering, and labeling
- Developing concrete understanding of quantity
- Developing flexibility, automaticity and fluidity with numbers.

NUMBER AND NUMBER SENSE IN INSTRUCTION

Daily number sense routines

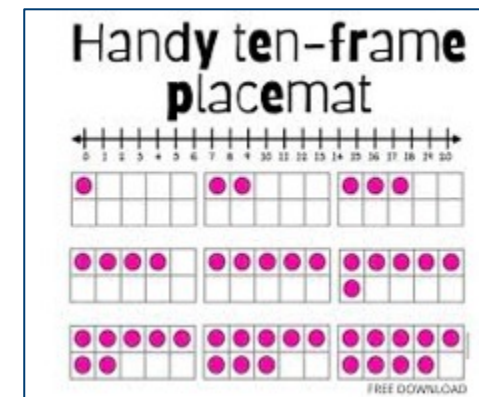• Counting routines

• Visual routines

• Playing with quantities
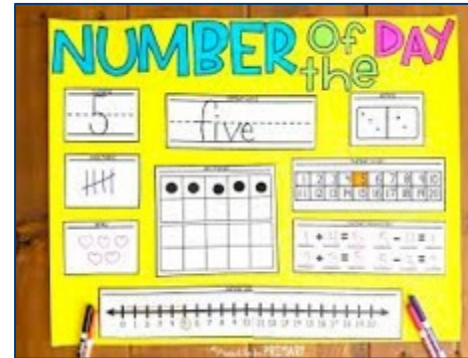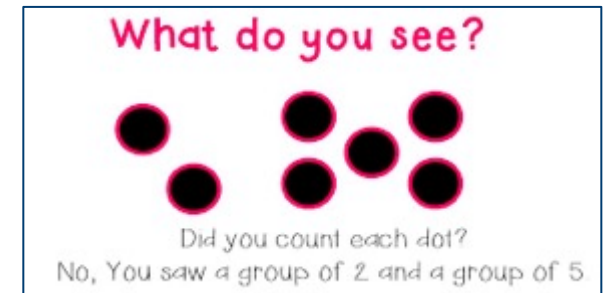
Supporting practices

• Build community and peer supports

• Throughout the day in all settings

• Include families (share routines)

IMPORTANCE OF NUMBER SENSE TO STUDENTS WITH SIGNIFICANT COGNITIVE DISABILITIES

Functional Skills
- **Counting:** Helps in money skills, finance, budget
- **Quantity identification**: Helps in shopping and holding or moving things
- **Number patterns:**   Useful for reading schedules

START WITH THE COMPLEXITY CONTINUUM

M-HS.8

The student will:

Match the graph on a number line with the correct inequality.

Complexity Continuum:

The graph on a number line could represent an inequality with descriptive words or the symbols <, >, ≤, or ≥.

What Is this Math VESOL About?

Unpacking Resources

- Mathematics Vertical Articulation Grades 3-HS VESOL by Strand Concepts

- Math VESOL to SOL Crosswalks

- Consult with other educators with content knowledge (ex. Mathematics Specialists)

Questions to Answer

- What do students need to **KNOW**?
- What do students need to **UNDERSTAND**?
- What do students need to **DO**?
- What **PREREQUISITES** are needed?
- What **REPRESENTATIONS** are used?
- What are common **MISCONCEPTIONS**?

Unpacking M-HS.8

What do students need to know and understand?	What do students need to do?	What are earlier math VESOL and SOL connections?	Representations needed?	What vocabulary is part of this VESOL?
What is an inequality? Descriptive words and symbols <, >, ≤, or ≥. How to read a graph and number line	Match the graph on a number line with the correct inequality.	M-6.16 M-7.14 M-8.14 (SOL 6.14a) (SOL 7.13) (SOL 8.18)	Graph Number line Symbols < > ≤ ≥ Manipulatives	Less than Greater than Less Than or equal to Greater Than or equal to

Math Instructional Strategies

CRA: CONCRETE-REPRESENTATIONAL-ABSTRACT
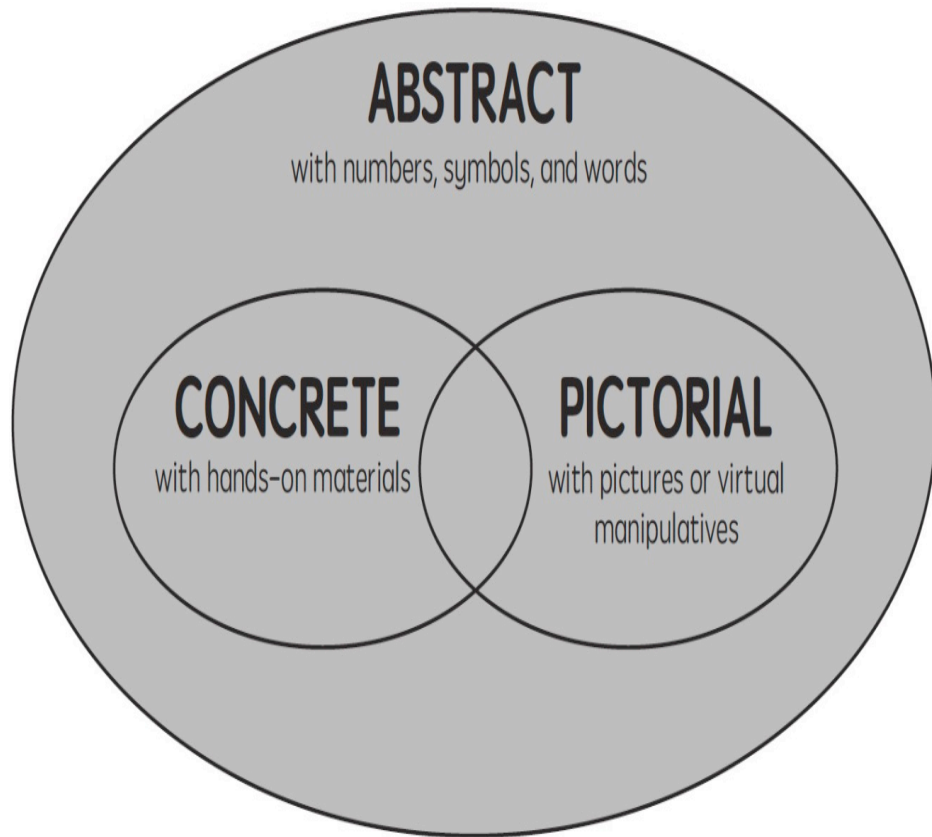
C-R-A is presented as a framework in which the concrete, representational (pictorial), and abstract forms of mathematics work collaboratively to facilitate students' deeper understanding of mathematics concepts.

For Additional Information on CRA:

Webinar: Evidence Based Specifically Designed Instruction in Mathematics

Kristin Williams-Faus   December 17, 2020

Concrete Phase

- Use physical objects you can touch and move

- Model the concept

- Adapt the manipulatives to meet the student's needs

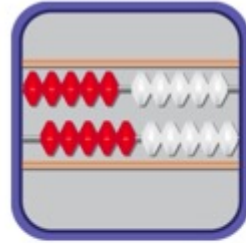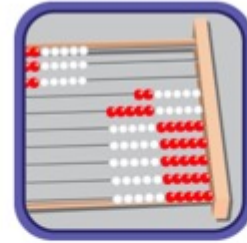# Virtual Manipulatives

Unifix Cubes

Ten Frames

Number Lines

20-Bead Rekenrek

100-Bead Rekenrek

Two-Color Counters

120 Number Board

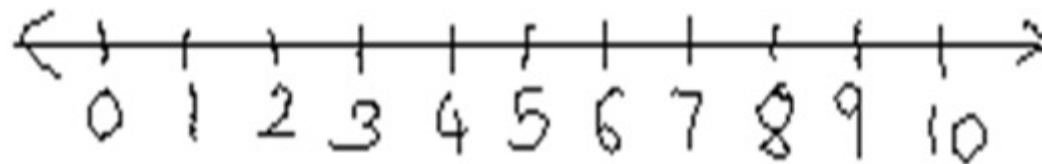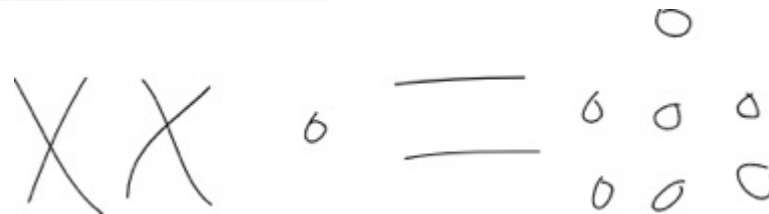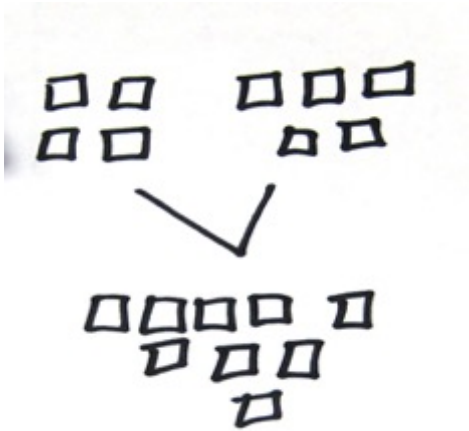Color Tiles

Base Ten Blocks
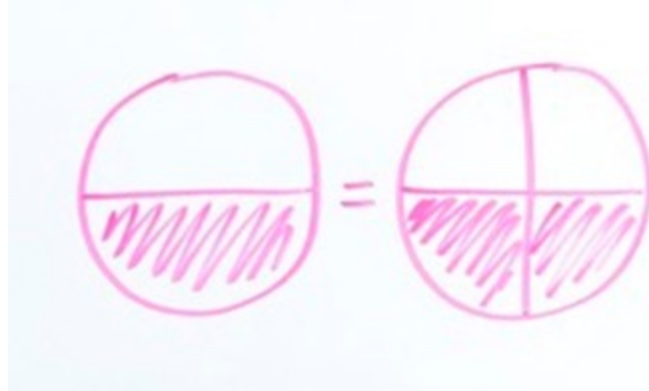
Math Balance

Dice

Spinners

REPRESENTATIONAL PHASE
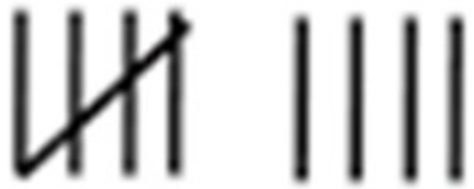
2 Dimensional
- Pictures
- Drawings
- Symbols

Abstract Phase

$$2x + 1 = 7$$
$$\underline{- 1 - 1}$$
$$\frac{2x}{2} = \frac{6}{2}$$
$$x = 3$$

$$\frac{1}{2} = \frac{2}{4}$$

$$3 < 5$$
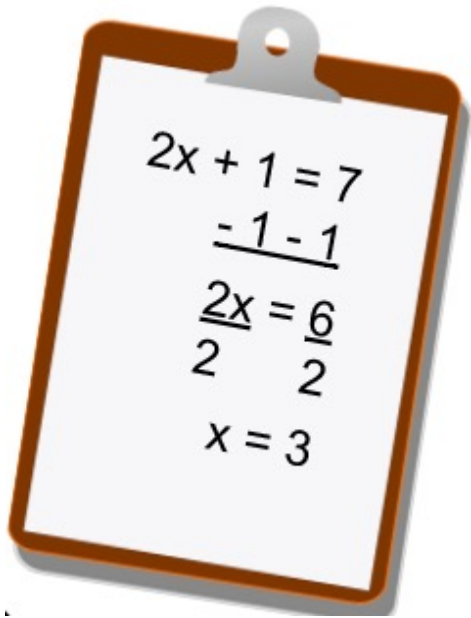
- Numbers
- Mathematical Symbols

$$3 \times 4 = 12$$

$$23 + 15 = 38$$

$$4 + 5 = 9$$

CRA (Concrete-Representational-Abstract)

M-8.13

The student will: Solve one- and two-step linear equations with one variable and solutions from 0 through 20.

Complexity Continuum:

Equations could range from having one step of addition, subtraction, multiplication, or division to having two steps with two different operations.
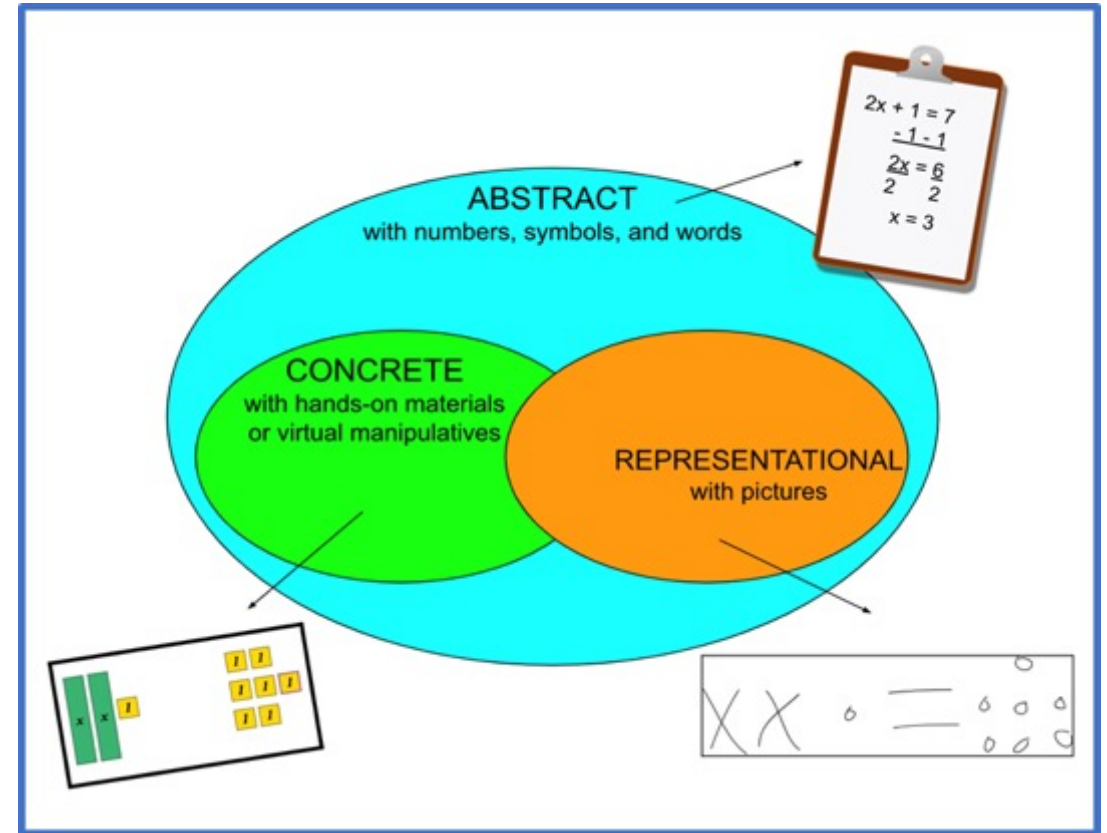
- Does not have to be linear/discrete
- Can pair 2 phases at a time or use all 3 phases
- Three ways that show the same concept. Not 3 different concepts.

Pablo had 2 cookies. Lucas gave him some more cookies.
Now Pablo has 5 cookies. How many cookies did Lucas give Pablo?

Kia had 5 cats. 3 of them were adopted. How many cats does Kia have left?
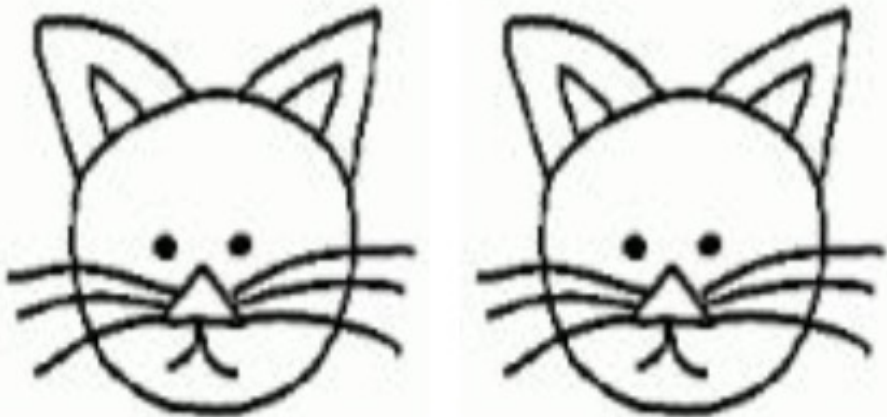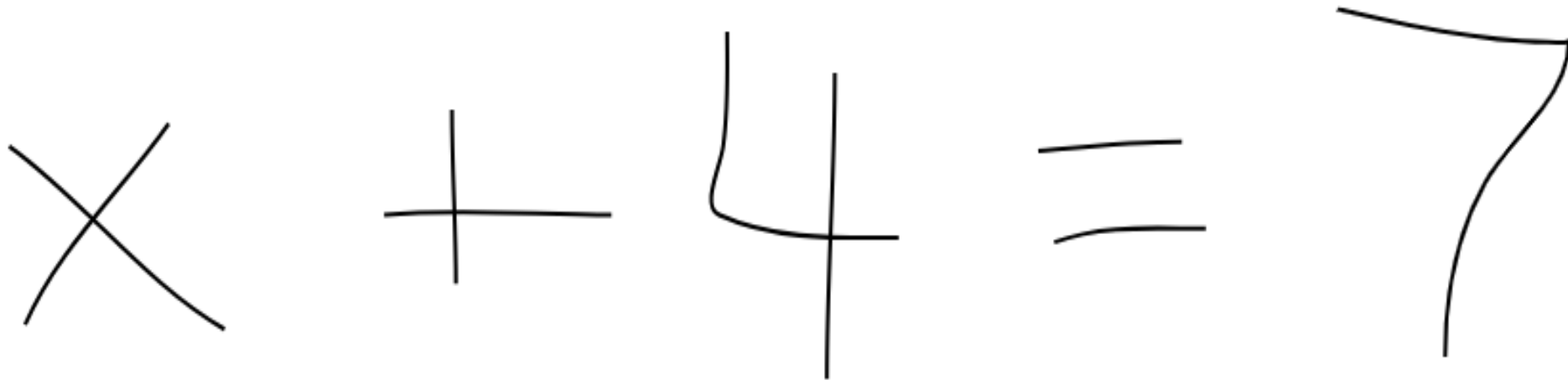
REPRESENTATIONAL

ABSTRACT EXAMPLES OF CRA FOR VESOL 8.13

Danai had some Skittles. Her friend gave her 4 more Skittles. Now Danai has 7 Skittles. How many Skittles did Danai start with?

ABSTRACT

$$x + 4 = 7$$

EXPLICIT INSTRUCTION

Explicit instruction often is described as the cornerstone of effective mathematics instruction for students with learning difficulties (Hudson et al., 2006; Jitendra et al., 2018; Witzel et al., 2003).

There are three main components of explicit instruction:

- **Modeling:** facilitated by the teacher
- **Practice:** involves the students and the teacher
- **Supports:** consist of an ongoing dialogue between the teacher and students. Supports are employed during modeling and during practice. Supports are described within the explanations of modeling and practice.

Evidence Based Specially Designed Instruction in Mathematics Resources Guide

Details for Explicit Instruction

- Identify the learning objective
- Scaffold information into chunks
- Clear explanations with modeling
- Verbalize thought process
- Provide opportunities for practice
- Give feedback

Modeling	Practice
Clear Explanation	Guided Practice
Planned Examples	Independent Practice

Supporting Practices
- Asking the right questions
- Eliciting frequent responses
- Providing immediate specific feedback
- Maintaining a brisk pace

USING CRA WITH STUDENTS WITH SIGNIFICANT COGNITIVE DISABILITIES

Based on two student profiles

Learner Variability

Vary in:
- Background knowledge
- Physical ability
- Prerequisite skills
- Conceptual understanding

STUDENT PROFILE: MICHAEL 6TH GRADE

- Down's Syndrome, excellent gross motor skills
- Minimal verbal communication, vivid facial expressions, gestures, Picture Exchange System
- Eager to please adults, enjoys working with peers, very social, short attention span, easily distracted
- Enjoys using the computer, operates computer mouse independently, slowly locates letters on keyboard
- Identifies most letters and about 20 sight words

- Handwriting is largely illegible
- Loves manipulatives
- Uses a number line to identify and count numbers 0-50, matches 0-50 to a set of objects, orders 1-50.
- Compares numbers 0-50 and understands smaller, larger, and same.
- Has difficulty understanding decimal numbers, fractions, and mixed numbers.
- Uses a calculator independently for math computation

28

Student profile: Lucy 6th Grade

- Spastic quadriplegic cerebral palsy
- Seizure disorder which is generally controlled with medication
- Uses a manual wheelchair for mobility with assistance
- Uses right hand to manipulate larger items and uses left hand for stabilization
- Uses an augmentative communication device to communicate basic needs, comments, and choices; able to use right hand to access communication

- Legally blind
- Sorts up to 5 objects based on color, shape, size
- Selects the correct numeral (1-9) that corresponds with a set of objects or image of a group of shapes
- Identifies the numeral that comes next in sequence (4, 5, ___) up to 9
- Uses a large voice output calculator for single-digit computation

Compare whole numbers 0 through 80 on a number line.

Depth of Knowledge (DOK) Level 2 - Application

Parameters – range of numbers

Math Tool

VESOL Code (SOL Code)	VESOL Text Complexity Continuum
M-6 3 (SOL 6.3b)	The student will: Compare whole numbers 0 through 80 on a number line. Complexity Continuum: Whole numbers 0 through 80 could be compared with the words "smaller," "larger," "same," or with the symbols <, =, >.

UNPACKING M-6.3

What do students need to know and understand?	What do students need to do?	What are earlier VESOL and SOL math connections?	What representations are needed?	What vocabulary is part of this VESOL?
How to compare whole numbers	Compare numbers from 0-80 using words or symbols on a number line	M-3.3 M-4.4 M-4.6 (SOL 3.1c) (SOL 4.2a) (SOL 4.3c)	Symbols and number line > Greater than < Less than = Equal	Smaller, Larger, and Same Greater than, Less than, and Equal

M-3.3 The student will: Compare whole numbers from 0 through 20.
Complexity Continuum: Whole numbers 0 through 20 could be compared with the words "smaller," "larger," "same," or with the symbols (>, <, or =).

M-4.4 The student will: Compare whole numbers from 0 through 40 or the fractions of 1/2 and 1/4.
Complexity Continuum: Whole numbers 0 through 40 and fractions 1/2 and 1/4 could be compared with the words "smaller," "same," "larger," or "less than," "equal," "greater than," or with the symbols (>, <, or =).

M-4.6 The student will: Compare whole numbers from 0 through 40 or decimals from 0.0 through 5.5.
Complexity Continuum: Whole numbers from 0 through 40 or decimals of 0.5 through 5.5 (0.5, 1.0, 1.5, 2.0, … ,5.5) could be compared with the words "smaller," "larger," "same," "less than," "equal," "greater than," or with the symbols.

ACTION DICTIONARY

Action Dictionary™

Action Dictionary Table of Contents

compare

to determine relative amounts or sizes by looking at two or more items, sets, or numbers

Students compare amounts, numbers, and sizes.

Example 1

The student chooses a set with more, less, or equal or the fraction circle with greater or fewer equal parts.

Instructor: The instructor shows a set of objects or fraction circle (white). The instructor places cubes or fraction circles (colored) in pocket chart to represent three choices of amounts (two matching one foil). Adjust choices based on individual needs and abilities. Errorless learning: place all three correct items.

Student: The student points to, eye gazes, touches, or verbally selects amount that is more, less, or equal to set of objects or fraction circle that has the same number of equal parts, e.g. choose pink fraction circle (sixths) to match shown white fraction circle (sixths). Errorless learning: any choice is correct.

pocket chart with objects *pocket chart with fraction circles*

Example 2

The student chooses symbol with more, less, and equal to compare sets or numbers.

Instructor: The instructor places three choices (two correct, one foil) of pic-symbols for more, less, and/or equal symbols in pocket chart. Adjust choices based on individual needs and abilities. Errorless learning: place all three correct items. Option: for comparing large numbers, instructor writes each number on place value chart, one above the other to compare number and size of digits.

Student: The student chooses the symbol to describe comparison of designated sets or numbers. Errorless learning: any choice is correct.

Example 3

The student uses ruler to compare length of two lines or shape sides.

Instructor: The instructor fastens ruler to plastic tray and places one line above and one line below to compare. The instructor marks the ends of both lines on the ruler for clarity. The instructor gives choices (two correct, one foil) of pic-symbols for more, less, and/or equal. Adjust choices based on individual needs and abilities. Errorless learning: place all three correct items.

Student: The student chooses more, less, or equal to compare the top with the bottom line. Errorless learning: any choice is correct.

plastic tray

Example 4

The student uses a balance scale to compare weight.

Instructor: The instructor gives choices (two correct, one foil) of pic-symbols for more, less, and/or equal. Adjust choices based on individual needs and abilities. Errorless learning: place all three correct pic-symbols. The instructor places two weights on either side of scale, points to first weight and asks, "More, less, or equal?"

Student: The student chooses more, less, or equal to compare the first with the second weight. Errorless learning: any choice is correct.

balance scale

compare

to determine relative amounts or sizes by looking at two or more items, sets, or numbers

Students compare amounts, numbers, and sizes.

Example 5

The student says "same" or "different" with a communication device when comparing two objects.

Instructor: The instructor records "same" and "different" on each button of the iTalk2™ or on two Talking Brix™ and fastens matching pic-symbols. Show two objects. Ask, "Are these the same or different?" Option: choose a specific attribute to determine if same or different, e.g. "Is the color the same or different?"

Student: The student activates the iTalk2™ or Talking Brix™ to choose "same" or "different."

iTalk2™ communicator *Talking Brix™*

Example 6

The student compares attributes.

Instructor: The instructor places two objects on table and three colors in pocket chart representing colors present in objects plus one foil. Point to first object. Say, "Show the color that matches this object." Repeat with second object. Option: repeat with size or shape. Errorless learning: all choices match.

Student: The student chooses the object that matches the color. If both objects match the same color, show the color attribute is the same. Errorless learning: any choice is correct.

pocket chart

Example 7

The student uses a multiple message communicator to describe similarities and differences.

Instructor: The instructor records the words "color," "size," "shape," "same," and "different" on the SuperTalker™ or QuickTalker® with matching pic-symbols attached. Show two objects, shapes, or pictures.

Student: The student chooses an attribute and the word "same" or "different" to compare attributes.

SuperTalker™ communicator *QuickTalker® communicator*

Example 8

The student uses a fraction model to compare fractions.

Instructor: The instructor gives choices (two correct, one foil) of pic-symbols for yes and no. The instructor places two fractions with different denominators on fraction model post. The instructor asks "Are these equivalent?"

Student: The student compares fractions to determine equivalence and chooses yes or no.

fraction model

Mathematics Vertical Articulation Grades 3 – HS VESOL by Strand Concepts
Adapted from 2016 Mathematics Vertical Articulation Grades K-Algebra II SOL by Strand Concepts
* Please see last page for directions for use*

NNS = Number and Number Sense; C&E = Computation and Estimation; M&G = Measurement and Geometry; P&S = Probability and Statistics; PFA = Patterns, Functions, and Algebra

NNS-STRAND CONCEPT		Grade K	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	HS
Number Identification and Representation	VESOL				M-3 1	M-4 1					
Number Identification and Representation	SOL	K.1ab; K.3abcd; K.4ab	1.1abcd; 1.2a; 1.3; 1.5ab	2.1ab; 2.2ab; 2.3ab	3.1a	4.1a					
Whole Number and Decimal Rounding	VESOL				M-3 2	M-4 3	M-5 1				
Whole Number and Decimal Rounding	SOL			2.1d	3.1b	4.1c; 4.3b	5.1				
Rational Numbers - Compare and Order	VESOL				M-3 3	M-4 2 M-4 4 M-4 6	M-5 3	M-6 3	M-7 1 M-7 2	M-8 1	
Rational Numbers - Compare and Order	SOL	K.2ab	1.2bc	2.1c; 2.4c	3.1c, 3.2c	4.1b; 4.2a; 4.3c	5.2b	6.2b; 6.3b	7.1b, c	8.1	

Linked in the Table of TTAC Online Resources

Learning and Teaching with Learning Trajectories

Comparison Senser: Foundations

Early Comparison Corresponder

Perceptual Comparer

First-Second Ordinal Counter

Early Comparer of Similar Items

Early Comparer of Dissimilar Items

Matching Comparer

Counting Comparer (Same Size)

Spatial Extent Estimator—Small/Big

Counting Comparer (5)

Mental Number Line to 5

Serial Orderer to 5 (Comparing Number)

Ordinal Counter

Counting Comparer (10)

The Mysterious Cookie Jar

Small Group

Mr. MixUp [Counting Comparer (10)]

Small Group

Cube Towers - Which Has More, Which Has Fewer?

Small Group

Flip to Compare [to 10]

Name Frame

Whole Group

INSTRUCTIONAL FOCUS FOR MICHAEL M-6.3

Based on Michael's profile, he is familiar with the number line, identifying numbers 0-50 and counting objects 0-50. He can compare numbers 0-50 and understands the vocabulary: smaller, larger and same. These skills show that Michael's previous learning has includes M-3.4, M-4.4 and M-4.6).

In grade 6, Michael will continue to build on these skills by:

- Expanding his identification of numbers and counting of sets to 51-80.

- Continuing to use the number line.

- Comparing numbers 0-80 using symbols <, >, and = (as stated in the Complexity continuum for M-6.3).

SETT Framework for AT Consideration

Student	Environment	Task	Tool

Michael's SETT Framework

Student	Environment	Task	Tool
Strengths: Gross motor skills, social skills, computer skills. Weaknesses: Attention, hand writing, limited communication skills.	Inclusive 6th grade classroom	Handling math manipulatives.	Non-slip surface grip (like shelf liner/protector or Dycem)

Using CRA with Michael

Concrete Phase

- Use Base-ten materials to have Michael group objects in tens (bundling 10 popsicle sticks or connecting 10 unifix cubes).

- Count groups of 10's to grasp the numbers 50, 60, 70, 80 and assign the appropriate number to each set.

- Add additional manipulatives, so Michael can count 51, 52, 53. Assign the appropriate number to each group of manipulatives.

- Review smaller, larger and same using manipulatives and numbers.

- Provide multiple opportunities to practice with other manipulatives and the number line.

- Once he has demonstrated mastery of identifying numbers and counting sets 51 -80. (Mastery may be 5 out of 5 correct on 3 consecutive days) move to the Representational Phase.

Based on *Concrete-to-Representational-to-Abstract Instruction*

www.specialconnections.ku.edu

Representational Phase

- Draw sets (51-80) using tally marks, dots, circles or other simple drawings to represent the manipulatives used in the concrete phase. Michael may also be able to use the computer for making sets and assigning the correct number.

- Review smaller, larger and same using drawings and numbers.

- Give Michael multiple opportunities to practice identifying or drawing sets to represent smaller, larger and same.

- Once he has demonstrated mastery of identifying smaller, larger and same with drawings and numbers, move to the Abstract Phase. (Mastery may be 5 out of 5 correct on 3 consecutive days.)

Based on *Concrete-to-Representational-to-Abstract Instruction*

www.specialconnections.ku.edu

USING CRA WITH MICHAEL- ABSTRACT PHASE

Abstract Phase

- Use concrete objects, simple drawings and numbers (51-80) to compare using target vocabulary: smaller, larger, and same.

- Introduce symbols paired with vocabulary: smaller, larger, same. Symbols may need to be introduced one at a time beginning with same and =.

- Compare numbers on number line with assign symbols and vocabulary.

- Give Michael multiple opportunities to practice comparing numbers using his number line.

- Once he has demonstrated mastery of comparing numbers 51-80 using a number line continue to review using classroom games & activities, worksheets and homework assignments. (Mastery may be 5 out of 5 correct on 3 consecutive days).

Based on *Concrete-to-Representational-to-Abstract Instruction*

www.specialconnections.ku.edu

USING CRA WITH MICHAEL VIDEO

Using a manipulative number line and two identified

points, use symbols >, <, and = to compare
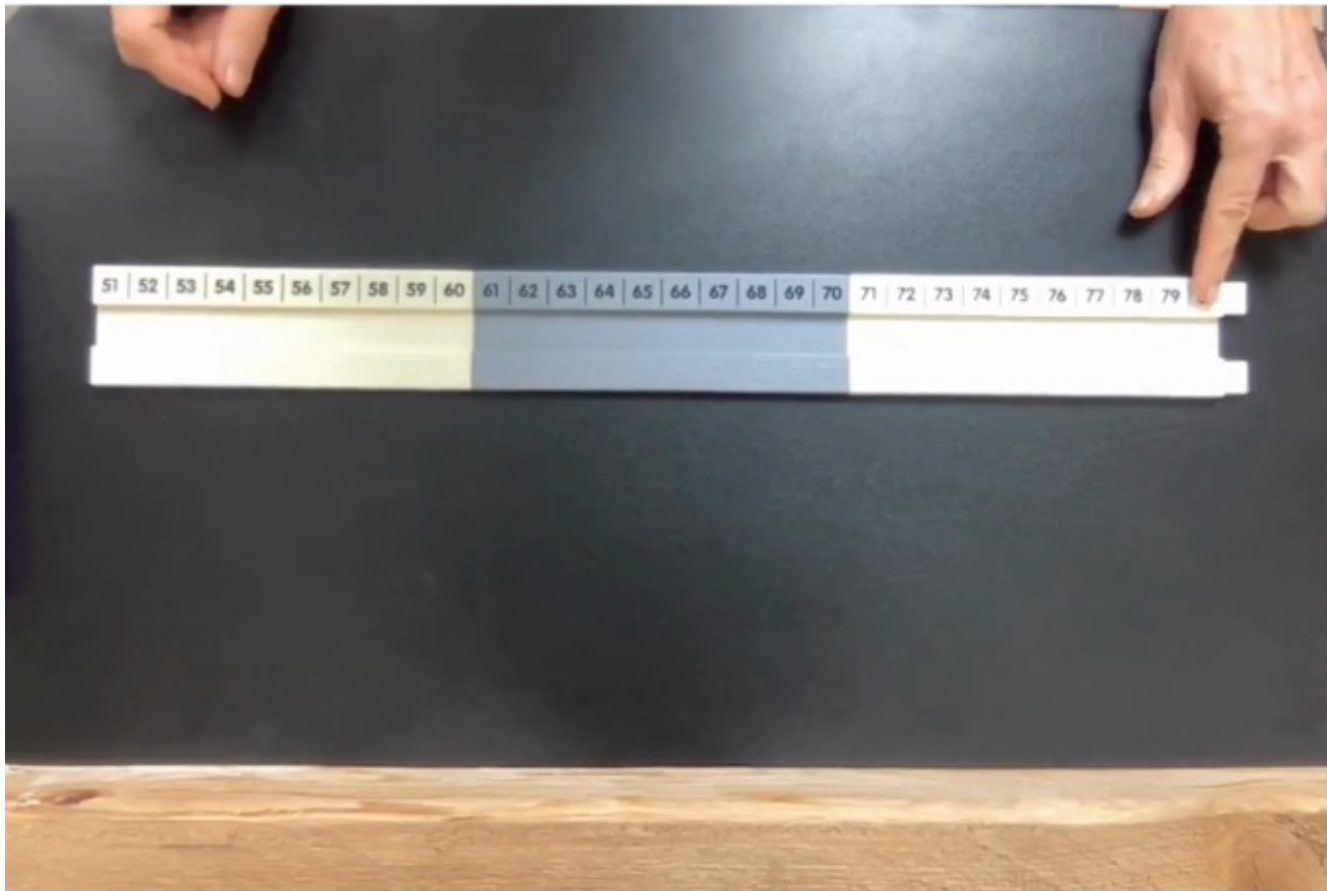
Additional CRA Practice for Michael for VESOL M-6.3

- Use a number line from 0 to 80 with points on 2 numbers. Ask Michael to put the correct number of counters above the two points and decides which one is larger. **(Concrete)**

- Use a number line with a point on one number and ask Michael to identify a number larger than the number and a number smaller than the given number. **(Representational)**

- Use a number line with two points and have Michael identify the symbol that compares the numbers. <, >, = **(Abstract)**

- Use a number line with one dot at 15 and an inequality statement.   15 < [blank]. Ask Michael to select a number that makes the statement true. The inequality symbol may or may not be read to the student. **(Concrete, Representational, Abstract)**

Instructional focus for Lucy M-6.3

- Based on Lucy's profile, she sorts up to 5 objects based on color, shape and size; selects the correct numeral (1-9) that corresponds with a set of objects or image of a group of shapes and identifies the numeral that comes next in sequence (4, 5, ___) up to 9. Lucy is visionally impaired and physically challenged.

In grade 6, Lucy will continue to build on these skills by:

- Expanding her identification of numbers and counting of sets to double digits.
- Introduce the number line.
- Introduce vocabulary: smaller, larger and same.

Lucy's SETT Framework

Student	Environment	Task	Tool
Strengths: Experience using AAC device and making appropriate selections. Familiarity with numerals and sequence. Weaknesses: Gross/fine motor skills. Limited verbal communication	Inclusive 6th grade classroom	Counting objects and answering/ communicating the total audibly.	Dynamic AAC device and/or app with all the answer choices Lucy needs.

USING CRA WITH LUCY- CONCRETE PHASE

Concrete Phase

- Develop concept of numbers beyond 9 (10 -20) by "counting" familiar concrete objects found in her environment.
- Provide multiple opportunities to practice counting objects, and sorting objects into groups based on size, shape and color.
- Incorporate Lucy's communication device so that she can respond.
- Once Lucy has demonstrated mastery of identifying numbers and counting sets of objects 1-20. (Mastery may be 10 out of 10 correct on 3 consecutive days)

USING CRA WITH LUCY

Concrete & Representational Phase

- Introduce the concept of same and different, beginning with same by having Lucy identify concrete objects that are the same based color, size, and tactile properties.
- Continue to work on the concept of same using pictures.
- Once Lucy has demonstrated understanding the concept of "same" using objects and pictures, move to the abstract phase using numbers. (Mastery may be 10 out of 10 correct on 3 consecutive days).

Teaching Lucy Same and Different- Color

Visually Distinctive Concrete Objects (Color)

Teaching Lucy Same and Different- Tactile

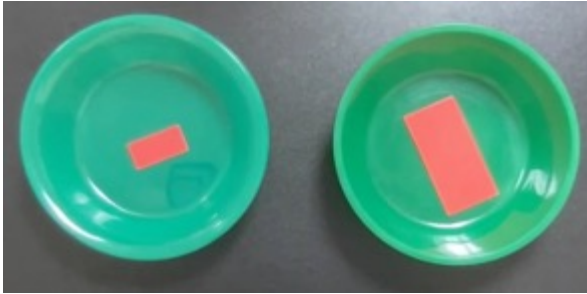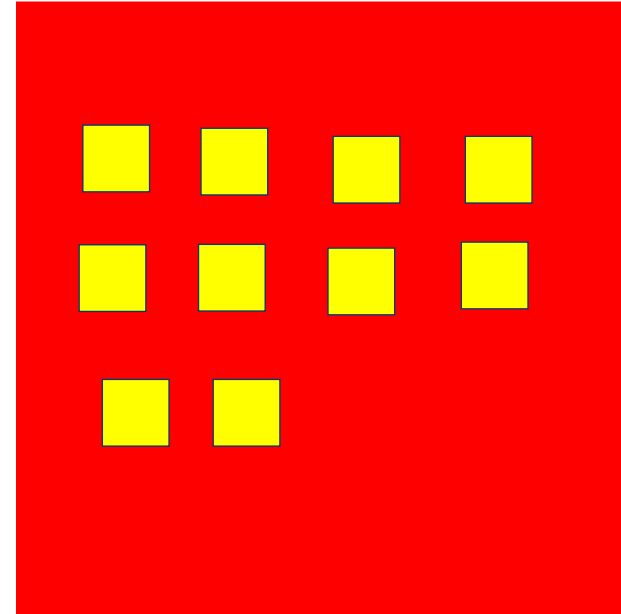Tactually Distinctive
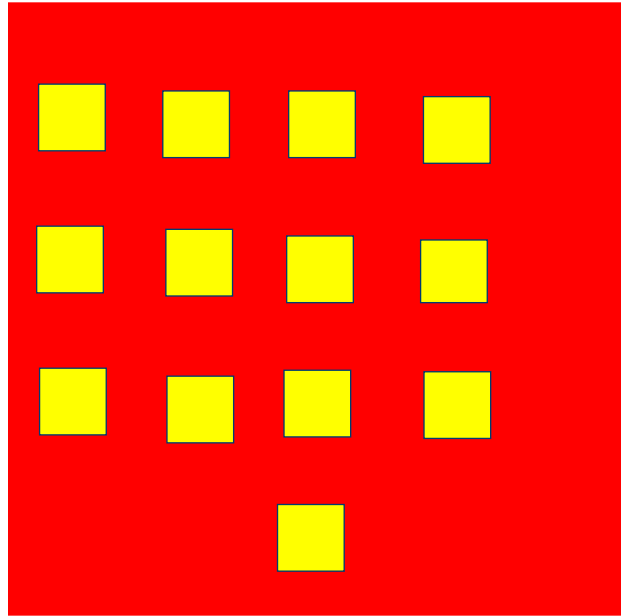

Sandpaper

Cotton balls

TEACHING LUCY SAME AND DIFFERENT PREPARED MATERIALS

Are these the same?

Teaching Lucy Same and Different- Similar Pictures

Do the pictures have the same number of blocks?

Concrete, Representational and Abstract Phases

- Use concrete objects, pictures and numbers to determine same, smaller and larger.

- Introduce the number line.

- Provide multiple opportunities to practice comparing using manipulatives, pictures, and numbers.

- Once Lucy has demonstrated mastery of smaller, larger, and same move to more practice using the number line. (Mastery may be 5 out of 5 correct on 3 consecutive days)

Concrete and Abstract Phase

Teach concept of "smaller" and "larger" using manipulatives and tactile numbers - transition to number lines
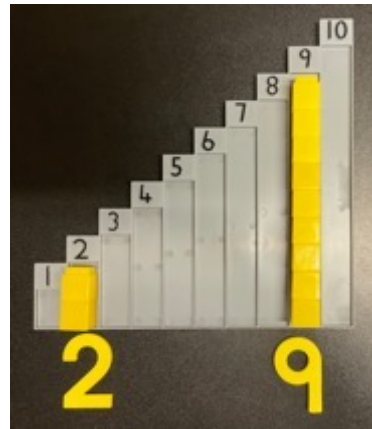
- Show Lucy a set of objects and ask her to create a set that has the same number of objects. **(Concrete)**

- Show Lucy a set of objects and ask her to create a larger one or a smaller one**. (Concrete)**

- Use a number line from 1 to 20 with points on 2 numbers. Ask Lucy to put the correct number of counters above the two points and decide which one is larger. **(Abstract, Representational, and Concrete)**

- Use a number line with a point on one number and ask Lucy to identify a number larger than the given number and a number smaller than the given number. **(Representational and Abstract)**

Integrating Mathematics Throughout the School Day

Plan Instruction for specific Math Concepts

- Students should have explicit time for developing math skills during each school day.

- Students can learn specific math concepts through whole- and small-group activities.

- Teachers can provide opportunities throughout the day for students to apply the math concepts they have learned.

- For example, if teaching shapes is the targeted math concept
  - Have students identify various shapes in the classroom
  - Take a walk outside or throughout the school and identify various shapes.

MATHEMATICS IN CLASSROOM ROUTINES AND ACTIVITIES

Teachers can use opportunities within classroom routines and activities for students to practice math concepts they have learned during math lessons. For example:

- Students can count the number of students in attendance in class for two days (M-3.3,) . Have the students keep track of the counts over two different days then make comparisons between the two days (M-3.16).

- Students use their individual schedules to understand time, a.m. and p.m. (M-3.13,M-4.18, M-5.14, M-6.8).

MATHEMATICS ACROSS CONTENT AREAS

Reading	Science	History	Functional
When reading a story, ask questions that encourage students to solve a practical math problem based on the story.	Measure the growth of a plant in the classroom each day.	Identify squares, straight lines, curved lines, on a map.	Count the length of time it takes to wash your hands.
Make a graph of the weather (sunny, rainy, cloudy) for 5 school days.	Describe objects from nature in geometric terms.		Use traffic signs to recognize shapes.

Camping with Friends

by D. Meeks

Jamison went on his first camping trip with his friends, Marcus and Tom. Jamison bought the food for their dinner. He bought:

- A pack of hotdogs for $3.00
- A package of buns for $1.00
- A bag of chips for $1.50
- Three drinks that each cost $1.00

Marcus brought the tent and sleeping bags. Tom brought wood to build a fire and a grill. The boys were so excited to be camping overnight even if it was only in Jamison's backyard.

Potential questions:

- **Reading** – Who brought the tent? Where were the boys camping? How many boys were camping together? What did Tom bring?
- **Math** - How much did the hotdogs and buns cost all together? What was the total cost of the drinks? How much more did the hotdogs cost than the chips?
- **Science** – What natural resource did Tom bring? How do the physical properties of wood change as it burns? What kind of energy is produced by the fire (electrical, kinetic, thermal)?

TEACHING READING, MATH AND SCIENCE TOGETHER

A story of a young girl who overcomes her fear of storms by making a cake with her grandmother.

Reading	Math	Science
Understand the meaning of words. (R-5.1)	Time & Elapsed Time (M-5.14)	Weather Conditions (S-5.4)
Answer questions About a nonfiction text (R.5.3)		
Identify details (R-5.6)		

Instructional Resources

How do you locate VAAP instructional materials on TTAC Online ?

Overview of VESOL Instructional Resources found Online

TTAC ONLINE VAAP Instructional Resources	VT TTAC Website - VESOLs	Additional Resources
VESOL Mathematics Instruction Resources	Unpacking the Standard (video)	Learning Trajectories
VESOL Mathematics Crosswalk	Vertical Alignment (video)	VDOE T/TAC At VT Math Content Site
Sample Activities	Number Sense Lessons and Activities	VDOE T/TAC At VT VESOL Resource

Assistive Technology Resources

AT Network Webpage

AT Tools in Schools Booklet

Virginia Assistive Technology, Tools, and Strategies: Consideration and Assessment Guidance Document

Virginia Assistive Technology, Tools, and Strategies: Consideration Guide

Virginia Assistive Technology, Tools, and Strategies: Consideration Guide Instructions and Definitions

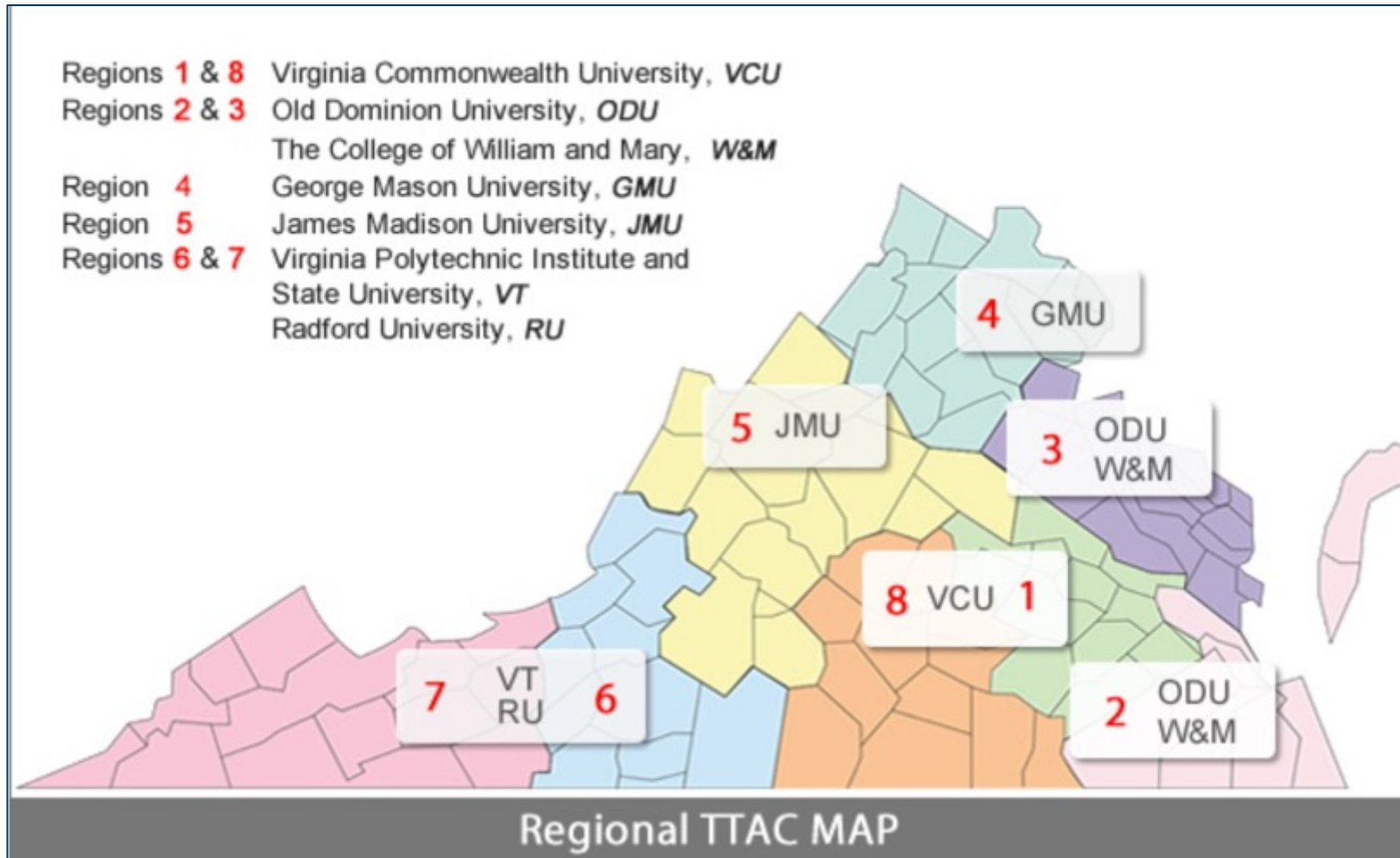Virginia Assistive Technology, Tools, and Strategies: Resource Guide

Assistive Technology Decision Making Guide

WATI Trial Use Guide

WHERE ARE THE T/TACs?

Regions **1** & **8** Virginia Commonwealth University, *VCU*
Regions **2** & **3** Old Dominion University, *ODU*
                       The College of William and Mary, *W&M*
Region **4**   George Mason University, *GMU*
Region **5**   James Madison University, *JMU*
Regions **6** & **7** Virginia Polytechnic Institute and
                       State University, *VT*
                       Radford University, *RU*

4 GMU

5 JMU

3 ODU W&M

8 VCU **1**

7 VT RU **6**

2 ODU W&M

Regional TTAC MAP

Frequently Asked Questions

FAQ 1: Am I free to use any math manipulative to teach the Math VESOL?

Yes. Teachers have the flexibility to use the math manipulatives that support each student's learning. The manipulative may include but are not limited to concrete objects, virtual manipulatives, pictures and symbols. It should be noted that use of manipulatives in instruction are different than use of manipulatives for the assessments. For example during the assessment, if students are comparing the numbers 10 and 8, the teacher cannot count out 10 tiles and 8 tiles for the student to compare.

Manipulatives used on the VAAP math tests must meet these criteria:

- must be familiar to the student and used during instruction,
- must be used individually and not shared with other students during the test administration,
- must be available in the test environment where students may access them if they choose to use them, and
- must not be labeled (e.g., fractions, decimals, numerals, text).

Manipulatives must not directly provide answers or identify the process used to determine answers.

FAQ 2: WHERE CAN I FIND RESOURCES SUCH AS ONLINE MANIPULATIVES AND 3-D MANIPULATIVES FOR MY STUDENTS WITH VISUAL IMPAIRMENTS?

Additional Resources:

- Online manipulatives
  - Math Learning Center Number Line
  - Didax Number Line
  - Math Learning Center Number Frames
  - Didax Unifix Cubes
  - Math Learning Center Website
  - Didax Manipulatives Website
- 3D Printed math manipulatives for students with visual impairments

THANK YOU FOR ATTENDING

Virginia Department of Education
Department of Student Assessment, Accountability and ESEA Programs
and
Training & Technical Assistance Centers (TTACs)