Teaching the Common Core to Students with Significant Cognitive Disabilities

Diane M. Browder, Ph.D.
Angel Lee, M.Ed.
Leah Wood, M.Ed.

University of North Carolina at Charlotte
Agenda

• Brief Overview
• Guidelines for Math
• Guidelines for English Language Arts
• An Example of An Activity to Teach Preservice Undergraduates to Access and Adapt Common Core Standards
Rationale for Teaching Common Core to Students with SCD

• Provide full educational opportunity
• Inclusion: Context, learning, and CONTENT
• Least dangerous assumption
  – Students may learn if taught vs. assumption can’t learn the content
• College, career, and community readiness
  – Enhanced with increased academic competence
• Fairness in assessment
What evidence supports teaching inclusive academic content to students with SCD?


Is there evidence Ss with SCD can learn content aligned with specific grade-aligned standards?


Common Core Standards in Mathematics
Common Core: K-8 Math

• Counting & cardinality (K only)
• Operations and algebraic thinking (K-5)
• Numbers and operations in base 10 (K-5)
• Numbers and operations fractions (3-5)
• Measurement and data (K-5)
• Geometry (K-8)
• Ratios and proportional relationships (6-8)
Common Core Math: 6-8 (continued)

- The number system (6-8)
- Expressions and equations (6-8)
- Statistics and probability (6-8)
- Functions (8)
Common Core Math: 9-12

• Numbers and quantity
• Algebra
• Functions
• Modeling
• Geometry
• Statistics & probability
Students with Significant Cognitive Disabilities

- CCSS Content

  - Current level of numeracy
    - One to one correspondence
    - Numbers to 5

Sample 5th grade CCSS for Operations and Algebraic Thinking

5.OA.3. Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane. For example, given the rule “Add 3” and the starting number 0, and given the rule “Add 6” and the starting number 0, generate terms in the resulting sequences, and observe that the terms in one sequence are twice the corresponding terms in the other sequence. Explain informally why this is so.
A model for Math lessons

- Personal Relevance - Story
- Graphic Organizer
- Task-Analysis

= Math Lesson
A Pilot Study on Teaching Common Core Math Standards

- Can students eligible for AA-AAS learn a math skill adapted from CCSS for their grade band in 2 weeks of instruction?
- How many students master content, make progress, or make no progress?
- Is within student progress consistent across the strands of content? That is, can students be classified into “levels” of learners?

<table>
<thead>
<tr>
<th>Student</th>
<th>Grade Band</th>
<th>M/F</th>
<th>Disability (Primary/Secondary)</th>
<th>IQ</th>
<th>Method of Communication/Accommodations/Special Needs</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Elementary</td>
<td>M</td>
<td>Autism</td>
<td>74</td>
<td>verbal</td>
</tr>
<tr>
<td>2</td>
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<td>M</td>
<td>Autism</td>
<td>&lt;50</td>
<td>nonverbal, picture symbols for communication</td>
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<td>3</td>
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<td>M</td>
<td>ID/Prader-Willi</td>
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<td>M</td>
<td>ID</td>
<td>60</td>
<td>nonverbal, sign language and DynaVox for communication, picture symbols, aggressive behaviors</td>
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<td>M</td>
<td>Autism/ID</td>
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<td>verbal, text supported with pictures</td>
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<td>M</td>
<td>Deaf/Autism/ID</td>
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<td>nonverbal, sign language (limited), picture symbols, text supported with pictures, interpreter</td>
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<td>M</td>
<td>ID/Cerebral Palsy</td>
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<td>very limited speech, Rocker switch to make choices</td>
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<tr>
<td>8</td>
<td>Middle</td>
<td>F</td>
<td>ID</td>
<td>52</td>
<td>verbal, text supported with pictures, attention-seeking behaviors</td>
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<tr>
<td>9</td>
<td>High</td>
<td>M</td>
<td>Autism/ID</td>
<td>41</td>
<td>verbal, text supported with pictures</td>
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<tr>
<td>10</td>
<td>High</td>
<td>F</td>
<td>Autism/ID</td>
<td>42</td>
<td>verbal, text supported with pictures, high degree of distractibility, stereotypy</td>
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<td>11</td>
<td>High</td>
<td>M</td>
<td>Visually Impaired/ID</td>
<td>Untestable</td>
<td>verbal, very large print, use of objects for concreteness, talking calculator</td>
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<td>12</td>
<td>High</td>
<td>F</td>
<td>ID/Down Syndrome</td>
<td>46</td>
<td>verbal, text supported with pictures</td>
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</tbody>
</table>
Intervention

- Six special education teachers
  - 2 per grade band: elementary, middle, high school
  - 2 per primary disability taught: ID or autism
  - All licensed in special education
  - 0.5 to 20 years experience; mean 9.3 years

- Setting for instruction
  - Special education classroom

- Scripted lesson plans that incorporated evidence-based practices (systematic prompting and feedback; task analytic instruction) and validated by content expert

- All materials needed for the application

- SMARTBoard™ version of the materials

- Data sheet for monitoring student progress
  - Task analysis of the responses students made during the lesson to perform the operation and complete the activity
Target Content: Algebra

• Elementary-Solve one-step equations for an unknown variable, represented by a shape, using a number line 4 + Δ=10
  • Application: Using a number line to determine how many more stickers a student needs to earn to fill sticker book page.

• Middle School-Solve one-step equations for an unknown variable, represented by a letter, using a number line 4+x=6
  • Application: Use a number line to determine how many more signatures are needed to fill a page of student’s yearbook.

• High School-Solve two-step equations with two variables using a table. Use table to find y if x is provided Y=3x+6
  • Application: Calculate amount of money needed for teacher to purchase classroom supplies and amount of money earned if getting paid to wash cars.
Target Content: Data Analysis/Probability

• Elementary- Collect (pose questions), organize (record data in table), create and graph data using a bar graph, and interpret data (answer questions).
  • Application: Gather, organize, graph, and interpret data on types of transportation students use to get to school and favorite foods in class.

• Middle- Determine number of outcomes and probability of various events. Describe probability as less likely, equally likely, or more likely.
  • Application: Spinner Experiment- use calculator to convert ratios to percentages and determine if odds are “good” or “bad”.

• High School- Solve two-step equations with two variables using a table. Use table to find y if x is provided Y=3x+6
  • Application: Determine odds of winning certain prizes when spinning a spinner for making honor roll.
Target Content: Geometry- Area and Volume

• Elementary- Find area using both tiling and formula.
  • Application: Find the area of a paper and decide if student has enough paint to create a picture for family member.

• Middle- Find area of a 2-D object and volume of a 3-D object using formulas and calculators.
  • Application: Calculate area of classroom floor for carpeting and volume of pool.

• High School- Determine appropriate unit of measurement and find volume of box.
  • Application: Find volume of a gift that needs to be shipped and select the best size box for shipping.
Target Content:
Numbers & Operations- Four Operations

• Elementary- Solve one-step story problem using addition, subtraction, multiplication, or division and a calculator.
  • Application: Four scenarios about purchasing high preference items at the mall. Student selects appropriate operation to solve.

• Middle- Solve multi-step ratio and percent problems (e.g., tax, markups and markdowns). Calculate percents in real-world contexts.
  • Application: Find sales price of an item using original price and discount (e.g., 30% off).

• High School- Solve two-step equations with rational numbers (e.g., decimals).
  • Application: Calculate sales tax for an item and final price, and tip on restaurant bill and total cost. Student determines if s/he has enough money to make purchase.
Target Content:
Numbers & Operations - Fractions, Decimals, and Exponents

- Elementary - Identify fractions, order fractions on number line, and compare fractions.
  - Application: Divide a candy bar to share equally with friends.

- Middle - Convert fractions to decimals; solve problems with fractions; locate and compare decimals and fractions on a number line.
  - Application: Divide a set number of dimes among students in the classroom (e.g., token economy) and locate the fraction of dimes each student received on a number line.

- High School - Convert fractions to decimals; Write decimals in scientific notation (e.g., base 10 with negative exponent).
  - Application: Cafeteria worker at high school divides brownie into tenths, hundredths, and thousandths. Student writes amount received in scientific notation and determine which number is the most/least.
Target Content:
Geometry-Coordinate Plane

• Elementary- Define coordinate system (x-and y-axes, origin point, number lines). Locate and graph points in first quadrant of coordinate plane.
  • Application: Students plan a garden and location of fruits and vegetables in the garden.

• Middle- Plot coordinate points on the coordinate plane; form line segments in the coordinate plane to create polygons.
  • Application: Students plan the layout for the activities of a school carnival using the coordinate plane.

• High School- Identify types of transformations: reflections, rotations, and translations; understand that a 2-D figure is congruent to another when transformed.
  • Application: Use coordinate plane to investigate how video game designer uses transformations to create images on screen.
(Show 2nd SMART Board template). “Are you guys ready to plan our school carnival? We have to have the carnival in the gym because it will be cold outside, so we must make sure there is enough space for every game and activity! This is going to be so much fun. Let’s look at our coordinate plane. When we plot points on a coordinate plane, we always start at the same place! Who knows where we start?” Select a different student each day to find the origin point on the coordinate plane. “Great…Xavier found the origin point. Show me the word ‘origin point.’” Wait for students to point to the word ‘origin point’. “Show me the ordered pair for the origin point.” Wait for students to point to ‘(0,0)’. Use LIP to help student find correct answer. “Now let’s label the quadrants of the coordinate plane.” Alternate students daily to label quadrants with name and ordered pair.

<table>
<thead>
<tr>
<th>TASK ANALYSIS #1: LABELING QUADRANTS</th>
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<tbody>
<tr>
<td>“Who can show me where Quadrant I goes?” Student drags “Quadrant I” to the upper right quadrant.</td>
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</tbody>
</table>
# Example of Data Sheet

## Locating Coordinate Points

**Student:** ____________________________

### A. Identify Key Vocabulary (Focus and Review)

<table>
<thead>
<tr>
<th>Date:</th>
<th>Show me “coordinate plane”</th>
<th>Show me “x-axis”</th>
<th>Show me “y-axis”</th>
<th>Show me “origin point”</th>
<th>Show me “coordinate point”</th>
<th>Show me “ordered pair”</th>
<th>Show me “line segment”</th>
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</tbody>
</table>

**Number of Independent Steps**

### B. Labeling Quadrants (TA #1 Only)

<table>
<thead>
<tr>
<th>Date:</th>
<th>Label Quadrant I</th>
<th>Match ordered pair to Quadrant I</th>
<th>Label Quadrant II</th>
<th>Match ordered pair to Quadrant II</th>
<th>Label Quadrant III</th>
<th>Match ordered pair to Quadrant III</th>
<th>Label Quadrant IV</th>
<th>Match ordered pair to Quadrant IV</th>
</tr>
</thead>
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</table>

**Number of Independent Steps**
## Did Students Learn?

<table>
<thead>
<tr>
<th></th>
<th>Beginning</th>
<th></th>
<th>Ending</th>
<th></th>
<th>Percentage Gain</th>
<th></th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
</tr>
<tr>
<td><strong>Numbers &amp; Operations</strong></td>
<td>10</td>
<td>67.7</td>
<td>30.3</td>
<td>77.5</td>
<td>25.9</td>
<td>9.8</td>
<td>13.4</td>
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<tr>
<td><strong>Algebra</strong></td>
<td>12</td>
<td>52.1</td>
<td>27.3</td>
<td>64.6</td>
<td>28.0</td>
<td>12.6</td>
<td>16.8</td>
</tr>
<tr>
<td><strong>Geometry-Area and Volume</strong></td>
<td>12</td>
<td>55.3</td>
<td>27.2</td>
<td>61.3</td>
<td>29.5</td>
<td>6.1</td>
<td>13.5</td>
</tr>
<tr>
<td><strong>Numbers &amp; Operations-Fractions, Decimals, and Exponents</strong></td>
<td>12</td>
<td>67.6</td>
<td>22.0</td>
<td>75.9</td>
<td>22.2</td>
<td>8.4</td>
<td>12.1</td>
</tr>
<tr>
<td><strong>Data Analysis/Probability</strong></td>
<td>12</td>
<td>44.7</td>
<td>21.3</td>
<td>64.3</td>
<td>22.8</td>
<td>19.7</td>
<td>11.9</td>
</tr>
<tr>
<td><strong>Geometry-Coordinate Plane</strong></td>
<td>11</td>
<td>48.0</td>
<td>24.0</td>
<td>64.0</td>
<td>22.6</td>
<td>16.0</td>
<td>11.3</td>
</tr>
</tbody>
</table>

Results of Wilcoxon Signed Ranks Tests for Change for Beginning of Instruction to Ending of Instruction

Note. * p<.05; ** p<.01; ns=not significant
Individual Progress

Student Progress on Lessons
(n=69 lessons)

Levels of Student Progress

- Inadequate Progress (n=18)
- Adequate Progress (n=35)
- Prior Mastery (n=16)
Individual Progress by Category of Content

Levels of Student Progress
- Green: Prior Mastery
- Red: Adequate Progress
- Blue: Inadequate Progress

Number of Lessons at Each Level

Students
Findings

• Overall students could learn a specific skill aligned with CCSS in two week period
• Overall performance varied by content versus by type of student
• Some students needed more adaptation and more time to learn; for some too simple

Cautions

• Did not necessarily master in 2 weeks
• Performance directly aligned with instruction; generalization to AA-AAS unknown
• Teachers using EBP with high fidelity
• No control group
Translating into Teacher Preparation

• Teachers need
  – model lesson plans before they can generate their own
  – Some ready made resources
  – Training to generalize their evidence-based practices to academics
    • E.g., least prompts, time delay, task analysis
  – Sample data sheets

Your Comments and Questions

We are going to solve these problems. In both of the problems there is a number we don’t know yet. We will solve the problem using a variable.

A variable is a letter that can be used in place of a number you don’t know yet.

3 + x = 8

Let's review our story problem about Shawn.

Shawn has $5 in his hand. He has more in his pocket. He has $12 in total.

How many are in his pocket?

The equation is: 5 + p = 12

Let's solve for p

p = $______

We can use a number line to solve this problem. I will put my finger on 5 and count how many jumps it takes to get to 12. (place your finger on 5 and count) one, two, three, four, five, six, seven. I will write p equals seven. He has $7 in his pocket.

Teacher friendly- includes teacher script, word problems, graphic organizers, and task analysis numbers, so teacher can follow SMARTBoard and record data on progress monitoring sheet.
Common Core State Standards

ENGLISH LANGUAGE ARTS
Common Core in ELA

• Reading: Standards for Literature
  – Key ideas and details
  – Craft and structure
  – Integration of knowledge and ideas
  – Range of reading/level of text comprehension

• Reading: Standards for Informational Text
  – Same subcategories as above
Common Core in ELA (continued)

• Reading: Foundational Skills (only K-5)
  – Print concepts, phonological awareness, phonics and word recognition, fluency

• Writing
  – text and type of purpose, production and distribution of knowledge, research to build and present knowledge, range of writing
Common Core in ELA (continued)

• Speaking and Listening: communication & collaboration; presentation of knowledge & ideas

• Conventions of Language: conventions of standard English, knowledge of language, vocabulary acquisition and use
English Language Arts

Adapted book + Story-based lesson + Comprehension response = ELA lesson
Adapted Text

• Use original text when possible
  – Use some original text readings even when using adapted text

• Use summaries of chapter books
  – Text complexity increases with grade bands

• Use both literature and informational text from the students assigned grade level

• Do not automatically use picture supports
  – Students may be able to work from with simple illustration or text alone
Use Common Core State Standard from Grade Level in Read Aloud

• Reading: Informational;
  – 4. RI.k5 Identify reasons that the author uses to support ideas in an informational text or an adapted grade appropriate text.

• In the non-fiction text *14 Cows for America*, what details does the author provide to support that idea that the Maasai people are kind?
Use Common Core State Standard from Grade Level in Read Aloud

• ELA: Literature
  – 6.RL.9 Compare and contrast texts in different forms or genres (e.g., stories and poems; historical novels and fantasy stories) in terms of their approaches to similar themes and topics.

• Use a Venn diagram to compare and contrast the story *Number the Stars* with a non-fiction piece on the Danish Resistance
Use Common Core State Standard from Grade Level in Read Aloud

• ELA: Literature
  – RL 11-12.1 Cite strong and textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text including determining where the text leaves matters uncertain.

• What sentences from *The Pearl* show that Juana thought the pearl was evil or bad?
ELA: Language

• **9-10.L.4** Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 9-10 reading and content, choosing flexibly from an array of strategies.
  a. Use context (e.g., the overall meaning of a sentence, paragraph, or text; a word’s position or function in a sentence) as a clue to the meaning of a word or phrase.

Examples of using context clues to determine meaning from *The Pearl*:

Kino did not understand. He looked **perplexed** and worried. "It is the Pearl of the World," he cried. "No one has ever seen such a pearl."

• Adapt the text to include the meaning of the unknown word.
• Allow for a generated response of provide response options
ELA-Writing

- **8.W.1** Write arguments to support claims with clear reasons and relevant evidence.
  
  a. Introduce claim(s), acknowledge and
  b. distinguish the claim(s) from alternate or
  c. opposing claims, and organize the reasons and evidence logically.

- **Number the Stars**: Journal- Was it a god or bad idea for the girls to run? Support your claim with facts from the informational text.

---

**Writing Journal Unit 3 Lesson 1: Back up opinion**

It was good that the girls raced home because, _______________________

_________________________

_________________________

1. They got to practice for the races at school on Fridays.
2. They got stopped by the soldiers
3. It was good exercise.
4. They might fall and get hurt.
Chapter 1

The *Black Pearl* Sails Again

*The Black Pearl* was a fast ship. It had huge black sails.

Jack Sparrow was the captain of the *Black Pearl*. Jack was a pirate.

*The Black Pearl* had a pirate crew. The crew wanted to find treasure.

Other sailors were afraid of the *Black Pearl*. They had heard terrible stories about the pirate ship.

*The Black Pearl* Sails Again
Class Activity

• Objective: Students will be able to target a specific skill to teach CCSS to students with SCD.
  – Locate CCSS
  – Write a target skill
  – Evaluate alignment of the skill
  – Cross reference with state’s website on CCSS for students in AA-AAS (e.g., extensions of CCSS)
  – Adapt for students at differing levels of current level of functioning in academics
1. Select CCSS

– Common Core State Standards-English Language Arts
  • http://www.corestandards.org/the-standards/english-language-arts-arts-standards

– Common Core State Standards-Mathematics
  • http://www.corestandards.org/the-standards/mathematics
Alternate Achievement of Same Content

• If students cannot achieve at or near grade level
  – Target alternate achievement
    • “A bite of the apple”
      – Or “applesauce”
2. Make Standard Accessible

- **Prioritize**
  - Teach a portion of the standards

- **Pinpoint**
  - Teach a portion of each standard

- **Simplify**
  - An extension of the standards

- **Task Analyze**
  - Skill sequences

- For the standard you selected
  - Would you teach this standard?
  - Would you teach all of it or some of it?
  - Does it need to be simplified? How?
  - Are there skills to teach before/after this? What?
3. Write a Skill You Would Teach to Address the Standard You Chose

(a) Select Standard:

**CCSS.ELA-Literacy.RL.4.2**

**Determine a theme** of a story, drama, or poem from details in the text; **summarize the text**.
(b) Prioritize, pinpoint, simplify, or task analyze:

**CCSS.ELA-Literacy.RL.4.2** Determine a theme of a story, drama, or poem from details in the text; **summarize the text**.

**Pinpoint**: select “summarizing text” as the focused objective for one lesson

**Task analyze**: break this skill down further to specify students determine what happens first, next, and last
(c) Develop aligned skill:

**CCSS.ELA-Literacy.RL.4.2**

**Determine a theme of a story, drama, or poem from details in the text; summarize the text.**

**Summarize the text by identifying what happens first, next, and last.**
4. Evaluate if Your Example is Aligned

- **State Standard:**
  - Identify and analyze forces that cause change in landforms over time

- **Content**
  - Forces that shape landforms

- **Performance**
  - Identify and analyze

Adapted from NAAC (2005)

- **Camilla will activate switch to listen to a science story about landforms.**
  - Content? No
  - Performance? No

- **Camilla will use pictures to identify forces (wind, water, ice)**
  - Content? Yes
  - Performance? Some

- **Camilla will select force and match with landform change (picture, model)**
  - Content? Yes
  - Performance? Stronger link
5. Find Your State’s Curricular Resources for Students in AA-AAS

- EXAMPLE:
  http://www.ncpublicschools.org/acre/standards/extended

- Compare/contrast the extension for the standard you chose with the skill you developed
  - Same/different?
  - Easier/harder?
  - Close alignment/ far alignment?
Write Ways to Adapt the Skill for Students at Different Entry Levels

• Some academic competence (reads 1st grade level; adds single digits)
• Emerging academic competence (recognizes some numbers; selects pictures to show understanding)
• Beginning at the beginning (no academic skills)
Final Questions and Comments
Contact Information

• Diane M. Browder, PhD
Snyder Professor of Special Education
Department of Special Education and Child Dev.
University of North Carolina at Charlotte
9201 University City Blvd
Charlotte, NC 28223-0001
Email: dbrowder@uncc.edu