# Solving the Common Core Equation

## *Teaching Mathematics CCSS to Students With Moderate and Severe Disabilities*

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For years Joseph, a student with moderate intellectual disability, received instruction on the same early mathematics skills. Although he made a little progress in telling time, naming coins, and counting items, by the time he reached fourth grade he seemed frustrated doing the same mathematics he had practiced since he was a preschooler. He refused to do his lessons, and it seemed like Joseph just did not like mathematics. By the end of fifth grade, however, it was another story. While the school's morning announcements were blaring over the speaker and Joseph was getting his backpack put away, he was eagerly asking, "Math? Ms. Harris! Math?"

What changed? Well, in part, Ms. Harris had decided to expect more of Joseph. She continued to promote his learning of basic skills such as telling time and counting during the course of many everyday activities, but she also began to teach him the same skills all fifth-graders would learn. Using real-world mathematics stories, interactive whiteboard materials, and hands-on manipulatives, she began to teach Joseph and his classmates to calculate perimeter and area, find a point on a coordinate plane, and create a graph. She began to teach Joseph the Common Core State Standards for his assigned grade. Surprisingly, Joseph grasped concepts like perimeter and coordinate planes even while continuing to master basics. Ms. Harris is representative of teachers who have found ways to adapt the Common Core State Standards in mathematics for students with moderate and severe disabilities.

The Common Core State Standards (CCSS) initiative has provided focused and rigorous standards of what students are expected to know in English language arts and mathematics, to better prepare students for college and career readiness (http://www.corestandards.org/). Forty-five states and three territories have adopted the CCSS for all students, including those who participate in alternate assessments based on alternate achievement standards. Although most educators are currently learning about the CCSS, special educators who work with students with moderate and severe disabilities have the added challenge of understanding the standards and knowing how to adapt instruction to ensure that students with disabilities also receive standards-based instruction.

Other than the legal requirement that all students have access to the general curriculum content and be prepared for state assessments (e.g., alternate assessments; No Child Left Behind Act of 2001, 2006), why try to teach students with moderate and severe disabilities grade-aligned mathematics? One rationale for teaching the CCSS is that demands for mathematical competence in today's world have greatly increased. This is true as well for students with moderate and severe disabilities who will face expectations in jobs and daily living (e.g., workplace charts and graphs, using numerically operated machinery). When teaching the CCSS to students with moderate and severe disabilities, it will be important to incorporate real-life examples in daily instruction.

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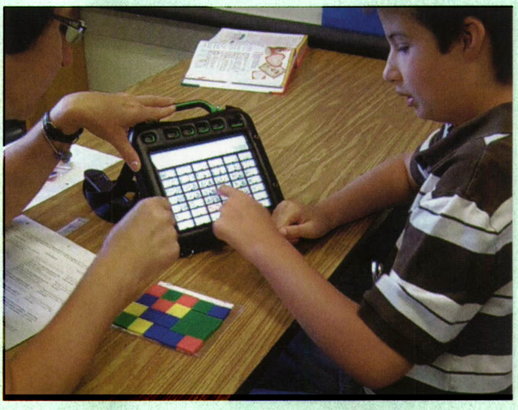
1 x 4 = 4
2 x 4 = 8
3 x 4 = 12
4 x 4 = 16
4 x 5 = 20
4 x 6 = 24
4 x 7 = 28

**Accessing the CCSS: Michael's Success Story**



Michael is a fourth-grade student with moderate intellectual disability who attends a self-contained classroom for students with moderate and severe intellectual disability. He is nonverbal and communicates using his Vantage Point device. In the beginning of the school year, his teacher, Ms. Adams, struggled to find the best approach for Michael. He could not identify numbers, count with one-to-one correspondence, and primarily worked on tasks such as matching and sorting; he would need some instruction in fourth-grade-aligned mathematics to be ready for the state's alternate assessment. Michael often would slap, kick, or throw his head back to avoid most mathematics tasks. We worked with Ms. Adams to create a better mathematics program for Michael. Collaborating with mathematics educators at her school, she targeted priority fourth-grade standards of the CCSS. She used word problems from the fourth-grade mathematics textbook and ideas from the Internet to identify real-life activities in which each skill would be used, and developed mathematics story problems for each skill. A task analysis of the mathematics process was created to use for both instruction and collecting data on student progress. To teach the lessons, Ms. Adams began by reading the real-life problem to Michael and two other students in a small group. She used systematic prompting strategies to help the group perform each step of the task analysis. These lessons also incorporated basic mathematics skills from Michael's individualized education program, such as number and symbol identification. Ms. Adams programmed his Vantage Point device so he could communicate responses such as "length" and "width." After one semester, Michael had shown progress on both basic skills (e.g., such as identifying numbers to 10, counting with one-to-one correspondence to 10) and on grade-aligned skills (e.g., using a calculator to solve equations, finding the area of rectangles when given an equation template, graphing coordinates on a coordinate plane). Ms. Adams set up opportunities for Michael to apply his newly learned skills on community-based instruction trips and in other school activities. Michael's aggressive behaviors also decreased substantially, and he was able to participate in the full 30-minute math session without seeking to escape the lesson.

However, teaching the content-rich CCSS can seem daunting; research shows that students with moderate and severe disabilities often lack the most basic of mathematical skills. For example, Kearns, Towles-Reeves, Kleinert, Kleinert, and Thomas (2011) found that about one quarter of this population could count with one-to-one correspondence to 10 and only a small percentage (4%–8%) of this population could apply computational procedures (e.g., addition, subtraction, multiplication, division) to solve real-world problems. In contrast, the CCSS require a fifth-grader to solve real-world problems using addition and subtraction of fractions, and a student in high school not only to analyze a relationship between two quantities but also to graph it as a linear equation.

Emerging research suggests that students with moderate and severe disabilities can learn content aligned with grade-level standards while continuing to work on basic numeracy. Jimenez, Browder, and Courtade (2008) demonstrated that high school students with moderate intellectual disability could learn to solve a linear equation when task analytic instruction and manipulatives were used. Browder, Trela, and colleagues (2012) and Browder, Jimenez, and Trela (2012) demonstrated that middle and high school students with moderate and severe intellectual disability or autism could learn a wide range of state standards from the grade level associated with their chronological age if a graphic organizer, task analysis, and math story were used. These studies built on a large framework of evidence-based practice in mathematics for students with moderate and severe

**Students with moderate and severe disabilities can learn content aligned with grade-level standards while continuing to work on basic numeracy.**

disabilities that support using systematic instruction procedures like prompt fading and task analysis (Browder, Spooner, Ahlgrim-Delzell, Harris, & Wakeman, 2008). Our six-step approach to teaching students with moderate and severe disabilities mathematics aligned to the new CCSS uses this research as a foundation (see box, "Accessing the CCSS: Michael's Success Story").

## Step 1: Select a Topic and Create Objectives

The first step is selecting a grade-aligned standard from the CCSS to target, which requires careful consideration. First, selecting standards from all domains is important; prior research shows the domains of computation and measurement have been primarily targeted when teaching students with moderate and severe disabilities, to the exclusion of remaining domains such as geometry and algebra (Browder et al., 2008). In addition, teachers must prioritize because, given the intensive instruction this population requires, it is impossible to teach all the content within a domain. This can be done by reviewing which standards are prioritized by the state for alternate assessments and by consulting with a general education mathematics teacher who is familiar with prioritized skills within a grade level (e.g., ask "What are your top 5 priorities for students to learn in this unit, ranked from 1 to 5?"). Also, if a state has specific access points, these provide a clear guide to the most important standards to consider as a priority.

Because teachers of students with moderate and severe disabilities often teach more than one grade level of student in a class, it may be helpful to consider how standards are addressed over multiple grade levels. For example, in a middle school class exploring the concept of volume, sixth- and seventh-graders could find the volume of a rectangular prism, and the eighth-graders the volume of a cube, sphere, or cylinder. The combined group of students could be taught these skills using graphic organizers to fill in formulas, calculators, and a real-life application, such as selecting boxes by volume in a packaging job.

It's also important to consider students' current level of numeracy. A geometry objective for students with little to no concept of number might be to identify the area by shading it. Students with counting skills could use tiling squares to find the area. Students like Joseph, who have computation skills, could use a formula and calculator to find the area.

To gain deeper understanding of the prioritized standards targeted for instruction, consult state or national resources, attend professional development on the CCSS, and talk with mathematics teachers. Content experts in the state of North Carolina have developed documents called "Math Unpacking Standards" that teachers may find useful (http://www.dpi.state.nc.us/acre/standards/common-core-tools/#unmath). This web site provides explanations of what the student is expected to understand and complete by grade level. Although students with moderate and severe disabilities may not be able to perform the exact grade-level expectation (e.g., computation of area 23" × 57"), they may be able to learn the basics (e.g., the concept of area, finding area using smaller numbers [2" × 5"]). In addition to online resources, it helps to have ongoing collaboration with a general educator who knows the content. For example, when Ms. Harris shared her idea for teaching area with a mathematics teacher in her school, she was surprised to learn that length is the longest side of the rectangle and width the shortest. Through simply checking in with her colleague, she avoided teaching her students the common misconception that length is the horizontal side and width the vertical side of a rectangle.

## Step 2: Identify a Real-Life Activity Using the Skill

After prioritizing content to teach, select a real-life activity to provide context to the lesson (see Table 1). Teaching core content in a meaningful way leads to better maintenance and generalization of the targeted skill (Collins, Hager, & Galloway, 2011). Resources for real-world lesson ideas include textbooks, the Internet, and application activities the general education teacher is using. Word problems in mathematics textbooks often give a real-life context where the skill will be used. Also, the SMART Exchange (http://exchange.smarttech.com/) and National Council of Teachers of Mathematics (http://www.nctm.org) web sites provide numerous mathematics activities with real-world application. Taking a field trip to observe the real-life activity may not be feasible, but it is often possible to find a video clip on the Internet that shows the activity. For the lesson, a teacher could use a story problem, taught in a read-aloud format, to illustrate the real-world activity that students work to solve. Providing manipulatives that relate to this real-world activity helps make the word problem come to life.

## Step 3: Incorporate Evidence-Based Practices

After prioritizing standards and developing a real-world application, incorporate evidence-based practices for teaching mathematics to students with moderate and severe disabilities into the lesson. Systematic instructional procedures with error correction and feedback, such as constant time delay and least intrusive prompting, are effective for teaching mathematics to this population (Browder et al., 2008; Browder, Trela, et al., 2012; Spooner, Knight, Browder, & Smith, 2011). Table 2 describes three evidence-based practices and how they apply to teaching mathematics skills. In addition to systematic instructional procedures, students need repeated opportunities to respond—both within a lesson and over multiple days—in order to gain a deeper understanding of the content and retain learned skills (Browder et al., 2008).

It can be helpful to write a task analysis of the mathematical procedure to use for step-by-step instruction. Task analytic instruction is an evidence-based practice for teaching mathematics to this population (Spooner et al., 2011). Figure 1 illustrates a scripted task analytic lesson with systematic

**Table 1. Sample Mathematics Standards, Aligned Components, and Activities**

| Mathematics Domain | Elementary | Middle | High |
|---|---|---|---|
| Algebra | 3.OA.3, 4.OA.2<br>Solve one-step equations for an unknown variable, represented by a shape, using a number line.<br>4 + Δ = 10<br>**Application:** Use a number line to determine how many more stickers a student needs to earn to fill sticker book page. | 6.EE.7, 7.EE.4, 8.EE.7<br>Solve one-step equations for an unknown variable, represented by a letter, using a number line.<br>$4 + x = 6$<br>**Application:** Use a number line to determine how many more signatures are needed to fill a page of student's yearbook. | A-REI.3<br>Solve two-step equations with two variables using a table. Use table to find y if x is provided.<br>$Y = 3x + 6$<br>**Application:** Calculate amount of money needed for teacher to purchase classroom supplies and amount of money earned if getting paid to wash cars. |
| Data analysis/ probability | 3.DPS.1f1, 3.DPS.1g1, 4.DPS.1f2, 4.DPS.1g3, 4.DPS.1j1, 5.DPS.1c1<br>Collect (pose questions), organize (record data in table), create and graph data using a bar graph, and interpret data (answer questions).<br>**Application:** Gather, organize, graph, and interpret data on types of transportation students use to get to school and favorite foods in class. | 6.NO.1f3, 7.DPS.2d1, 7.DPS.2d2, 7.DPS.2b<br>Determine number of outcomes and probability of various events. Describe probability as less likely, equally likely, or more likely.<br>**Application:** Determine number of outcomes and probability using the dice, a bag of marbles, and a spinner. | S-MD.3, S-MD.5, S-MD.7<br>Spinner experiment; use calculator to convert ratios to percentages and determine if odds are "good" or "bad."<br>**Application:** Determine odds of winning certain prizes when spinning a spinner for making honor roll. |
| Geometry: Area and volume | 3.MD.5, 3.MD.7, 4.MD.3<br>Find area using both tiling and formula.<br>**Application:** Find the area of a paper and decide if student has enough paint to create a picture for family member. | 5.MD.3, 5.MD.4, 6.G.2, 7.G.6<br>Find area of a 2-D object and volume of a 3-D object using formulas and calculators.<br>**Application:** Calculate area of classroom floor for carpeting and volume of pool. | A.REI.3<br>Determine appropriate unit of measurement and find volume of box.<br>**Application:** Find volume of a gift that needs to be shipped and select the best size box for shipping. |
| Numbers and operations: Four operations | 3.OA.3, 4.OA.3<br>Solve one-step story problem using addition, subtraction, multiplication, or division and a calculator.<br>**Application:** Four scenarios about purchasing high preference items at the mall. Student selects appropriate operation to solve. | 6.NS.1, 7.RP.3, 7.NS.1d<br>Solve multistep ratio and percent problems (e.g., tax, markups and markdowns). Calculate percentages in real-world contexts.<br>**Application:** Find sales price of an item using original price and discount (e.g., 30% off). | A.REI.2<br>Solve two-step equations with rational numbers (e.g., decimals).<br>**Application:** Calculate sales tax for an item and final price, and tip on restaurant bill and total cost. Students determine if they have enough money to make purchase. |
| Numbers and operations: Fractions | 3.NF.1, 3.NF.2, 4.NF.1, 4.NF.2<br>Identify fractions, order fractions on number line, and compare fractions.<br>**Application:** Divide a candy bar to share equally with friends. | 6.NS.1, 7.NS.6, 7.NS.1<br>Convert fractions to decimals, solve problems with fractions, locate and compare decimals and fractions on a number line.<br>**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. | N-RN.2<br>Convert fractions to decimals, write decimals in scientific notation (e.g., base 10 with negative exponent).<br>**Application:** Cafeteria worker at high school divides brownie into tenths, hundredths, and thousandths. Student writes amount received in scientific notation and determines which number is the most/least. |
| Geometry: Coordinate plane | 4.G.1, 5.G.1, 5.G.2<br>Define coordinate system ($x$- and $y$-axes, origin point, number lines). Locate and graph points in first quadrant of coordinate plane.<br>**Application:** Students plan a garden and location of fruits and vegetables in the garden. | 5.G.1, 6.G.3, 7.G.2<br>Plot coordinate points on the coordinate plane; form line segments in the coordinate plane to create polygons.<br>**Application:** Students plan the layout for the activities of a school carnival using the coordinate plane. | G-CO.2, G-CO.5<br>Identify types of transformations: reflections, rotations, and translations; understand that a 2-D figure is congruent to another when transformed.<br>**Application:** Use coordinate plane to investigate how video game designer uses transformations to create images on screen. |

**Table 2. Evidence-Based Practices for Mathematics Instruction**

| Evidence-Based Practice | What Is It? | What Does It Look Like in the Classroom? |
|---|---|---|
| Constant time delay | A method of systematic instruction where the teacher gradually delays the delivery of a prompt to help the student learn a skill. | The teacher identifies a skill to teach the student (e.g., how to identify obtuse, acute, or right angles) and finds an appropriate prompt to help the student get the right answer. This prompt is anything the student needs to get the right answer, and stays the same throughout the time it takes the student to learn the skill. It could be a verbal model (teacher presents an obtuse triangle and says "obtuse"), a gesture to the correct answer, or even a physical prompt by moving the student's hand to the correct answer.<br><br>First, the teacher presents the problem (e.g., "What kind of triangle is this?") and immediately uses the prompt to help the student get the right answer. After doing this for a number of *trials* (sessions), the teacher fades that prompt by simply delaying it: The teacher presents the problem (e.g., "What kind of triangle is this?") and waits 4–6 seconds before delivering the prompt. This gives the student time to answer independently, but also provides support. |
| Least to most prompting (or system of least prompts) | A leveled system of prompting that provides just enough support for the student to get the correct answer, but not more support than is needed. | The teacher identifies a skill to teach the student (e.g., entering a division problem into a calculator) and a hierarchy of prompts to use. This hierarchy should include 3–4 levels of prompts, starting with the least intrusive prompt and moving towards the most intrusive prompt, which guarantees that the student responds correctly. An example of a prompt hierarchy is independent (student responds to natural cue with no additional help), verbal prompt (tell them what to do), model (show them what to do), physical prompt (help them do it).<br><br>The teacher provides the natural cue (e.g., shows the student a division problem and says "Use the calculator to solve the problem"), then waits a few seconds. If the student completes the first step correctly, the teacher simply moves on to the next step. If the student does not respond, the teacher provides a verbal cue ("Enter the first number into the calculator"). If the student continues to not respond, the teacher provides a model ("Watch me as I enter the first number into the calculator, like this. Now you do it"). If the student still does not respond, the teacher uses a physical prompt (e.g., takes the student's hands and supports entering the first number into the calculator).<br><br>Least to most prompting is self-fading: The student never gets more prompting than needed and eventually will be able to perform the skill independently. |
| Task analysis | A method of breaking down a long, complicated task into its component steps. This allows the teacher to teach (and take data on) each step in a systematic way. | The teacher identifies a skill to teach the student (e.g., how to use a ruler to measure an object), and breaks it down into a series of steps. When teaching the student how to use a ruler, the teacher uses the same steps every time (combined with a method for prompting):<br>1. Find the zero on the ruler.<br>2. Find the edge of the object.<br>3. Line the ruler up with the object so that the zero is on the edge.<br>4. Look down the ruler and find where the object stops.<br>5. Find the number on the ruler that is closest to where the object stops.<br>6. Write or say that number.<br>This allows the teacher to see on which steps the student is making progress, or areas where the student needs help. This data also can be used to make educational decisions and assess progress towards goals on student individualized education programs. |

**Figure 1. Sample Scripted Mathematics Lesson**

**Lesson plan objective:** Students will demonstrate their understanding of coordinate grids by plotting coordinate points and connecting points with line segments to make polygons on a coordinate grid, completing minimally 80% of task analyzed steps independently.

Part 1: Focus and Review

| | |
|---|---|
| **Introduction** | This lesson plan has students planning the school carnival. Teachers will use a SMART Board template or poster showing the school gymnasium; students will be plotting different points and line segments to create the layout where activities will be at the carnival. Show SMART Board template or poster with carnival pictures as anticipatory set. Say: <br> Today we are going to plan a carnival. Have you ever been to a carnival before? It takes a lot of planning so we better get started! 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. We are going to use a coordinate plane to help us plan the space for all the events, and we will create a location for each event using points and line segments. <br> Show SMART Board template or poster of coordinate plane. Maintain a fast pace and have student identify items. |

| **Teacher** | **Targeted response** | **Prompting (Constant time delay)** | **Reinforcement** |
|---|---|---|---|
| "Show me the coordinate plane." | Student points to coordinate plane. | ❑ Zero-delay trials: immediately prompt <br> ❑ 4-second delay trials: <br> • If student waits 4 seconds, provide response prompt ("This is the coordinate plane."). <br> • If student responds incorrectly, provide response prompt ("If you don't know the answer, wait, and I'll help you."). | "That's right: That is a coordinate plane." |
| "Show me the *x*-axis." | Student points to *x*-axis on a coordinate plane. | ❑ Zero-delay trials: immediately prompt <br> ❑ 4-second delay trials: <br> • If student waits 4 seconds, provide response prompt ("This is the *x*-axis."). <br> • If student responds incorrectly, provide response prompt ("If you don't know the answer, wait, and I'll help you."). | "That's right: That is the *x*-axis." |
| Show me the *y*-axis." | Student points to *y*-axis on a coordinate plane. | ❑ Zero-delay trials: immediately prompt <br> ❑ 4-second delay trials: <br> • If student waits 4 seconds, provide response prompt ("This is the *y*-axis."). <br> • If student responds incorrectly, provide response prompt ("If you don't know the answer, wait, and I'll help you.") | "That's right: That is the *y*-axis." |
| "Show me the coordinate point." | Student points to one of the coordinate points on the coordinate plane. | ❑ Zero-delay trials: immediately prompt <br> ❑ 4-second delay trials: <br> • If student waits 4 seconds, provide response prompt ("This is a coordinate point."). <br> • If student responds incorrectly, provide response prompt ("If you don't know the answer, wait, and I'll help you."). | "That's right: That is a coordinate point." |
| "Show me an ordered pair." | Student points to an ordered pair. | ❑ Zero-delay trials: immediately prompt <br> ❑ 4-second delay trials: <br> • If student waits 4 seconds, provide response prompt ("This is an ordered pair."). <br> • If student responds incorrectly, provide response prompt ("If you don't know the answer, wait, and I'll help you."). | "That's right; we use ordered pairs to plot points on a coordinate plane." |

*continues*

**Figure 1. *Continued***

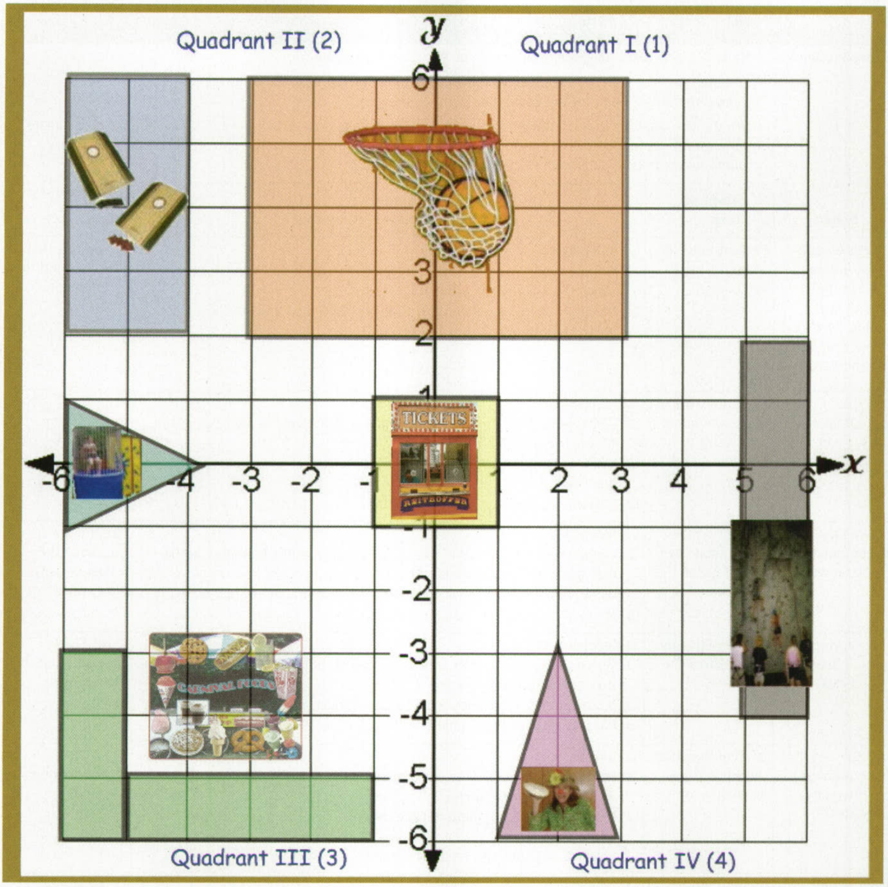
Part 2: Task Analysis—Finding Ordered Pairs

| | |
|---|---|
| **Introduction** | Show SMART Board template or poster of the coordinate grid. Say:<br>Before we can plan our carnival, let's practice finding ordered pairs for some coordinate points. Let's find the ordered pair for the coordinate point on the grid!<br>Use the task analysis to teach students to identify ordered pairs. You do not have to do every single coordinate point on the coordinate plane, but do give each student an opportunity at the SMART Board or poster. Vary points selected on 18 subsequent days. |

| **Teacher** | **Targeted response** | **Prompting (Least intrusive prompting)** | **Reinforcement** |
|---|---|---|---|
| "Let's identify your ordered pair for the coordinate point. First, find the *x*-coordinate on the *x*-axis." | Student finds the *x*-coordinate on the *x*-axis. | ❑ Independent<br>❑ Verbal prompt (e.g., "Put your finger on the point and move it to the *x*-axis. That is the *x*-coordinate.")<br>❑ Model prompt (e.g., show how to move finger up/down to the *x*-axis)<br>❑ Physical prompt (e.g., hand over hand) | "Good job, that's how you find the *x*-coordinate." |
| "Is the *x*-coordinate positive or negative?" | Student identifies the *x*-coordinate as positive or negative. | ❑ Independent<br>❑ Verbal prompt (e.g., "The *x*-coordinate is [left/right] of the origin point, so it is [negative/positive].")<br>❑ Model prompt (e.g., point out the negative sign or no sign in front of number)<br>❑ Physical prompt (e.g., hand over hand) | "Yes! The *x*-coordinate is [negative/ positive]." |
| "Write the *x*-coordinate in the ordered pair." | Student writes *x*-coordinate in first space of parentheses. | ❑ Independent<br>❑ Verbal prompt (e.g., "Write the *x*-coordinate you just identified in the first space of the parentheses.")<br>❑ Model prompt (e.g., show where to write *x*-coordinate in ordered pair)<br>❑ Physical prompt (e.g., hand over hand) | "That is how you write the *x*-coordinate! Nice work!" |
| "Next, find the *y*-coordinate on the y-axis." | Student finds the *y*-coordinate on the *y*-axis. | ❑ Independent<br>❑ Verbal prompt (e.g., "Put your finger on the point and move it to the *y*-axis. That is the *y*-coordinate.")<br>❑ Model prompt (e.g., show how to move finger left/right to the *y*-axis)<br>❑ Physical prompt (e.g., hand over hand) | "Yes! That's how you find the *y*-coordinate." |
| "Is the *y*-coordinate positive or negative?" | Student identifies the *y*-coordinate as positive or negative. | ❑ Independent<br>❑ Verbal prompt (e.g., "The *y*-coordinate is [left/right] of the origin point, so it is [negative/positive].")<br>❑ Model prompt (e.g., point out the negative sign or no sign in front of number)<br>❑ Physical prompt (e.g., hand over hand) | "Yes! The *y*-coordinate is [negative/ positive]." |
| "Write the *y*-coordinate in the ordered pair." | Student writes *y*-coordinate in first space of parentheses. | ❑ Independent<br>❑ Verbal prompt (e.g., "Write the *y*-coordinate you just identified in the first space of the parentheses.")<br>❑ Model prompt (e.g., show where to write *y*-coordinate in ordered pair)<br>❑ Physical prompt (e.g., hand over hand) | "That is how you write the *y*-coordinate! Nice work!" |
| "What is the ordered pair for the coordinate point?" | Student identifies ordered pair (reading aloud/using augmentative and alternative communication device). | ❑ Independent<br>❑ Verbal prompt (e.g., "Read the ordered pair that you wrote.")<br>❑ Model prompt (e.g., read the ordered pair, such as "2, 3" for [2,3]; have student repeat)<br>❑ Physical prompt (e.g., hand over hand) | "Awesome work, you found the ordered pair for the coordinate point." |

| | |
|---|---|
| **Wrap-up activity** | Once students have completed the lesson plan, have them plan a carnival for the classroom. Make poster cutouts representing activities and use tape on the floor to create the coordinate grid. Have students plot ordered pairs and identify polygons on the floor in the proper location using their coordinate plane skills. This will give students the opportunity to apply the skills and practice managing the space. |

**Figure 2. Sample Interactive Whiteboard Template**




instruction (i.e., constant time delay and least intrusive prompts). For more information on scripted mathematics lesson instruction, see Trela, Jimenez, and Browder (2008).

### Step 4: Include Instructional Supports

Instructional supports help students solve problems and also responds to individual learning needs. Graphic organizers are one type of support that promotes problem solving in mathematics for students with moderate and severe disabilities (Browder, Jimenez, et al., 2012; Neef, Nelles, Iwata, & Page, 2003). Hands-on manipulatives also may help make mathematical concepts more concrete and may aid in problem solving. Technology (e.g., interactive whiteboards, calculators, and alternative and augmentative communication systems) can be incorporated in lessons to provide visual representation of the problem, help with problem solving, promote student responding, and increase engagement. Figure 2 provides a sample interactive whiteboard screenshot of a lesson on graphing on a coordinate plane.

### Step 5: Monitor Progress

In using student performance on a task analysis of a mathematical process to monitor individual student's progress, researchers often summarize the number of steps of the task analysis the student performed without assistance (e.g., Jimenez, Mims, & Browder, in press). The specific criterion set for mastery can be based on this performance of the task analysis (e.g., all steps correct for 2/2 days). It can be difficult to decide whether to hold back a small group if one of the students is not making adequate progress. An alternative is to continue instruction while providing additional intensive, individualized instruction for this student, which might include extra practice or teaching a few steps of the task analysis at a time. The student also may benefit from additional instructional supports. For example, Ms. Harris discovered that although Joseph could complete an algebraic problem to find the missing value with a calculator, he still needed a number line to identify order of numbers and how to correctly write the solution. This was a simple fix and Joseph quickly reached mastery criterion once this support was in place.

**Students will need opportunities to practice skills using different numbers and story problems and across different contexts.**

### Step 6: Plan for Generalization

Planning for generalization is a necessary component when planning instruction for students with moderate and severe disabilities. Students will need opportunities to practice skills using different numbers and story problems and across different contexts. This approach will help promote generalization and prevent memorization. Practicing these skills in real-life situations has been shown to be an evidence-based practice for teaching mathematics to this population (Browder et al., 2008). For example, after finding points on a plane, students might apply this approach to a simple grocery store layout and then go to the store to see the actual locations.

### Final Thoughts

The CCSS in mathematics were created to help all students become ready for the demands of future careers and life in an age of technology. Students with moderate and severe disabilities will need skills to meet these changing expectations. Although mathematics instruction could focus on a few of the earliest mathematics skills throughout the student's school career, research has shown students with moderate and severe disabilities can learn skills that align with the grade level of their chronological age (Browder, Jimenez, et al., 2012; Jimenez et al., 2008). In doing so, students may generalize their growing numeracy skills to a wide range of mathematics standards (e.g., recognizing numbers in perimeter, on graphs, in equations) instead of to a small range of instructional targets (e.g., recognizing numbers presented alone on flash cards). Using this six-step process, teachers will be able to find useful ways of teaching students the CCSS in mathematics, and students with moderate and severe disabilities can make progress toward grade-aligned mathematics skills.

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