More Language Arts, Math, and Science for Students with Severe Disabilities

edited by

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Dr. Browder is the Lake and Edward P. Snyder Distinguished Professor of Special Education and has over two decades of research and writing on assessment and instruction for students with severe developmental disabilities. She received the 2009 Distinguished Researcher Award from the AERA Special Education SIG and the 2009 First Citizens Bank Scholar at the University of North Carolina at Charlotte. In 2011 Dr. Browder was recognized by the state of North Carolina with the O. Max Gardner Award for research that has made a contribution to humanity.

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Dr. Spooner is Principal Investigator on a personnel preparation project involving distance delivery technologies at the University of North Carolina at Charlotte and Co-principal Investigator on a U.S. Department of Education, Institute of Education Sciences (IES) Project to teach students with moderate and severe intellectual disability to solve mathematical problems. He has also served as a Co-principal Investigator with Diane Browder on a project for determining evidence-based practices in the area of intellectual disability and Co-principal Investigator on a project focusing on high-quality mathematics and science instruction for students who participate in alternate assessments judged against alternate achievement standards. Dr. Spooner has held numerous editorial posts, including Co-editor of *TEACHING Exceptional Children*, Co-editor of *Teacher Education and Special Education*, Co-editor for *The Journal of Special Education*, and Associate Editor for *Research and Practice for Persons with Severe Disabilities.* His research interests include instructional procedures for students with severe disabilities, alternate assessment, and validating evidence-based practices.

CHAPTER 3

Common Core State Standards Primer for Special Educators

Shawnee Y. Wakeman and Angel Lee

Sara has been provided the links to the Common Core State Standards (CCSS; National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010) by her administrator. She has listened to her general education counterparts discuss the changes from the existing state standards to the CCSS, and she has participated in the fourth-grade team's discussion of how to address the new content within the scope of the curriculum. She hasn't yet felt comfortable participating in the discussions as she is simply unsure of how to address this content with her students with moderate and severe disabilities. Because there are so many standards to review for her students that are in third, fourth, and fifth grade, she is overwhelmed. Previously her state provided teachers of students in alternate assessments based on alternate achievement standards (AA-AAS) a prioritized subset of the state standards to use for instruction and the assessment. Sara also is unsure how to navigate the CCSS because math looks completely different than English language arts (ELA). As one of two special education teachers at her school, Sara feels somewhat isolated and embarrassed that she has basic questions when the general education teachers are becoming more fluent with the standards at every meeting. Sara also finds some of the content within the standards to be unfamiliar. Although the fourth-grade teachers have been sharing the lessons they have designed, Sara is not confident she would have the math concept correct if she were to contribute lesson ideas. In addition, as a special education teacher, she has not yet been invited to participate in CCSS professional development training provided by her school district. With the previous state standards, teachers met in a professional learning community (PLC) for 2 years to develop curriculum resources and supports for all teachers in the district to use. Because the PLC has not yet developed new information about the CCSS, Sara is not confident she can accurately line up the previously developed material with the new standards. To date, Sara's only strategy is to teach standards that are familiar from previous years' of instruction without much consideration for how those standards build student understanding across time or how they align with the assessment. Sara is eager to find resources to build her knowledge and subsequent use of the CCSS in designing lessons for her students.

Sara is likely not alone in her feelings of being overwhelmed by the CCSS. Many teachers of students with significant cognitive disabilities are still searching for resources that will help them adapt instruction that aligns with the CCSS. Although the CCSS are relatively new, having to use state content standards to plan instruction is not new for most teachers of students with moderate and severe disabilities. Over the past decade, most teachers have revised their instructional approach to address state standards to prepare students for the newly emerging alternate assessments. In a five-state survey, Karvonen, Wakeman, Browder, Rogers, and Flowers (2011) found that curriculum for students with significant cognitive disabilities has shifted to include academics in the instructional targets for this population. In contrast, although students are being taught a wide range of academic content, the most intensive instruction is still grounded in functional academic areas that may or may not link to state standards. This supports other research that shows teachers may lack resources or buy-in to teach state standards. Ryndak, Moore, Orlando, and Delano (2009) found that the extent to which students have access to academic content instruction differs greatly by state and across students.

A number of research studies have used academic content standards to design and implement instruction with students with moderate and severe intellectual disability. Research literature reviews of academic content instruction with students within this population (Browder, Spooner, Ahlgrim-Delzell, Harris, & Wakeman, 2008; Browder, Wakeman, Spooner, Ahlgrim-Delzell, & Algozzine, 2006) identified that prior to 2004, the content focus within the research represented a very narrow range of academics (i.e., sight words, money, time). In the past couple of years, a number of studies have extended beyond functional academic skills to content more typical of general education state standards. For example, Browder and colleagues (2012) implemented four math and four science units addressing national content standards and found increases in student test scores after instruction for students. In addition, Browder, Trela, and Jimenez (2007) examined the effect of a read-aloud using an adapted middle school novel with students with moderate to severe disabilities and autism. After the intervention, students were able to complete five skills successfully related to vocabulary and literacy development (i.e., identify vocabulary in text, read repeated story lines, participate in reading routines [e.g., turn the page], read new words, answer questions by referencing text). The emerging evidence supports the least dangerous assumption of teaching academic content standards to students within this population.

STATE CONTENT STANDARDS

Prior to the development of the CCSS, every state in the nation had either required or suggested standards for teachers to use to design instruction. Because these standards were state-specific, students in one state may or may not have had instruction on the same content in the same sequence as their neighbors in the next state. One of the No Child Left Behind Act of 2001 (PL 107-110) requirements for AA-AAS is that the assessment content must be aligned to the grade-level content. As Towles-Reeves, Kleinert, and Muhomba (2009) described, states have had the significant challenge to ensure that their alternate assessments and the other components within the system (e.g., extended content standards) were aligned to grade-level content standards. Many states developed several iterations of alternate or extended content standards that were designed specifically for students who participated in AA-AAS. Researchers found mixed outcomes for how well these early attempts of extending content aligned with the original standards (Flowers, Browder, & Ahlgrim-Delzell, 2006; Johnson & Arnold, 2004; Kohl, McLaughlin, & Nagle, 2006). Altman and colleagues (2010) surveyed state directors of special education, including eight unique states such as Guam. Twenty-seven responders indicated that they used extended or expanded academic content standards. Cameto and colleagues (2009) used data from the 2006–2007 school year to identify a number of features about the alternate assessment systems within each state and also found that many used extended content standards. (See the report for information about each state.) Some states now are in the process of creating extensions for the CCSS, for example Kansas (http://www.ksde.org/Default.aspx?tabid=2384), North Carolina (http://www.ncpublicschools.org/acre/standards/extended), and Colorado (http://www.cde.state.co.us/CoExtendedEO/StateStandards.asp).

CONCEPTUAL CONTENT ARRANGEMENTS

Although the CCSS will serve as the content base for the next generation of AA-AAS, states are seeking alternatives to simply extending the standards. One reason may be the mixed results for the degree of alignment between the extended standards and the general education standards (Flowers et al., 2006; Roach, Elliott, & Webb, 2005). Other conceptual arrangements of the content are being developed to inform instruction and assessment for students with significant cognitive disabilities. Two national consortia—Dynamic Learning Maps (http://dynamiclearningmaps.org) and the National Center and State Collaborative (NCSC; http://www.ncscpartners.org)—funded by the Office of Special Education Programs and consisting of state partners and psychometric and special education experts, have been charged to design new AA-AAS for use in the 2014–2015 school year. Both of these consortia are using new conceptual arrangements of how students learn the content to significantly guide the development of the AA-AAS. These include learning progressions and learning maps.

Learning Progressions

Although content standards illustrate what should be taught to students at each grade level or span, conceptual hypotheses about how students learn the content have begun to emerge. One trending topic is the development of learning progressions. Popham defined a learning progression as "a carefully sequenced set of building blocks that students must master en route to mastering a more distant curricular aim. These building blocks consist of subskills and bodies of enabling knowledge" (2007; p. 83). Learning progressions have been hypothesized, and at times tested, in several content areas, particularly science, for how typically developing students would learn the content (e.g., New Zealand Ministry of Education, 2007; Smith, Wiser, Anderson, & Krajcik, 2006; Steedle & Shavelson, 2009). One such learning progression that is being used by NCSC was developed by math and reading experts using existing research from each content area and was based on four guiding principles articulated by Hess (2008; http://www.naacpartners.org/

publications/ELA_LPF_12.2011_final.pdf [Hess, 2011]; http://www.naacpartners.org/publications/IntroForMath_LPF.pdf [Hess, 2010]). Learning progressions are not content standards; instead, they articulate the content knowledge or skills needed for students to build understanding toward a larger curriculum or content area goal.

Learning Maps

A second conceptual arrangement for content is a concept or learning map. Concept maps are common in education and can be used to graphically organize and show relationships among concepts. McAleese (1998) provided substantial information about the definition, background, and models of concept maps. There is some literature about students with and without learning disabilities regarding the effectiveness of using concept maps to improve student learning (e.g., Guastello, Beasely, & Sinatra, 2000; Strum & Rankin-Erickson, 2002), but there is little about students with moderate and severe disabilities. Using the foundational underpinnings for conceptual maps, Dynamic Learning Maps created learning maps specifically designed for students who participate in an alternate assessment in which related skills are linked to other skills. The maps are intended to illustrate how skills work together across multiple pathways to reach curricular goals.

PURPOSE AND DEVELOPMENT OF THE COMMON CORE STATE STANDARDS

The CCSS were written to represent the knowledge and skills necessary for all students, including those with intellectual disability, to be college and career ready. Wakeman (2012) explained that the array of skills needed for college and career readiness for students with moderate and severe disabilities not only includes academic content but also those skills identified within each student's individualized education program (IEP). These may include daily living, self-help, communication, social, and transition skills. Much of the focus within transitional efforts for students with significant disabilities in the past has been employment (Wagner, Newman, Cameto, Levine, & Garza, 2006). In the past few years, however, an increase in college and postsecondary education opportunities for students with moderate and severe intellectual disability has emerged (Hart & Grigal, 2010). Kearns and colleagues (2010) identified five goals for helping students with significant cognitive disabilities become college and career ready, including 1) developing communicative competence by kindergarten; 2) cultivating fluency in math and ELA for learning, leisure, or vocational purposes; 3) using age-appropriate social skills and working in small groups; 4) demonstrating independent work and assistance-seeking behaviors; and 5) accessing support systems. Given the purpose of the CCSS, it is imperative that teachers of all students, including those with intellectual disability, are able to use the CCSS as a primary resource to design instruction.

The authors of the standards provided several purposeful intentions that include driving effective practice, aligning with college and work guidelines, targeting higher order skills and rigorous content, promoting global competiveness, and following a research and evidence base (see http://www.corestandards.org/assets/Criteria.pdf). The authors intended to help frame a set of standards that allow students across the country (in the states that choose to adopt the CCSS) to receive instruction based on the same set of content and learning targets and, therefore, become globally competitive. The CCSS focus on results rather than means. That is, the standards do not provide instruction for *how* to teach, but instead represent *what* to teach in ELA and mathematics. Each state has the ability to decide 1) whether or not to adopt the CCSS, and 2) if they do adopt any portion of the CCSS (states can choose to adopt only one content area), to enhance the CCSS with additional standards determined to be essential for learning by students within their state.

Development of the CCSS was led by states (in collaboration with teachers, administrators, and education experts) and coordinated by the National Governors Association Center for Best Practices (NGA) and the Council of Chief State School Officers (CCSSO). Several items were used to help frame the content of the CCSS, including research, stakeholder surveys, assessment data, and current state standards, as well as the standards from other nations, the National Assessment of Educational Progress ELA frameworks, and results of student performance studies. Criteria used to frame the development of the standards included

Alignment with expectations for college and career success

Clarity

Consistency across all states

Inclusion of content and the application of knowledge through higher-order skills

Improvement upon current state standards and standards of top-performing nations

Reality-based, for effective use in the classroom

Evidence and research-based (Council of Chief State School Officers, n.d.).

As of this writing, 45 states, Washington D.C., and 4 U.S. territories have adopted the CCSS. (See http://www.corestandards.org/in-the-states for the full list.) In addition, individual states can decide to write alternate standards that are linked to the CCSS and represent the state's judgment of the highest expectations possible for students with moderate and severe disabilities. Wisconsin (http://dpi.wi.gov/sped/assmt-ccee.html) and North Carolina (http://www.ncpublicschools.org/acre/standards/extended) are just two states that have undertaken this type of work.

STRUCTURE OF THE COMMON CORE STATE STANDARDS

The following sections describe the structure of the content within the CCSS for mathematics and English language arts.

Mathematics

The mathematics section in the CCSS is composed of two components: practice and content. There are eight mathematical practices outlined as critical for instruction:

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.

4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning. (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010)

These practices are composed of processes defined by the National Council of Teachers of Mathematics and by proficiencies defined by the National Research Council. The eight standards are written for all grades, as they represent processes all students should engage in within the context of mathematical content. (For a full description of each mathematical practice, please visit http://www.corestandards.org/Math/Practice.)

The content standards are written by grade level using domains, clusters, and individual standards for Grades K–8. In high school, the standards are no longer written by grade level but are instead written by conceptual categories that may align with courses (i.e., Number and Quantity, Algebra, Functions, Modeling, Geometry, Statistics and Probability). Figures 3.1–3.3 provide examples taken from the introductory section of the CCSS for Mathematics and views of the differing structures of the standards for mathematics in Grades K–8 and high school. Each domain represents the group of related standards. For example, in third grade there are five domains: Operations and Algebraic Thinking, Number and Operations in Base Ten, Numbers and Operations-Fractions, Measurement and Data, and Geometry (http://www.corestandards.org/Math/Content/3/introduction). Within each domain there is a cluster of standards. The individual standards taken as a group represent the cluster under each domain. For example, in the third-grade Measurement and Data

Standards define what students should understand and be able to do.

Clusters summarize groups of related standards. Note that standards from different clusters may sometimes be closely related, because mathematics is a connected subject.

Domains are larger groups of related standards. Standards from different domains may sometimes be closely related.

Domain

Number and Operations in Base Ten **3.NBT**

Use place value understanding and properties of operations to perform multi-digit arithmetic.

Standard

1. Use place value understanding to round whole numbers to the nearest 10 or 100.
2. Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.
3. Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.

Cluster

Figure 3.1. Illustration of how to read the math Common Core State Standards. (From National Governors Association Center for Best Practices, Council of Chief State School Officers. [2010]. *Common Core State Standards*. Washington, DC: Authors; reprinted by permission. Retrieved from http://www.corestandards.org/Math/Content/introduction/how-to-read-the-grade-level-standards)

Statistics and Probability	**7.SP**

Use random sampling to draw inferences about a population.

1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*

Draw informal comparative inferences about two populations.

3. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*

4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*

Investigate chance processes and develop, use, and evaluate probability models.

5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

Figure 3.2. An example of the structure of the Common Core State Standards in K–8 mathematics. (From National Governors Association Center for Best Practices, Council of Chief State School Officers. [2010]. *Common Core State Standards.* Washington, DC: Authors; reprinted by permission. Retrieved from http://www.corestandards.org/assets/CCSSI_Math%20Standards.pdf)

domain there are four clusters of standards: 1) solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects; 2) represent and interpret data; 3) geometric measurement: understand concepts of area and relate area to multiplication and to addition; and 4) geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures (http://www.corestandards.org/Math/Content/3/MD). And, within each cluster there are individual standards. Following the same example, the Represent and Interpret Data cluster includes two standards:

1. 3.MD.B3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar might represent 5 pets.

2. 3.MD.B4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units- whole numbers, halves, or quarters. (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010; http://www.corestandards.org/Math/Content/3/MD)