THE NATIONAL ASSOCIATION OF SPECIAL EDUCATION TEACHERS (NASET)

COURSE HANDBOOK

Math Intervention for Special Education: Instructional Strategies 30 study hour credits

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Module Summaries

The NASET Math Intervention for Special Education: Instructional Strategies course, taught by Dr. Sarah Powell of The University of Texas at Austin, is comprised of 6 Modules totaling 30 study hours. Each Module contains video lectures, slide presentations, and a downloadable handout with reflection, research, and practice activities. At the end of each Module, there is a multiple-choice examination which must be successfully completed with a grade of at least **80%** to move on to the next Module. Upon successful completion of each Module, you will immediately be able to view, save, or print a professional certificate of recognition. Modules are enabled for review one at a time in sequential order, per the listing below.

MODULE A

Introduction to Math Intervention

Video Lecture and Slide Presentation: Module A provides the foundation for the entire course. It defines math intervention, explores why students experience difficulty with math, and shows how early math skills predict outcomes years later. It also introduces the cognitive stages of learning and the five-part instructional platform that the rest of the course is built on. After completing this module, you should understand the following:

Defining Math Intervention

- Math intervention as targeted instruction and assessment for students who experience difficulty with math
- Who receives intervention: students with a specific learning disability, students with any identified disability, and students without a disability who struggle with math
- Common areas of difficulty: math knowledge, reading, and cognitive skills such as working memory and processing speed

The Continuum of Mathematics Learning

- Research showing early math predicts later math, college enrollment, degree completion, and adult outcomes
- Kindergarten math as an early indicator of later math difficulty
- Unfinished learning: the gap between where a student is and where the student needs to be
- Mapping critical content across grade levels in operations, place value, and problem solving

Cognitive Stages of Learning (Haring & Eaton, 1978)

- Acquisition: building initial accuracy with a new skill
- Proficiency: doing math accurately and with ease
- Generalization: knowing when to apply a skill, supported by interleaved and distributed practice
- Adaptation: transferring knowledge to unfamiliar problems
- Students can move back and forth between stages

The Instructional Platform

- The What Works Clearinghouse practice guide on assisting students who struggle with math
- Five components: math vocabulary, representations, explicit instruction, fluency, and word-problem solving
- Reflecting on your strengths, opportunities for growth, and short- and long-term plans

MODULE B

Instructional Platform: Math Vocabulary

Video Lecture and Slide Presentation: Module B explores the first component of the instructional platform. Math vocabulary is the foundation that representations, explicit instruction, fluency, and word-problem solving all rely on. This module covers why vocabulary matters, where students get confused, and how to teach formal terms with precise definitions. After completing this module, you should understand the following:

The Importance of Math Vocabulary

- Math vocabulary as the terms that describe math concepts, procedures, strategies, and representations
- Math language as a broader system that includes symbols and gestures
- The number of terms students encounter: roughly 110 to 150 in grades K-2, and several hundred more by middle school
- How students use vocabulary through listening, speaking, reading, and writing

Common Areas of Difficulty

- Terms used only in math, such as trapezoid and numerator
- Terms shared with everyday English that carry different or more precise math meanings
- Terms with more than one math meaning, such as round, square, and second
- Homophones, such as sum and some
- Related terms students confuse, such as factor and multiple
- Informal terms used in place of formal ones, such as diamond instead of rhombus

Emphasizing Formal Terms

- Saying greater than and less than instead of alligator language
- Distinguishing digits from numbers when discussing place value
- Regrouping, trading, or exchanging instead of carrying and borrowing
- Numerator and denominator instead of top number and bottom number
- Reading decimals by place value and naming results as sum, difference, product, or quotient

Precise Definitions and Instructional Activities

- Pairing each term with a precise, student-friendly definition and a representation
- Word walls, semantic maps, and Frayer models
- Flashcards and games such as Heads Up, bingo, and memory matching
- Glossaries, discussion, math writing, and math storybooks

MODULE C

Instructional Platform: Representations

Video Lecture and Slide Presentation: Module C explores the second component of the instructional platform. Representations help students understand math concepts before they work with abstract numbers and symbols. This module covers the types of representations and shows how to use them for counting, the operations, fractions, and algebra. After completing this module, you should understand the following:

The Importance of Representations

- Concrete, pictorial, and abstract representations
- Virtual manipulatives as pictorial representations
- Using concrete and pictorial representations to build understanding of abstract math
- Presenting representations to students as tools, not toys

Representations for Counting and the Operations

- Addition as parts put together for a total, and as change
- Subtraction as change and as difference
- Multiplication as equal groups and as multiplicative comparison
- Division as partitive and quotative

Representations for Fractions

- The length, area, and set models of fractions
- Modeling fraction multiplication and division
- Tools such as Cuisenaire rods, fraction circles, pattern blocks, and geoboards

Representations for Algebra

- The equal sign as a relational symbol
- Keeping both sides of an equation balanced
- Using zero pairs to solve equations
- Combining representations with math vocabulary across the instructional platform

MODULE D

Instructional Platform: Explicit Instruction

Video Lecture and Slide Presentation: Module D explores the third component of the instructional platform. Explicit instruction is clear, unambiguous teaching that is especially important for students who experience difficulty with math. This module covers the three core ideas of explicit instruction: modeling, practice, and engagement strategies. After completing this module, you should understand the following:

Understanding Explicit Instruction

- Explicit instruction as instruction that is clear and unambiguous
- How explicit instruction fits within the cognitive stages of learning
- Deciding when to be more explicit and when to be less explicit

Modeling

- Describing the goal of a lesson and why it matters
- Step-by-step think-alouds that show students how to solve a problem
- Making modeling a dialogue with students

Practice

- Guided and independent practice within the explicit instruction framework
- Supports used within modeling and practice

Engagement Strategies

- Asking a mix of lower-level and higher-level questions
- Eliciting frequent responses through choral response, turn and talk, and manipulatives
- Providing affirmative and corrective feedback

MODULE E

Instructional Platform: Fluency

Video Lecture and Slide Presentation: Module E explores the fourth component of the instructional platform. Fluency means doing math accurately and with ease, which frees up working memory for more complex problems. This module covers fact fluency and computational fluency, with strategies for each operation. After completing this module, you should understand the following:

Understanding Fluency

- Fluency as doing math accurately and easily
- Balancing conceptual and procedural knowledge
- Efficiency compared with automaticity
- When timed and untimed activities are appropriate
- How fluency reduces the load on working memory

Fact Fluency

- The 390 basic facts across addition, subtraction, multiplication, and division
- Connecting facts to the meanings of each operation
- Fluency pathways toward automaticity
- Instructional activities to build fact fluency

Computational Fluency

- Fluency with multi-digit numbers
- Addition: the traditional algorithm and partial sums
- Subtraction: the traditional algorithm, partial differences, and adding up
- Multiplication: the traditional algorithm and partial products
- Using base-10 blocks and place value disks to connect strategies to place value

MODULE F

Instructional Platform: Word-Problem Solving

Video Lecture and Slide Presentation: Module F explores the fifth component of the instructional platform. Word-problem solving brings together reading and math, and it draws on every other part of the platform. This module covers why common strategies fall short, how to teach an attack strategy, and how to teach students to recognize word-problem schemas. After completing this module, you should understand the following:

Understanding Word-Problem Solving

- Word-problem solving as setting up and solving text-based word problems
- Directive and routine word problems
- The cycle of word-problem solving and its connection to reading
- Common areas of difficulty and ineffective strategies such as keywords

Attack Strategies

- An attack strategy as a general process for working through a word problem
- Examples such as RICE, RIDE, RIDGES, STAR, SOLVE, and UPS Check
- Choosing one attack strategy and using it consistently
- Using an attack strategy together with schema instruction

Additive Schemas

- Total: parts put together for a total
- Difference: amounts compared for a difference
- Change: a starting amount that increases or decreases over time
- Static compared with temporal problems
- Unknowns in different positions

Multiplicative Schemas

- Equal groups: groups with an equal number in each group
- Set (multiplicative comparison): a set compared a number of times
- Schema equations and gestures that help students identify each schema
- Reflecting on your strengths, opportunities for growth, and plans for word-problem instruction

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