IS SPEECH LANGUAGE THERAPY REALLY NECESSARY IN THE MATH CLASSROOM?

DISCLOSURES

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0BJECTIVES

• Discuss the need for speech language pathology and math teacher collaboration and ways it can be beneficial to student success

• Describe speech pathologists self-perceived skills in providing speech services in the math classroom

• Explain learning of the academic language for math and how the SLP can help with transition of those skills

MATH AND LANGUAGE

• What got me here?

• Math was NOT my favorite subject in school.

• I did not learn math language in my career preparation

• Seeing way too many math strugglers on my speech caseload.

MATH LANGUAGE

• Would rather teach language than math 😊😊

• Parents stated language much more “important” for academic success than math 😞

• Parents use flashcards and workbooks for language but everyday activities for math.

WHAT ISN’T MATH?

??????

PARENTS AND THE MATH GAP
SOME DEFINITIONS

- Early numeracy: general understanding of numbers. Several skills involved:
  - Verbal counting
  - Knowing number symbols
  - Recognizing quantity
  - Discerning number patterns
  - Comparing magnitude
  - Estimating quantities

NECESSARY SKILLS FOR MATH LEARNING

- Increased attention span
- Learn to stay on task
- Hold more information in mind
- Ability to shift between tasks.

WHAT DO THESE ALL HAVE IN COMMON?

- Oral language (OL)
- Early numeracy (EN)
- Phonological awareness (PA)

MATH VOCABULARY LEARNING

- Concepts and learning and recall of math vocabulary often impeded the same way as acquisition to written language.
- The demands on reading in math goes far beyond story problems, - reading equations, mathematic conceptualization, definition.

MATH VOCABULARY

- Consists of 5 types of language
- How do we teach this?
- How do math teachers teach this?

ONE

- Words that have the same meaning inside and outside of math
  - Circle
  - Add
  - Cylinder
- Students already have conceptual schema
- They bring ideas and experiences to these words
TWO

- Words with different meanings inside math than outside
  - Distribute
  - And - or
  - Table
  - Fraction
  - Tangent
  - Sum
  - Product
  - Slope
  - Mean
- The teacher needs to create new conceptual schemas

THREE

- Words that are unique to math and do not exist outside
  - Exponent
  - Quotient
  - Numerator
  - Denominator
  - Cosine
- Words are new and must be taught concrete experiences

FOUR

- Competing words that are formed using competing or opposite meaning
  - Least common multiple
  - Greatest common factor
- Think of statements - John is intelligent, handsome, tall boy
- These are qualifiers of words and must be seen in a certain order.

FIVE

- Compound words formed by combining different concepts
  - Miles per hour
  - Scale factor
  - Density
- Before understanding secondary words/concepts the student must understand the primary concepts.

LINGUISTIC NUANCES

- Lack of language containers for concepts and processes
- Organization and attention
- Phonemic awareness and number sense.

OKAY NOW WHAT?

- We need a test for specific math language and it should be incorporated into the curriculum
- Connect early numeracy skills for our at risk kiddos.
- Classroom observations — recommendations for teachers
VOCAB DEVELOPMENT

- Restate definition in own words
  - Beginner: The pattern has ________
  - Intermediate: The first pattern has ________; the second pattern has ________. They both have ________.
  - Advanced: While the first and second patterns both have ________, both are different because ________.

CHUNKING

- Inch, foot, centimeter, yard
- Chord, volume, box, unit.
- Develop the schema

FOUR PHASES OF MATH

- Math problem solving similar to reading comprehension
  - 1- problem translation
  - 2- problem integration
  - 3- solution planning
  - 4- solution execution

WORKING MEMORY

- Follow multi step directions that build on each other.
- Count forward or backward by set amount
- Attempting to write verbatim a series of recently heard sentences
- Mentally complete math equation with 2 digit or higher numbers
- Following the actions of multiple characters over the course of a story.

WORKING MEMORY IN THE CLASSROOM

- Consider the demands of the text
  - New concepts and ideas introduced may be within grasp as long as the language used is familiar to the child. If the child has to contribute great deal of mental stress to the comprehension of word – fewer resources will be like to integrate content and information.
### PSTM
- Phonological short term memory
- Discrepancies:
  - Sentence imitation (rote task) versus comprehension of sentence (follow directions)
  - Child has PSTM to repeat (storage) but not capacity to act (process)

### USE SUPPORTS
- Reduce the memory constraints
- The SLP role here:
  - Make teachers and other educators aware of how WM and resources limits may play out in response to expectations and assignments.
  - Provide supports for children.
  - Work directly on skills and strategies that will improve use of available resources.

### CLASSROOM MODIFICATIONS
- Teach adult discourse strategies: chunking, repetition, summarizing.
- Ensure children remember requirements.
- Provide written test of key steps.
- Reduce rate of instruction.
- Consider demands of response environment.

### VISUAL SUPPORTS
- Gesture toward items needed in multistep directions.
- Write sequence on the board.
- Make info for secondary tasks more available.
- Individualize visual supports.
- Combine visual with physical experience.

### Support Child Specific Knowledge
- Pre-teaching.
- Breaking down tasks.
- Improve phonological memory.
- Increase "automaticness" of skills.
- Teach domain specific knowledge.
- Improve metacognition and strategy use.
METACOGNITION

- Rehearsal
- Task analysis
- Visualization
- Study and organizational skills

STRATEGIES

- Highlight the problem process
  - How did you solve the problem?
  - Did anyone solve it another way?
  - Tell us what was going through your mind?
- Recognize the thinking of others
- Honor surprise
- Invite reflection

TAKE HOME

- Mathematical maturity shows a shift from method of counting based to a retrieval based strategies.

REFERENCE


QUESTIONS

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