

## Outline of *Helping Students With Mathematical Disabilities to Succeed*

The three main questions that the article addresses are:

1. What is a math disability?
2. What are its characteristics?
3. What can teachers do to help students with a math disability?

“Severe problems with mathematics are referred to as dyscalculia” (p. 2).

“It is generally agreed that dyscalculia is a neurologically based disorder of mathematical abilities. It originates as a genetic or congenital disorder of the brain and causes a discrepancy between an individual’s general cognitive level and mathematical abilities” (p. 2).

“Most students with mathematical difficulties learn in a mainstream educational classroom, many teachers do not have the specialized expertise needed to help them” (p. 2).

At least 6% of students in the classroom have dyscalculia.

Over half of the students that tested positive for dyscalculia only had problems in arithmetic. Their scores in reading were normal. The rest of the students who tested positive for dyscalculia had low scores in reading and arithmetic.

“Dyscalculia has been divided into subtypes in various ways. Geary (2000) developed the following useful categorization:

1. *Semantic memory*: difficulty retrieving arithmetic facts.
2. *Procedural memory*: difficulty understanding and applying mathematical procedures.
3. *Visuospatial memory*: difficulty understanding spatially represented numerical information such as misalignment of columns, place value errors, or geometry”. (p. 3).

“The fact that individuals with dyscalculia have differing subtypes of mathematical disability makes diagnosis and treatment perplexing. It is also confusing because a learning disability may not be the only cause of mathematical difficulties” (p. 3).

Mathematical difficulties can also be caused by language difficulties. Math has its own language so students with language disabilities like dyslexia or dysgraphia have trouble learning the math vocabulary.

Math anxiety is not a math disability but it can greatly affect a person’s ability to do well in math.

“There are two mathematical learning styles or personalities that teachers should consider when planning instruction: qualitative and quantitative” (p. 3).

Students with a qualitative learning style do well with patterns and visual aspects of mathematics. They look at things on a whole-to-part basis. They have problems with sequence and detail. They make careless errors because they skip steps and try to make up their own ways to solve

problems. They are good at backward counting, subtraction, division, and estimation. They learn best through inductive, visual-spatial, and pattern strategies.

Students with a quantitative learning style are good with language skills. They are good with sequences and like to look at problems in pieces. They are part-to-whole oriented. They are usually good at calculations, counting, addition, multiplication, and naming geometric shapes. They have problems with broad concepts, estimation, and sophisticated geometry. They learn best through direct, sequential, step-by-step teaching methods.

## **MATH INTERVENTION STRATEGIES FOR TEACHERS**

Treatment of math anxiety, teachers should:

- Assure that the classroom environment is safe
- Never ridicule or punish students for wrong answers
- Assess students in a nonthreatening way
- Provide activities that produce mathematical success
- Use charts and graphs to show students' progress
- Use students' names and daily activities in word problems to motivate students
- Praise students regularly for large and small successes
- Discuss famous people like Einstein who overcame learning problems
- Post steps for overcoming anxiety (take deep breaths, believe in oneself, get help)
- Play math games
- Have students form learning groups or pairs to encourage cooperation

General instruction for students with math difficulties

- Students with math difficulties need to be seated in the front of the class
- They should be actively engaged in lessons
- Instruction should be well organized
- Start instruction with concrete objects and move onto pictures and diagrams
- Before moving on, students need to master prerequisite skills
- After reviewing the big picture, teachers need to present the concept step-by-step
- Students should summarize what they learned at the end and beginning of each lesson
- Frequent short reviews are better than long ones

- Never give large amounts of work or time pressures
- “Break down long assignments into smaller ones and provide students with immediate feedback after each one” (p. 5).
- Textbooks and other materials should be appropriate
- “Students learn best through multisensory instruction that incorporates multiple senses and movement” (p. 5).
- Materials like geoboards, Base 10 Blocks, Cuisenaire rods, geometric blocks, counters and play money make abstract concepts concrete.
- Use measuring tools to measure real objects
- Walk a number line to add or subtract
- Use real thermometers to measure and convert temperature
- Fill a jar with jellybeans to illustrate numbers
- Allow extra time for students to over-learn math skills so they become automatic
- Students should learn through multisensory activities
- Use music or rhythm to facilitate learning

#### Mathematical Communication for students with math disabilities

- “Students should have opportunities to communicate mathematics in multiple ways” (p. 5).
- They can write in a math journal to help them feel comfortable with math terms
- They can discuss math ideas aloud
- Teachers should explain new vocab using concrete examples and then have students make their own examples
- Students can make their own math dictionaries
- Teachers should teach new symbols and sign with multiple examples
- Teachers should emphasize meaning, never pure memorization
- Teachers should post directions and procedures on the wall
- Teachers can make helpful math-reminder sheets for students to keep in their notebooks
- Textbooks can be recorded orally, so students with reading problems can understand them

#### Assessment for students with math disabilities

- “Ongoing formal (e.g., tests) and informal (e.g., observation, checklists, interviews) assessment procedures are necessary to plan appropriate instruction” (p. 6).
- Tests and quizzes should always take place in a relaxed atmosphere
- Written test should be very legible with big spacing
- Items on tests should be grouped according to type
- Items on test can be reduced or break test into parts
- Students should be allowed to write directly on test instead of an answer sheet
- Test can be read a loud to students if needed
- Interviews with students can be used as a helpful assessment

#### Word problems for students with math disabilities

- Use students’ personal experiences to explain word problems
- Student should underline facts and circle the questions in word problems