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Dyscalculia: making numbers more meaningful

By Ron Hardman - Kilroy's Workshop · Educational information, not clinical advice

When numbers and calculations remain difficult, "try harder" is not a teaching plan. Start with the particular math idea a learner needs help understanding.

What dyscalculia means

Dyscalculia is a learning disorder involving severe, persistent difficulty acquiring arithmetic skills—not simply another name for being "bad at math." A learner may struggle to judge quantities, compare numbers, connect a symbol such as 7 with seven objects, recall arithmetic facts, or carry out calculation procedures. The pattern is not the same for everyone: two learners may need help with quite different parts of mathematics. [1] [3]

Working memory, attention, and spatial processing can also be involved, but dyscalculia is not just a working-memory problem. The 2025 neuroscience review describes multiple contributing processes and substantial differences in their nature and severity between individuals. [3]

How common is it? The 2019 review reports an estimated **3–7%** of children, adolescents, and adults; the 2025 review cites 5–7%. These are research estimates, not one universal rate or a way to identify an individual learner. [1] [3]

A low score on one activity is not a diagnosis. Assessment considers mathematical performance alongside the person's history and broader clinical and psychosocial information. [1]

Match support to the difficulty

The review favors interventions directed at specific mathematical difficulties and notes gaps in evidence and learning programs for older adolescents and adults. This supports being specific about the learning goal—not promising that one tool works for everybody. [1]

Our practical suggestion: ask the learner to explain a small example. Is the difficulty comparing quantities, understanding a fraction, choosing an operation, or remembering a procedure? Keep that observation separate from a diagnostic label.

Connect quantities, pictures, and symbols

The 2021 IES practice guide recommends systematic instruction, clear mathematical language, carefully chosen representations, and number lines for elementary mathematics intervention. [2] Its evidence is not a trial of Shop Class Math or proof of outcomes for teenagers with dyscalculia.

Our application: use the same quantity across an object model, a picture, and a written calculation. Explain what each part represents. Avoid adding several unfamiliar diagrams at once.

A name for the connection: concrete–representational–abstract (CRA)

CRA connects physical materials, drawings, and mathematical notation. The IRIS Center describes this instructional framework; the important step is explaining how the representations match, not just handing a student objects. [4]

- **Concrete:** combine seven physical pieces with five more.
- **Representational:** draw the groups or show their positions and moves on a number line.
- **Abstract:** connect those actions to 7 + 5 = 12, working toward solving with the notation itself.

The sequence below is our application of that framework, not a tested shop-based treatment.

A workshop example: 7 pieces plus 5 pieces

1. Start with 7 equal-size pieces. Five more are added.
2. Make a group of ten: take 3 of the new pieces to join the 7.
3. Two new pieces remain. Ten and two make 12.
4. On a number line, start at 7, move 3 to reach 10, then move 2 to reach 12.

Write 7 + 5 = 12. Ask the learner to connect each step to the pieces. Try another example together, then offer a similar problem independently. This is our original teaching example, not a diagnostic test or a validated intervention.

Make fraction size visible

Original practice idea: divide one strip into 8 equal parts. Shade 3. That is 3/8 of this whole—not 3 separate wholes. Locate 3/8 between 0 and 1 on a number line. Compare it with half: 4/8 is half, so 3/8 is smaller. Keep the whole the same size when comparing fractions.

From fraction strip to a shop measurement

Use a 12-inch strip of paper or cardboard and a ruler. No cutting or shop equipment is needed. Measure from the same starting end each time.

1. **Concrete:** divide the 12-inch length into 8 equal sections. Each section is 12 ÷ 8 = 1½ inches. Mark 3 sections, 4 sections, and 5 sections from the starting end.
2. **Representational:** draw a matching line from 0 to 12 inches. Label those marks 3/8, 1/2 (4/8), and 5/8 of the whole strip.
3. **Abstract:** 3/8 × 12 = 4½ inches; 1/2 × 12 = 6 inches; 5/8 × 12 = 7½ inches.

Ask: “Which mark is closest to the starting end? Which is halfway? Why are the marks 1½ inches apart?” A fraction *of a 12-inch length* is not the same as that fraction of one inch.

Shop Class Math uses physical contexts to make mathematical relationships explicit. This is an original learning activity, not evidence that shop-based instruction treats dyscalculia.

Accommodations and instruction do different jobs

Accommodations address access barriers without changing the intended learning goal. Depending on the task and learner, options may include additional time, read-aloud, a reference sheet, or a calculator. **Instruction or intervention** teaches the mathematical knowledge or skill itself. A learner may need both. [5]

Our example: a calculator might help a learner explore material costs when the goal is choosing and explaining an operation. It would change what you can infer from a check of unaided calculation. Explicitly teaching how 7 + 5 can be regrouped as 10 + 2 serves a different purpose. Agree on the goal and permitted support with the learner’s educators, and record which help was used.

Keep practice and progress honest

Our number-sense practice includes grouped quantities, a number line with one move at a time, and fraction bars. It is untimed and unscored. Worked explanations are supported practice; they do not count as independent results in the parent report. Larger text and optional lesson read-aloud remain available.

Untimed exploration is our design choice, not a claim that timed practice is always harmful. The IES guide also includes timed activities as one way to develop fluency. [2] Choose the approach with the learner and their educators.

When to seek individual help

Persistent difficulties that affect school or everyday activities deserve discussion with educators and a qualified assessment professional. Bring examples of the learner's work, the help provided, and what the learner says is confusing. These resources do not diagnose, treat, or replace individualized support.

Sources & evidence limits

1. Haberstroh, S., & Schulte-Körne, G. (2019). The Diagnosis and Treatment of Dyscalculia. *Deutsches Ärzteblatt International, 116*(7), 107–114. doi:10.3238/arztebl.2019.0107. PubMed record.
   Evidence synthesis supporting a German guideline; searches covered 2015–2016. This is not presented as a current clinical standard or a study of this product. Claims here were checked against the indexed abstract.
2. What Works Clearinghouse (2021). *Assisting Students Struggling with Mathematics: Intervention in the Elementary Grades.* Institute of Education Sciences. Official guide and recommendations.
   Elementary-grade intervention evidence; applying these ideas to teens requires caution.
3. Nieder, A. (2025). The calculating brain. *Physiological Reviews, 105*(1), 267–314. doi:10.1152/physrev.00014.2024.
   Broad neuroscience review; Box 1 discusses dyscalculia and individual variability. Published online in 2024, in the January 2025 issue. Not an evaluation of this course.
4. The IRIS Center, Vanderbilt University. *Algebra (Part 1): Applying Learning Strategies to Beginning Algebra*, Concrete-Representational-Abstract (CRA) STAR Sheet. Resource and CRA framework.
   Educator training resource explaining the framework; not a dyscalculia-specific clinical trial.
5. The IRIS Center, Vanderbilt University. *Accommodations: Instructional and Testing Supports for Students with Disabilities*. Page 1: Accommodations; Page 2: Practices Confused with Accommodations.
   Educational guidance distinguishing access supports from instruction and modifications; supports must fit the learning goal.

Sources checked September 21, 2026. Selected-source educational guide, not a systematic review. Written by Ron Hardman - Kilroy's Workshop; no clinical review or product-efficacy study is claimed.

Read online: https://shopclassmath.com/dyscalculia-and-math.html