The Write Stuff: Evaluation and Treatment for Dysgraphia

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November 6, 2026
Occupational Therapy Association of California Annual Conference

Learning Objectives

- Participants will understand the components of dysgraphia
- Participants will learn a systematic tool to guide their assessment
- Participants gain treatment strategies for intervention

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Why should we address dysgraphia?

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Prevalence in the Bridge Program at The Christ School

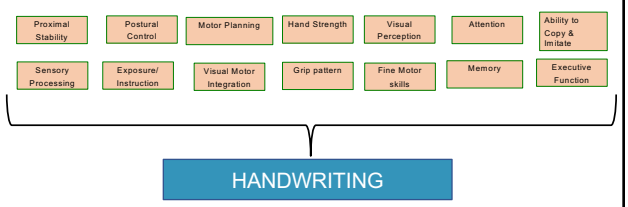
- **1st grade:** 1 out of 3 students with dysgraphia
- **2nd grade:** 10 out of 10 students with dysgraphia
- **3rd grade:** 11 out of 20 students with dysgraphia
- **4th grade:** 13 out of 20 students with dysgraphia
- **5th grade:** 10 out of 16 students with dysgraphia

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Writing is an important academic skill that's been associated with overall academic achievement.

Writing is an incredibly complex skill that involves many skills and brain functions.

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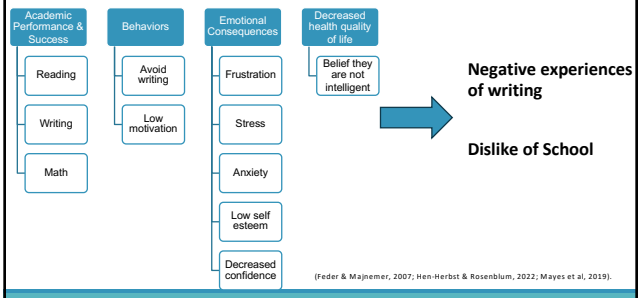
When dysgraphia remains undiagnosed, children struggle to succeed in school.

Schools frequently overlook dysgraphia

- Fail to assess handwriting
- Fail to provide accommodations
- Focus heavily on reading and math while neglecting writing

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Dysgraphia influences



(Feder & Majnemer, 2007; Hen-Herbst & Rosenblum, 2022; Mayes et al, 2019).

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Children who have difficulty with writing are often mislabeled as sloppy or lazy rather than being recognized as having a learning disorder.

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It is our responsibility to…

- **Provide positive support** -> can help a child overcome these challenges.
- **Evaluate and treat** -> determine needs & provide intervention
- **Train teachers** -> increases self-efficacy to support children with dysgraphia

(Kalenjuk et al., 2024)

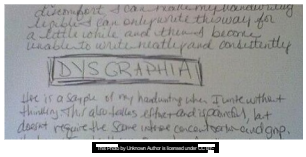
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Basics of Dysgraphia

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Greek Translation

DYS = “impaired”
GRAPHIA = “making letter forms by hand”



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Dysgraphia

Dysgraphia' and 'specific learning disorder in written expression' **describes individuals who demonstrate writing ability incongruous with their cognitive level and age.**

(Baggett et al., 2024; Gosse & Van Reybroeck, 2021).

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What is Dysgraphia??

neurological condition and learning difference

writing ability = their cognitive level and age

"an impairment in handwriting ability that is characterized chiefly by very poor or often illegible writing or writing that takes an unusually long time and great effort to complete."

Impairment in the production of written text

(Baggett et al., 2024; Gosse & Van Reybroeck, 2021).

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Dysgraphia is…

- a **catch-all term** to diagnose handwriting difficulties (due to complexities of writing)
- difficult to identify and diagnose
- not an intelligence problem
- not due to a lack of instruction, motivation, effort or attention

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Cause of Dysgraphia

Writing is incredibly complex and involves several areas of the brain.

- Unclear of the causes (McCloskey & Rapp, 2017)
- Likely a genetic link since it often runs in families (Berninger & Richards, 2010)

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Prevalence of Dysgraphia

- Often undiagnosed or misunderstood
- Researchers estimate that 10% to 30% of people have difficulty with writing (depending on the diagnostic criteria used).
- More common in boys
- Likelihood increases if family member has it

(Chung, et al, 2020)

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Diagnosis of Dysgraphia

Not a standalone diagnosis; does not have specific criteria for diagnosis

- Falls under Specific Learning Disorder in the DSM-5 ->
  - Formal diagnosis would be **Specific Learning Disorder with impairment in written expression"**
- Since dysgraphia can encompass both cognitive/academic challenges (the "writing" aspect) AND fine-motor difficulties (the "handwriting" aspect) ->
  - It also overlaps with/involves elements addressed under **Developmental Coordination Disorder (DCD)**

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Diagnosis of Dysgraphia

Involves assessment of the child's:

- Grade and age expectations
- School environment and educational history
- Learning strengths and weaknesses.
- Cause and extent of the writing difficulties
- The type of writing difficulties
- Interventions, supports and strategies that have already been implement and are currently in place, as well as the impact/effectiveness of these remediation efforts.

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Types of Dysgraphia

Developmental
-> Deficits in the process of learning to write

Acquired
-> Due to head/brain trauma

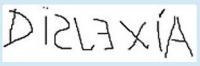
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Comorbidities

- Dyslexia
- Dyscalculia
- ADHD
- Autism

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Dyslexia



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- A specific learning disability related to reading (Baggett et al., 2024).
- Children with dyslexia struggle with graphomotor aspects of writing (Gosse & Van Reybroeck, 2021).
- Two indicators of dyslexia: lack of diverse vocabulary and poor idea development/organization of ideas (Baggett et al., 2024).

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Dyslexia, Dysgraphia, & Dyscalculia

Distinct neurodevelopmental disorders that affect different academic skills but often co-occur.

- **Dyslexia** – a learning disorder that primarily affects reading, including word recognition, decoding, and spelling.
- **Dysgraphia** – a learning disorder that affects handwriting and written expression, including letter formation, spelling, organizing ideas, and expressing thoughts in writing.
- **Dyscalculia** – a learning disorder that affects mathematical abilities, including understanding numbers, learning arithmetic facts, performing calculations, and solving mathematical problems.

Baggett et al. 2023

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ADHD & Autism

Extremely common in ADHD (Combined & Inattentive Types) & Autism!

A study of 724 children by Mayes & Calhoun (2007b) reported dysgraphia in

- 58% of students with ADHD
- 50% of student with autism

A study of 1,000+ children by Mayes et al (2019) found that

- 59% of the students with ADHD or autism met the criteria for dysgraphia
- 92% showed graphomotor weakness relative to their overall intellectual ability

This means that handwriting problems are the rule (not the exception) for these populations and should be routinely screened for.

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Signs & types of dysgraphia

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Early indicators

Signs may be present **as early as 5 years of age**

- Difficulties emerge during kindergarten/1st grade when handwriting and spelling are explicitly taught
- *Remember…it is not due to lack of instruction or lack of motivation, effort, instruction, or attention!*

Early testing and diagnosis is best…particularly as writing demands increase

It is never too late to get testing done!

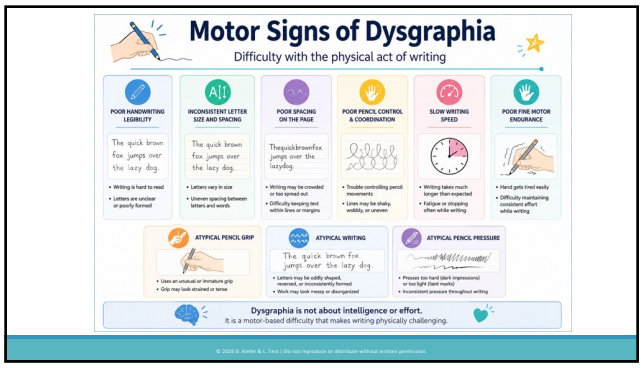
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Signs of Dysgraphia

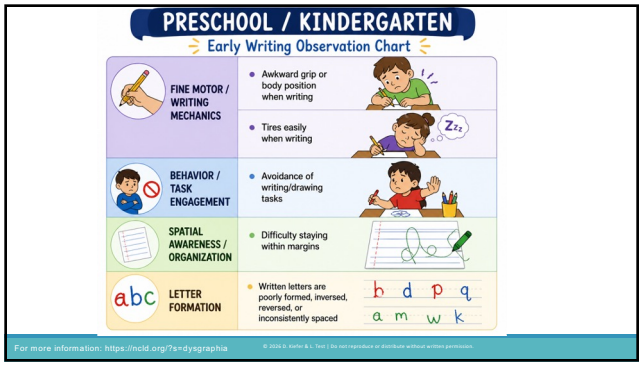
- ✓ Spelling errors/difficulty
  - Transpositions (incorrect order of letters in a word)
- ✓ Letter crowding/atypical spacing
  - Abnormal/inconsistent use of margins (left and/or right margins)
- ✓ Poor legibility
  - Letter reversals
  - Inconsistent sizing
  - Inversions: letters formed to look like a mirror (flipped) in relation to the horizontal line
- ✓ Poor alignment/atypical writing in relation to vertical access (positioning of letters above/below line)
- ✓ Inconsistent/lack of grammatical conventions
- ✓ Abandoned words
- ✓ Difficulty with written expression

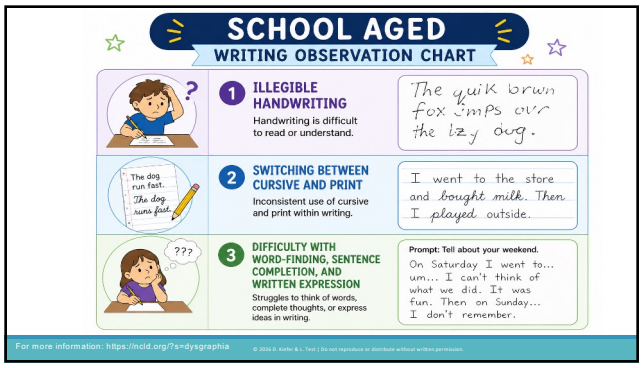
(Baggett et al., 2023)

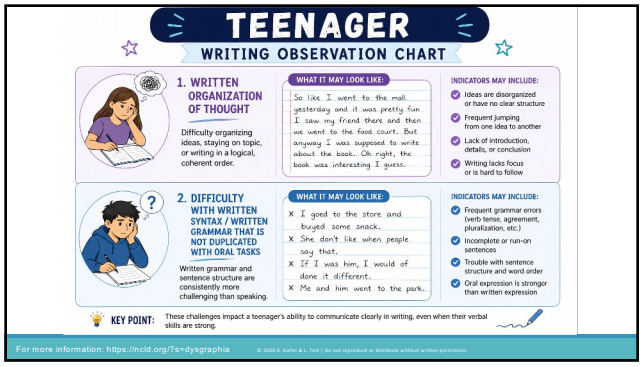
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Motor Signs of Dysgraphia
Difficulty with the physical act of writing
POOR HANDWRITING LEGIBILITY
The quick brown fox jumps over the lazy dog.
• Writing is hard to read
• Letters are unclear or poorly formed
INCONSISTENT LETTER SIZE AND SPACING
The quick brown fox jumps over the lazy dog.
• Letters vary in size
• Uneven spacing between letters and words
POOR SPACING ON THE PAGE
Thequickbrownfox jumps over the lazydog.
• Writing may be crowded or too spread out
• Difficulty keeping text within lines or margins
POOR PENCIL CONTROL & COORDINATION
• Trouble controlling pencil movements
• Lines may be shaky, wobbly, or uneven
SLOW WRITING SPEED
• Writing takes much longer than expected
• Fatigue or stopping often while writing
POOR FINE MOTOR ENDURANCE
• Hand gets tired easily
• Difficulty maintaining consistent effort while writing
ATYPICAL PENCIL GRIP
• Uses an unusual or immature grip
• Grip may look strained or tense
ATYPICAL WRITING
The quick brown fox jumps over the lazy dog.
• Letters may be oddly shaped, reversed, or inconsistently formed
• Work may look messy or disorganized
ATYPICAL PENCIL PRESSURE
• Presses too hard (dark impressions) or too light (faint marks)
• Inconsistent pressure throughout writing
Dysgraphia is not about intelligence or effort.
It is a motor-based difficulty that makes writing physically challenging.
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Signs Beyond the Page
Understanding the cognitive and behavioral signs of dysgraphia during writing.
Cognitive Signs
Written Expression
• Struggles with written expression
• Ideas clearer when spoken
• Difficulty organizing thoughts
Language Processing
• Difficulty translating ideas to paper
• Word retrieval challenges
• Slow written output
Behavioral Signs
Frustration
Writing can feel overwhelming and lead to frustration.
Awareness of Difficulty
Often aware of the challenge, which can impact confidence.
Key Pattern:
Difficulty expressing ideas in written form despite adequate understanding.
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PRESCHOOL / KINDERGARTEN
Early Writing Observation Chart
FINE MOTOR / WRITING MECHANICS
• Awkward grip or body position when writing
• Tires easily when writing
BEHAVIOR / TASK ENGAGEMENT
• Avoidance of writing/drawing tasks
SPATIAL AWARENESS / ORGANIZATION
• Difficulty staying within margins
LETTER FORMATION
• Written letters are poorly formed, inversed, reversed, or inconsistently spaced
b d p q
a m w k
For more information: https://ncld.org/?s=dysgraphia
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Three Subtypes

Motor: usually due to lack of motor coordination.

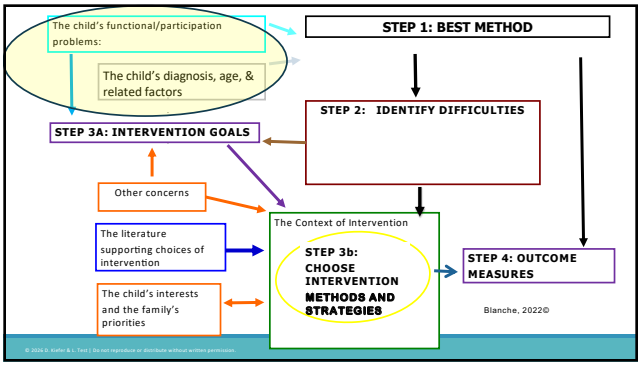
Spatial: impaired spacing of letters, drawing

Language processing deficits: inefficiency of graphomotor loop

(Chung et al., 2020)

Evaluation of Dysgraphia

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Reasons for Referral (Parent)

- Homework requires excessive time or support.
- Child becomes fatigues or frustrated during writing tasks.
- History of fine motor delays (difficulty with coloring, buttoning, or handwriting).
- Child can explain ideas verbally but struggles to write them down.
- Handwriting or written work is affecting grades.
- Writing output is much shorter than expected.
- Child avoids homework or other activities that involve writing.

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Reason for Referral (Teacher)

Writing Performance

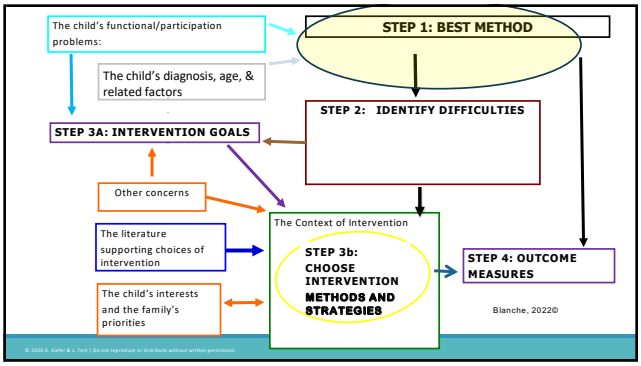
- ☐ Writing is difficult to read (illegible)
- ☐ Writes significantly slower than peers
- ☐ Avoids writing tasks when possible
- ☐ Produces less written work than expected
- ☐ Avoid work

Academic Impact

- ☐ Handwriting affects grades/performance
- ☐ Written work does not reflect the child's knowledge
- ☐ Has difficulty interpreting writing
- ☐ Assignments are incomplete
- ☐ Verbal responses are much stronger than written responses

KEY QUESTION: Is there a significant discrepancy between what the student can say and what the student can write?

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Step 1: Gather the information

Goal: Evaluate legibility, speed, and underlying motor skills and its functional impact – needs to be educationally relevant

1. Parent and Teacher Interview
2. Clinical Observations
3. Functional Handwriting
4. Standardized handwriting assessments
5. Visual Motor and Visual Perception
6. Fine motor/Motor planning
7. Metacognition

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1. Parent/Teacher Interview

Parent/Teacher Interview

- Writing vs. verbal discrepancy
- Good ideas but poor written output
- Is handwriting affecting grades?
- Is work avoided?
- Complaints of hand fatigue

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2. Clinical Observations

Work samples:

- Classroom worksheets
- Homework
- Writing assignments
- Tests

Functional Writing

- Can the child write??
- What is the quality & legibility in functional writing tasks?

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2. Clinical Observations

Unstructured Observations

- Posture – slouched, propped?
- Pencil grasp – functional vs inefficient
- Paper position
- Effort & Attention Level
- Emotional State - frustration?
- Endurance/fatigue
- Automaticity
- Processing/Fluency
- Motor planning – hesitation, re-starting

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2. Clinical Observations

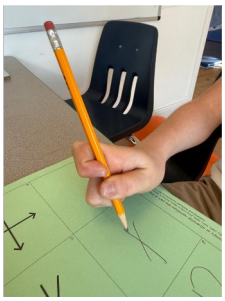
Unstructured Observations

- Cognitive load
  - Copying - low cognitive load
    - Primarily visual and motor
    - Minimal language generation
  - Dictation - moderate cognitive load
    - Involves motor and language processing (spelling, auditory processing, working memory)
    - More demanding than copying
  - Free writing/Composition - high cognitive load
    - Involves executive function, language formulation and motor output
    - Highest demand task

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3. Functional Writing

Functional Writing

- Can the child write?
- What is the quality & legibility in functional writing tasks?

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3. Functional Writing: ETCH & informal writing

Functional Writing:

- Write alphabet, near and far point copying, dictation
- Observe relative speed & effort
- Analyze
  - Letter formation
  - Size consistency
  - Spacing
  - Alignment & Line awareness
  - Reversals
  - Legibility (letters, words and sentences)
  - Speed (words/ minute)

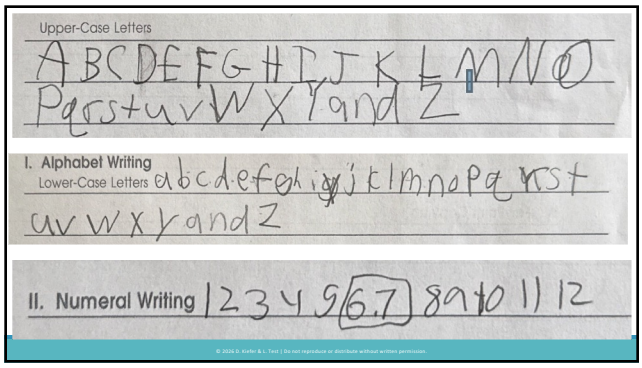
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3. Functional Writing: ETCH & informal writing

Functional Writing:

- Is copying ok?
- Differences between near/far point copying in speed – vestibular?
- Dictation difficulties – executive function?
- Cognitive/linguistic load issue?
- If all areas are poor – motor/graphomotor issue

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4. Standardized Handwriting Assessments

Standardized Handwriting Assessments

- How efficient is their writing compared to peers?
- What is their writing speed and fluency?

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4. Standardized Handwriting Assessments: DASH

Standardized Handwriting Assessments

- Get standard scores and percentiles
- Observe:
  - Slow output
  - Pausing
  - Fatigue over time
  - How fast/efficient is writing?
  - Is there automaticity?
  - Writing speed and fluency

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5. Visual Motor and Visual Perception

Visual Motor & Visual Perception

- What is their underlying visual-motor integration?

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5. Visual Motor and Visual Perception: VMI

Visual Motor & Visual Perception

- Get standard scores and percentiles
- Poor VMI/VP = could explain spacing, alignment, copying issues, and difficulties with organization on page

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6. Fine Motor/Motor Planning

Fine Motor/ Motor Planning

- Does the child have motor planning difficulties?

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6. Fine Motor/Motor Planning

Fine Motor/ Motor Planning

- BOT
- Clinical tasks (in-hand manipulation, finger isolation, and precision tasks)

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Additional Assessments

Additional Handwriting Assessments

- THS-R (Test of Handwriting Skills - Revised) - Focuses on handwriting proficiency.
- Test of Handwriting Performance (THP) – measures functional classroom handwriting
- Print Tool® (Handwriting Without Tears)
- Handwriting Without Tears Screener
- Minnesota Handwriting Assessment (MHA) – grades 1-2; Good for identifying early handwriting difficulties.
- McMaster Handwriting Assessment Protocol – observational assessment

Visual-Motor and Graphomotor Assessments

- Developmental Test of Visual Perception (DTVP-3)
- Wide Range Assessment of Visual Motor Abilities (WRAVMA)

Writing Assessments (evaluate written expression beyond handwriting abilities)

- Test of Written Language–4 (TOWL-4) - spelling, vocabulary, sentence construction, story composition
- Woodcock-Johnson Tests of Achievement - writing samples, spelling, writing fluency
- Wechsler Individual Achievement Test (WIAT-III/IV) - sentence writing, essay composition, spelling, written expression

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7. Metacognition

Metacognition

- What is the child's perception of their writing?

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7. Metacognition

Metacognition

- "Here's How I Write Assessment"
- Does the child recognize errors and self correct?

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Three Subtypes

Motor: usually due to lack of motor coordination.

Spatial: impaired spacing of letters, drawing

Language processing deficits: inefficiency of graphomotor loop

Chung, P. J., et al (2020)

ETCH = what it looks like **DASH = how fast it happens** **VMI = spatial foundation** **BOT = motor foundation**

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Motor Dysgraphia (graphomotor/fine motor difficulty)

Difficulty with fine motor skills needed to produce letters or numbers.

May include poor pencil grasp, poor posture, and slow/illegible handwriting.

Core issue: motor execution + fine motor control

Motor dysgraphia = execution problem

Area	Expected Findings
ETCH	✗ Poor legibility (formation, control) ✗ Inconsistent letter shapes
DASH	✗ LOW (slow, effortful)
VMI	May be average or slightly low
BOT-2	✗ LOW (fine motor precision, dexterity)
Copying	✗ Poor
Dictation	✗ Poor
Free Writing	✗ Poor
Pencil grip	✗ Immature/inefficient
Posture	✗ Poor stability
Fatigue	✗ High (complains of hand pain, tiredness)

Chung, P. J., et al (2020)

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Spatial Dysgraphia (visual-spatial/visual motor issue)

Difficulty with spatial perception, spacing of letters, copying or composing text, and drawing ability

Core issue: spatial organization on page + visual perception

Spatial dysgraphia = visual organization problem

Area	Expected Findings
ETCH	✗ Poor spacing, alignment, sizing ✗ Letters drift, inconsistent placement
DASH	Variable (may be slow due to inefficiency)
VMI	✗ LOW (key finding)
BOT-2	Often average or mildly low
Copying	✗ Poor (key feature)
Dictation	✗ Poor (same spatial issues)
Free Writing	✗ Poor (messy layout, organization on page)
Pencil grip	Usually functional
Posture	Usually functional
Drawing tasks	✗ Often poor (important clue)

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Language-Based Dysgraphia (SLD in written expression)

Includes deficits in spelling, grammar, and clarity or organization of written expression.

Copying text is typically intact.

Core issue: language processing, spelling, grammar, organization

Language dysgraphia = thinking problem

Area	Expected Findings
ETCH	✓ Legibility often OK ✗ Errors increase in dictation & composition (spelling, grammar, organization)
DASH	Usually average (unless secondary fatigue)
VMI	✓ Average
BOT-2 (fine motor)	✓ Average
Copying	✓ Intact (key feature)
Dictation	✗ Poor (spelling, sentence structure errors)
Free Writing	✗ Significantly worse (organization, clarity, grammar)
Pencil grip	✓ Functional
Posture	✓ Functional
Effort/Fatigue	May fatigue from cognitive load, not motor

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1. Is copying intact?
YES → **Language-based**
NO → go to next

2. Is VMI low?
YES → **Spatial**
NO → go to next

3. Are motor signs obvious (grip, fatigue, BOT-2)?
YES → **Motor**
NO → mixed profile

Feature	Language	Spatial	Motor
Copying	✓ Good	✗ Poor	✗ Poor
Dictation	✗ Poor	✗ Poor	✗ Poor
Free writing	✗ Worst	✗ Poor	✗ Poor
Legibility	Usually OK	✗ Spatial errors	✗ Motor errors
Speed (DASH)	Usually OK	Variable	✗ Slow
VMI	✓	✗ Low	±
BOT-2	✓	±	✗ Low
Pencil grip	✓	✓	✗ Poor
Posture	✓	✓	✗ Poor
Fatigue	Cognitive	Mild	✗ High

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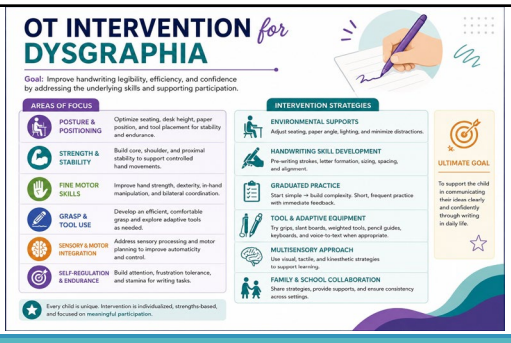
Evaluation Report

- Results need to tie back to academic performance
  - Writing vs verbal discrepancy
  - Is handwriting affecting grades?
  - Is output reduced?
  - Is work avoided?
- Be specific and anchor it to motor, visual-motor, language, and/or executive/cognitive load

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Overall Guide to Treatment

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The Need to Treat Dysgraphia

Study by Mayes et al (2019) found that the rates of dysgraphia among the ages were remarkably similar:

- 6–7 years: 56%
- 8–10 years: 60%
- 11–16 years: 61%

Therefore, despite years of handwriting instruction, students do **not** "grow out of it.

Dysgraphia reflects an underlying neurological weakness; practice alone is not enough.

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What is the goal?

1. Remove handwriting as a barrier

- *When the goal is learning, students should not be forced to rely on a neurological weakness to demonstrate knowledge.*

2. Medication is not a solution

- *For students with ADHD, stimulant medication may improve handwriting somewhat however, handwriting problems usually remain*

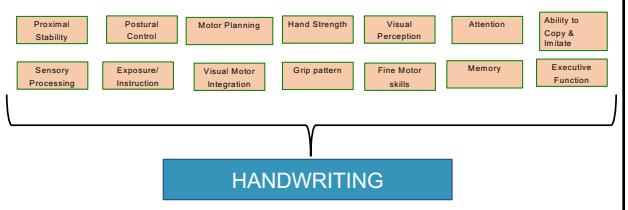
3. Treatment is important, but we need more research and evidence

- *Evidence for handwriting intervention is limited - few controlled studies, improvements were generally modest , and handwriting often remained below normal even after therapy*

(Mayes et al., 2019)

Improvement is possible, but dysgraphia often persists

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REMEDIATION	• Specific intervention that addresses dysgraphia
ACCOMODATION	• Strategies and supports implement in the classroom without changing the curriculum
MODIFICATION	• Adapts the curriculum

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Remediation: Intervention

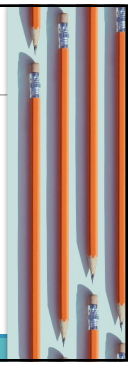
Students with writing difficulties focus their attention on the form rather than the content, spend less time on planning, and make fewer corrections.

Systematically teach them the writing processes such as planning, reviewing, and editing (Graham & Harris, 2010)

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Remediation: OT Intervention

- Motor activities for hand strength and dexterity
- Pencil grip and pencil pressure
- Postural Control/Posture
- Shoulder stability
- Letter formation (start location and sequence), alignment, spacing
- Pairing verbal cues/directions with start location and sequence with each letter
- Spatial organization/visual perception intervention
- Combining with orthographic approach
- Video modeling
- Working on executive function, including the planning and organization of ideas
- Address any language components influencing writing deficits



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Remediation: Support beyond handwriting

- Support student's motivation
- Self-regulatory development
- Metacognition
- Confidence

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Accommodations

Do This!	Don't Do This!
• Use images and diagrams to support text	• Use large blocks of heavy text
• Align text to the left and keep a consistent layout	• Underline words, use italics or write in capitals
• Consider producing materials in other formats e.g. audio or video	• Force users to remember things from previous pages-give reminders and prompts

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Accommodation: Assistive Technology

Technology is one of the best accommodations! Recommended to teach it early!!

- Keyboarding instruction
- Speech to text software
- Proofreading software – spell check, grammar tools

These tools allow students to demonstrate what they know without handwriting being a barrier.

(Mayes et al, 2019)
https://www.ldrfa.org/top-assistive-technology-tools-for-dyslexia-and-dysgraphia/

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Accommodation: In the Classroom

- Larger pencils
- Pencil grips
- Raised lined paper for tactile feedback
- Extra time
- Reduce copying from the board
- Provide lecture notes
- Use speech recognition
- Grade ideas/content rather than handwriting when appropriate

(Mayes et al., 2019)

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Modifications

- Modify written assignments
- Allow oral responses
- Provide multiple-choice or fill-in-the-blank assessments when handwriting is not the skill being assessed

(Mayes et al., 2019)

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Han and Wang (2025) reviewed developmental dysgraphia interventions.

Four areas of emphasis:

- Task-Oriented and Sensorimotor-Based Interventions
- Technology Assisted Interventions
- Self-regulated and Individualized
- Integrated Approaches

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