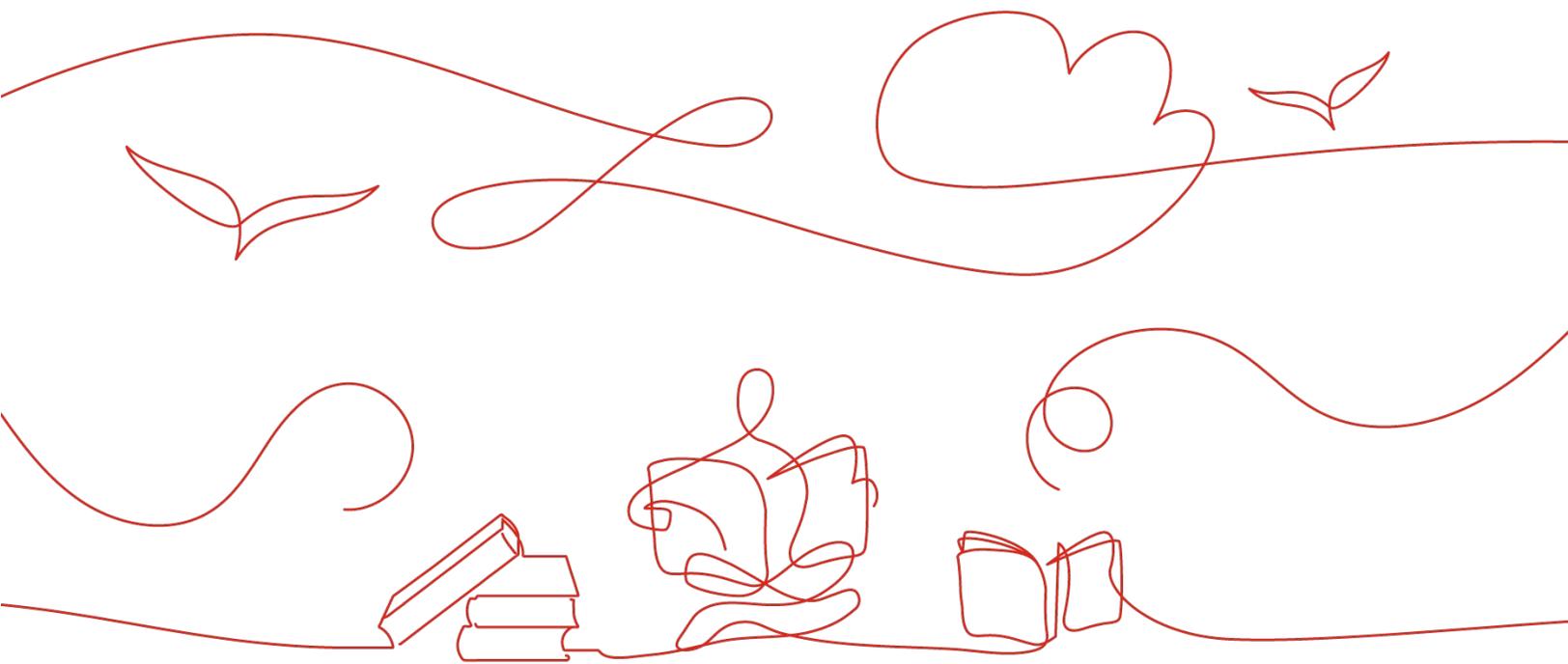


LUKE WAITES CENTER FOR
DYSLEXIA AND LEARNING DISORDERS

DYSGRAPHIA

SCOTTISH RITE



Authors

Sheryl Frierson, M.D., M.Ed.

Anna Middleton, Ph.D., CALT

Sue Jones, M.A., CCC-SLP

Ivonne Tennent, M.Ed., LDT, CALT-QI

About this book

This booklet was developed to provide families with information regarding the diagnosis and treatment of dysgraphia, a specific learning disorder which impacts a child's ability to write by hand. For sources of information please see the Reference section on page 26.

How did we come to this definition?

There currently is no consensus definition of dysgraphia. The Diagnostic and Statistical Manual 5th Edition outlines behavioral characteristics of Specific Learning Disorder in written expression but does not specify a disorder of handwriting or letter formation. Thus, a committee of diagnostic, educational, research, and medical staff convened at Scottish Rite for Children to review the current literature surrounding writing development, handwriting instruction, and dysgraphia. Most working definitions of dysgraphia are centered around a graphomotor impairment that creates complications in written expression. Additional research supports a role of other processing impairments in some children with dysgraphia. Thus, the impairment of handwriting characteristic of dysgraphia is not exclusively a motor impairment, but a disruption in one of several coordinated processes that are required for proficient handwriting skill.

Acknowledgements

The information contained in this book integrates research and content supported by leading experts in the field of learning and writing. The information presented in this booklet was reviewed and compiled by staff in the Luke Waites Center for Dyslexia and Learning Disorders. We appreciate the contributions of Jeff Black, M.D., Jerry Ring, Ph.D., Kellie Dyer, M.Ed., and Vennecia Jackson, M.D.

Table of Contents

Dysgraphia Basics	1
Definition of Dysgraphia	3
Breaking Down the Definition	4
Overview of Handwriting	6
Handwriting Instruction	10
Accommodations	12
Suggestions for Parents	14
Suggestions for Teachers	16
Dysgraphia Evaluation	17
Resources	20
Glossary	25
References	26
Appendix	27

Tips for using this booklet

Words in **blue** are defined in the glossary.

For sources of information please see References on page 26.

DYSGRAPHIA BASICS

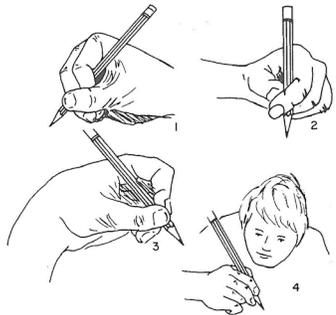
What is Dysgraphia?

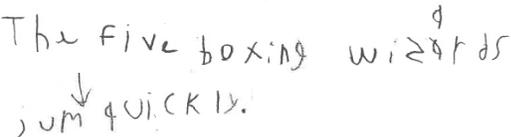
Dysgraphia is a learning disorder that makes it difficult to learn to produce good handwriting. Students with dysgraphia may have difficulty learning to:

- Form letters and write words correctly.
- Write letters and words that other people can read.
- Put correct spacing between letters and words.
- Place letters and words correctly on the line.
- Write fast enough to keep up in class.
- Copy from the board accurately and fast enough to keep up in class.

Students with dysgraphia may be so focused on how they are writing that they can't focus on what they are writing. Dysgraphia can lead to poor spelling and difficulty writing good sentences, paragraphs, stories, and reports.

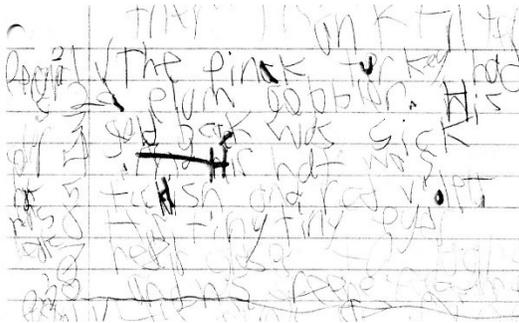
What are warning signs?

<p>Physical Signs</p>  <p><small>Developmental Variation and Learning Disorders (1999)</small></p>	<ul style="list-style-type: none">• Cramping of fingers or hand when writing• Odd hand, body, or paper position• Slow copying speed• Slow writing speed• Too much need to look at the pencil and paper while writing• Too much need for talking through how to make each letter
--	--

<p>Production Problems</p> <p>The five boxing wizards jump quickly.</p> 	<ul style="list-style-type: none">• Not completing writing assignments• Refusing to do writing assignments• Tears when asked to do writing• Inaccurate copying
--	---

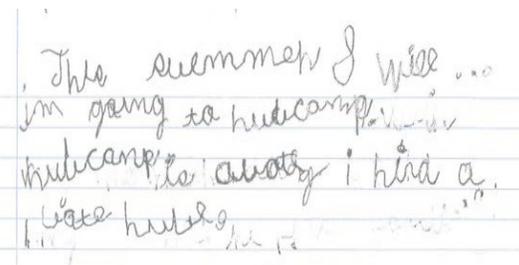
DYSGRAPHIA BASICS

Letter Writing Problems



- Incorrect use or inappropriate mixture of upper- and lowercase letters
- Variable size, shape, direction, and slant of letters
- Same letter looks different each time it is written
- Letters look “drawn” instead of written
- Starting at the bottom when writing letters
- Using different ways to write the same letter
- Too much erasing and crossing out
- Lots of errors that are not fixed

Space and Place Problems



- Variable placement of letters and words on the line
- Not putting correct spaces between letters and words
- Not using margins correctly
- Not writing on the correct part of the page
- Disorganized writing on the page
- Wrong order of letters

How common is Dysgraphia?

- Dysgraphia is estimated to affect approximately 5% of the population.
- Dysgraphia commonly co-occurs with related specific language disorders (for example, dyslexia or a specific learning disorder of written expression), but it is not caused by these other disorders.

DEFINITION OF DYSGRAPHIA

The following definition can be found in the Texas Education Agency Dyslexia Handbook: Procedures Concerning Dyslexia and Related Disorders (2018 Update):

Dysgraphia is a neurodevelopmental disorder manifested by illegible and/or inefficient handwriting due to difficulty with letter formation. This difficulty is the result of deficits in graphomotor function (hand movements used for writing) and/or storing and retrieving orthographic codes (letter forms). Secondary consequences may include problems with spelling and written expression. It is not solely due to lack of instruction and is not associated with other developmental or neurological conditions that involve motor impairment.

BREAKING DOWN THE DEFINITION

“Dysgraphia is a *neurodevelopmental* disorder...”

- Dysgraphia is a difference in how the brain develops the skills needed for handwriting.
- These differences are apparent during childhood and are not caused by brain injury or trauma.

“...manifested by illegible and/or inefficient

- Written letters may be difficult for others to read, inconsistent in size and shape, and often take a long time to produce.

“...due to difficulty with *letter formation*.”

- Children with dysgraphia often have difficulty correctly writing letters.

“This difficulty is the result of deficits in *graphomotor function*...”

- Graphomotor function refers to the brain systems that control the movement of the pencil.
- **Graphomotor** problems include difficulty with hand-eye coordination (visual motor), feeling how the pencil is moving (proprioceptive-kinesthetic), and remembering how to move the hand to form the letters (motor memory).

BREAKING DOWN THE DEFINITION

“...and/or storing and retrieving *orthographic codes*.”

- Some children with dysgraphia struggle with writing due to difficulty remembering how the letters should look (letter form).
- Knowing the **orthographic code** includes remembering the correct direction that different letters should face.

“Secondary consequences may include problems with *spelling and written expression*.”

- Difficulty writing letters often creates problems in other areas of written language.
- Inaccurate letter formation can make it hard to remember spelling patterns.
- A child who has trouble forming letters (production) has difficulty thinking about what they are writing (content).

What dysgraphia is not:

- Lack of intelligence
- Another neurological or developmental condition (e.g., traumatic brain injury, general motor disorder)
- Specific Learning Disorder of Written Expression
- Due to a lack of effective handwriting instruction

OVERVIEW OF HANDWRITING

Handwriting is a complex process. To form letters, words or sentences on paper, the child needs to:



- Hold a pencil with an effective grip
- Apply an appropriate amount of pressure
- Coordinate the small muscle movements of the fingers and thumb
- Visualize what the letter looks like
- Remember the hand movement that makes the letter
- Make the letter the correct size
- Place the letter neatly on the line
- Use appropriate spacing

When should handwriting instruction begin, and when is handwriting fully developed?

Handwriting instruction should begin in preschool and kindergarten when a child is taught to write their own name and name the letters. By the end of kindergarten, children should be able to name and write all upper- and lower-case letters, continuing to practice through second grade. Beginning in second or third grade, many teachers begin to teach **cursive writing** with instruction on how connective strokes link each letter.

When should you be concerned?

There is no general agreement on when handwriting skills should be fully developed. If your child's difficulty writing impacts his or her ability to complete schoolwork, a formal evaluation should be considered.

OVERVIEW OF HANDWRITING

General Developmental Timeline of Handwriting Skills

Year	Skill Development	TEKS* Expectations
Preschool	Develop fine motor skills (e.g. snips paper using scissors, copies shapes).	Use marks, letter-like shapes, or symbols to “pretend write.”
Kindergarten	Name and print all upper- and lower-case letters through observing, tracing, and copying. Hand dominance is typically established.	Develop handwriting by accurately forming all uppercase and lowercase letters using appropriate directionality .
Grade 1	Write alphabet from memory in lower-case manuscript letters; others should be able to recognize the letter out of context of a word.	Develop handwriting by writing words, sentences, and answers legibly and with appropriate spaces between words.
Grade 2	Focus on legibility and automaticity .	Develop handwriting by accurately forming all cursive letters using appropriate strokes.
Grade 3	Teach lower and upper-case cursive. Practice letters alone and in words.	Write complete words, thoughts, and answers legibly in cursive leaving appropriate spaces between words.
Grade 4	Write lower-and upper-case cursive letters alone and in words.	Write legibly in cursive to complete assignments.

*Note: TEKS = Texas Essential Knowledge and Skills

OVERVIEW OF HANDWRITING

Does handwriting matter? YES!

- Young writers must develop **fluent** (automatic without a lot of effort) **legible** (easy to read) handwriting so they can focus on generating and organizing ideas
- Messy or illegible writing can impact readers' judgments of the quality of the content
- Handwriting promotes better spelling
- Handwriting engages brain areas related to reading
- Handwritten notes can lead to deeper comprehension of lectures and better learning

Does my child need to know how to write in cursive?

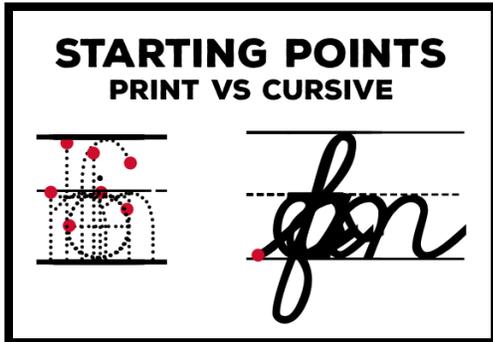
Learning how to write is a challenging task that requires the coordination of visual and fine motor abilities. Some movements involved in handwriting are complex and may not develop until a child is age six or older. This is one reason young children tend to have messy or inconsistent handwriting. By age seven, most children should be able to master letter formation in either print or cursive.



Cursive advantage?

- Research on handwriting does *not* support one method over the other.
- Both require practice to learn and improve.
- Children may benefit from one or the other.

OVERVIEW OF HANDWRITING



While most children first receive instruction in manuscript writing in early school years, many also learn cursive at some point in schooling. Cursive handwriting instruction is mandatory beginning in 2nd grade according to the Texas Essential Knowledge and Skills (TEKS) standards (p.10). Although there is no evidence that one writing style is generally easier, faster, or more

efficient than the other, there are some differences that may contribute to how successful a child may be with a given writing style. Children need direct instruction and plenty of practice to master handwriting in both manuscript and cursive.

A Comparison of Manuscript and Cursive Handwriting Styles

	Manuscript	<i>Cursive</i>
Format	Ball-and-stick	Joined
Starting points	Many	Fewer
Pen lifts	Many	Fewer
Direction changes	Fewer	Many
Diagonal lines	Many	Fewer
Ambiguous letters	More	Less
Resembles Printed Text	More	Less

HANDWRITING INSTRUCTION

When choosing a curriculum that will help meet the child's needs, consider the following guidelines.

- The teaching sessions need to be **brief** (10-15 minutes/day).
- Correct **pencil grip** and **paper position** are taught.
- **Letter formation** instruction is taught **explicitly** and **directly**, with adequate practice.
- **Sequence of letter introduction** is focused on how the letters are formed rather than the order of the alphabet.
- Lessons progress from introduction of individual letters, to combining letters into words, phrases and eventually sentences.
- All lowercase cursive letters begin on a baseline.
- A practice book is available to **accommodate left or right handedness** illustrating **correct slant**.
- A model is provided for a student to **trace** and then **copy**.

What do students with Dysgraphia need?

For a child with dysgraphia, the goal of handwriting instruction is not to make handwriting pretty or perfect, but to develop automatic and fluent letter and word formation. Automatic and fluent letter and word formation frees up the child's **working memory** so they can attend to the content of their writing. High-quality instruction can improve both legibility and efficiency of handwriting, though children with dysgraphia will likely continue to struggle with handwriting.

Children with dysgraphia need explicit instruction in handwriting that...

- Focuses on letter formation and direct instruction of letter strokes
- Organizes lessons by grouping letters according to common features
- Teaches individual letters before letter clusters and words

HANDWRITING INSTRUCTION

- Accounts for individual strengths and weaknesses (individualized)
- Provides opportunity for students to trace and copy models
- Integrates technology when appropriate

Who can provide handwriting instruction?

Who provides interventions is less important than how the instruction is delivered. Handwriting instruction for a child with dysgraphia involves delivering instruction with greater intensity. The instructor should have training in **effective methods of handwriting instruction**. An educator certified in regular or special education with appropriate training in the teaching of handwriting should be able to provide handwriting instruction.

Occupational Therapy

Occupational therapy (OT) is often recommended for children with dysgraphia. There is limited evidence of benefit if OT does not include specific activities to improve letter formation and pencil grip. There is commonly an increase in self-confidence and willingness to participate in motor activities with therapy, but these often do not transfer to improved handwriting.

When choosing an occupational therapist, parents should ask about the approach used. Generally, the more different the exercises are from the handwriting tasks at school, the less likely there will be improvement in skills important to academic success. Interventions that focus on the practice of developmental subskills are not recommended and are not supported in research as beneficial (e.g. sensory integration, brain training, or perceptual motor techniques).

Handwriting Instruction

Effective Methods

- Explicit instruction in letter formation
- Individualized instruction
- Technology (e.g., digitized tablets)

Ineffective Methods

- Visual demonstrations (motion models)
- Skywriting
- General motor skill instruction

ACCOMMODATIONS

Accommodations allow students to efficiently acquire information and demonstrate knowledge.

A better understanding of dysgraphia should result in appropriate expectations and willingness to make adjustments in writing tasks at school.

Accommodations are:

- An appropriate adjustment or strategy to bypass or lessen the effects of a disability such as dysgraphia.
- *Not* specific methods of instruction.
- A change in the way the classroom teacher
 - presents new information,
 - helps a student master a new skill, and
 - tests a student.

Nearly all children with dysgraphia will benefit from some form of accommodations. Some students meet eligibility for services to address the impact of dysgraphia on their performance. In public schools, this support might be provided through Section 504 or IDEA (special education). Accommodations offer changes in*:

- The rate of producing written work
- The volume of the work to be produced
- The complexity of the writing task
- The tools used to produce the written product
- The format of the product

*See the Appendix for more detailed suggestions on handwriting accommodations from CanChild.

ACCOMMODATIONS

Alternative Text Production

Because the degree of improvement with handwriting intervention is often small, it is important to also give the student access to alternative methods of producing written output (e.g. keyboarding, scribing, voice-activated technology). When deciding whether to rely on technology resources, it is useful to understand the underlying processes required to accomplish the task of writing or typing.

The table below highlights differences in the demands associated with printing versus typing. Printing involves many **neuromotor** and **neurocognitive** demands. The demands associated with typing are fewer and *slightly* different than those for printing. For that reason, some children with dysgraphia may benefit from the use of a keyboard for producing written text. However, some children will also struggle with keyboarding because it still involves some of the same processes. It is important to identify what works best for each individual child.

Neuromotor and Neurocognitive Demands

Print

- Hold a pencil with good grip and pressure
- Visualize what the letter looks like
- Draw the letter (correct size, shape, and placement)
- Leave the correct amount of space between letters

Keyboard

- Isolate a finger
- Visualize what the letter looks like
- Locate the correct letter on a keyboard
- Press the key

SUGGESTIONS FOR PARENTS

Learn more about dysgraphia.

- This booklet was developed to provide basic information to parents and families regarding dysgraphia.
- Additional information for families can be found at:
 - <http://www.understood.org>
 - <http://www.LDonline.org>
- Dysgraphia is included in the list of disorders that Texas public schools are required to identify according to the Texas Dyslexia Handbook (2018 Update).

Every child with dysgraphia is different.

- Identify your child's strengths and challenges. Learn more about dysgraphia and talk to your child about how their writing difficulty may impact their performance at school.
- Support your child's personal learning style (the way your child learns best). Help them continue to develop their strengths and allow them to engage in activities they enjoy (sports, art, music, etc.)
- Acknowledge your child's ability to learn despite writing difficulties.
- Share your thoughts and develop a plan for working with your child's educators to address their challenges.

Encourage ways of teaching and learning that optimize your child's abilities.

SUGGESTIONS FOR PARENTS

Alternate Means of Support

BYPASS TECHNOLOGY

Access to laptops, tablets, mini-recorders, and Livescribe Echo pens can help your child transfer their thoughts into written language. Remember that they will need training and practice using any new tool!

SHELTERED PRACTICE

Give your child time to practice handwriting without judgment as to how much or how well they write.

ACCOMMODATIONS

When the amount of handwriting work is more than the child can reasonably produce, it is time to provide them with accommodations.

Provide resources and support to help your child develop better writing skills.

- Provide pencil grips, writing utensils or special tools or paper for writing
- Children with poor **kinesthetic** feedback benefit from raised line paper so they can feel the line.
- WOW = Watch Our Writing is a checklist approach designed to remind students about the body positions that are most conducive to good handwriting (see Resources).
- Talk to your child's teacher(s) about accommodations for children who are left-handed or **ambidextrous**.
- Consider alternative means of text production and support.

Collaborate with your child's educators.

- Develop an understanding of the school's responsibilities to your child. Use the information on dysgraphia covered in the 2018 Dyslexia Handbook provided by the Texas Education Agency (TEA).
- Develop a team that includes teacher, your child and you. Make sure everyone is focused on the success of your child.
- Request accommodations specific to your child's needs.
- Let each teacher know what has worked for your child in the past.
- Acknowledge the teacher's efforts made on the behalf of your child.

SUGGESTIONS FOR TEACHERS

Create a positive learning environment.

- Offer structured, consistent practice of handwriting and a systematic approach to teaching spelling as detailed in the Best Practice Checklist (see Resources).
- Avoid critical evaluations of handwriting in the classroom.
- Teach keyboarding skills early including the use of spell check and other reference resources.
- Do not punish by having the student start assignments over for “sloppiness”.
- Do not penalize for spelling errors unless final draft or spelling test.
- Allow oral responses.
- Allow peer review or scribe as support for written tasks.
- Allow use of technology apps for worksheets and notetaking.

Left-Handed Students

- Write in notebooks and spirals from back to front. Left-handed spiral notebooks are available.
- The paper should be rotated clockwise, and they should slant backhanded to avoid the development of hooking the left hand.
- Allow the student to write using their preferred hand.

Did you know?

Additional recommendations and information can be found in the **Resources** section of this document.

DYSGRAPHIA EVALUATION

The **graphomotor** and **orthographic processing** problems that underlie dysgraphia can be identified by a variety of educators, child development, and health care professionals who are familiar with factors associated with typical and impaired handwriting.

Dysgraphia is a learning disorder related to, but different from, other learning disorders such as **dyslexia** and **Specific Learning Disability (SLD) in Written Expression**. The following table demonstrates common behaviors related to the three disabilities and their overlap. A thorough evaluation can help identify a student's difficulties in the following areas.

Which one is it? What to look for?

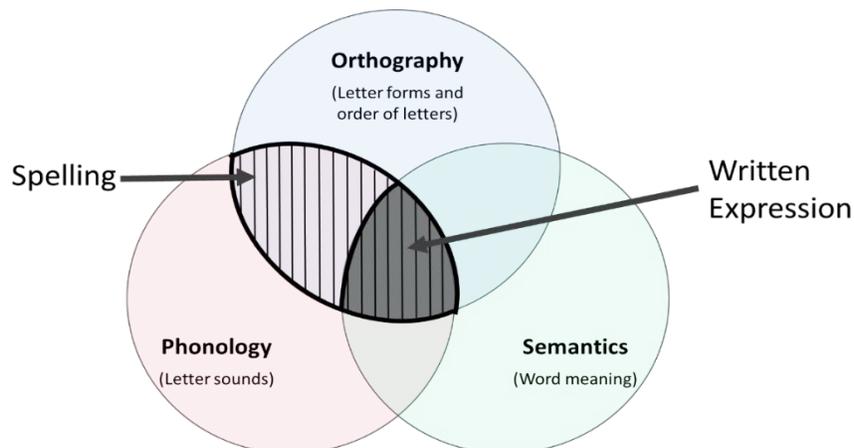
Observed Difficulties	Dysgraphia	Dyslexia	SLD Written Expression
Difficulty forming letters on paper: errors in size, spacing, proportion, formation, rhythm	✓		
Trouble copying letters and words from models	✓		
Slow, effortful writing	✓		
Inappropriate spacing between letters and words in written expression	✓		
Difficulty reading and spelling irregular words	✓	✓	
Trouble sounding out words when reading and spelling		✓	
Difficulty with orthographic processing	✓	✓	
Difficulty with phonological processing		✓	
Trouble with written expression	✓	✓	✓
Trouble with reading comprehension		✓	
Problems with vocabulary, grammar, sense of audience			✓
Organization and development of thoughts in writing			✓
Errors in application of punctuation and capitalization	✓		✓

DYSGRAPHIA EVALUATION

The Writing System

We use language to communicate by ear (talking/listening), by eye (reading), and by hand (writing). Not all issues with writing are caused by dysgraphia. A child can have one or more disorders that impact writing.

- **Dysgraphia** means impaired ability to form letters (graphs). The problems that arise from dysgraphia are related to the formation of letters. Dysgraphia does not impact a child's ability to read.
- **Dyslexia** means impaired word skills (decoding, reading, spelling). Children with dyslexia often struggle with writing due to weaknesses in phonics knowledge. These weaknesses are not caused by difficulty forming letters.
- **SLD in Written Expression** is a broad category that encompasses many types of issues producing written language. However, these are not due to problems in letter formation, but in other types of impairments that lead to difficulty getting thoughts out on paper.



The Three Domains of Written Language. This graphic represents the overlapping influences of sounds, letters, and meaning on written language. Impairments in any domain can lead to difficulties in spelling or writing.

DYSGRAPHIA EVALUATION

Is it dysgraphia? Questions to answer

AREAS TO ASSESS				
HANDWRITING QUALITY	HANDWRITING EFFICIENCY	ORTHOGRAPHIC PROCESSING	MOTOR SKILLS	IMPACT
Is handwriting hard to read?	Is handwriting slow, effortful, and tiring?	Does the child have trouble recognizing, recalling and/or writing letters and words?	Is there evidence of impairment with motor skills?	Are handwriting difficulties causing frustration and impacting school performance?

Evidence to Support Diagnosis of Dysgraphia

- The quality and efficiency of letter formation is substantially impaired.
- Graphomotor and/or orthographic processing deficits that underlie poor handwriting were found.
- Difficulties with handwriting are causing problems with spelling and/or written expression.
- Lack of handwriting instruction has been ruled out as a possible cause of poor handwriting.
- Substantial difficulty with motor coordination has been ruled out.
- Medical, neurological, developmental or behavior conditions associated with handwriting and motor problems have been ruled out.

Orthographic Processing Checklist

Does the student:

- Have difficulty reading or spelling irregular words?
- Confuse letters with similar appearance (*n* for *h*)?
- Misread little words in text (*of* for *from*)?
- Reverse letters (*b* for *d*)
- Have trouble remembering basic sight words?
- Have trouble copying from a book or board to paper?
- Spell a word different ways?
- Spell words according to sound rather than appearance?
- Read at a slow rate?

RESOURCES

Technology

- **Apps** can be used to make worksheets and notetaking more accessible.
 - SnapType
 - Paperport Notes
- **Keyboarding** should be an option. There are many downloadable programs (some free and others at a cost) that can be used to instruct children in typing.
- **Electronic Devices.** Laptops, notebooks, and tablets are portable, allowing the child to take notes, begin writing assignments in school, and complete in-class writing assignments without the burden of handwriting difficulties.
- **Speech-to-text software** and programming can be helpful. The student needs to speak clearly and read efficiently to train the software. Students with articulation, speech fluency, or word finding problems may benefit less.

Handwriting Programs

- The *Handwriting without Tears* programs and apps can be utilized to enhance print and cursive writing. <https://www.lwtears.com>
- *Learning Cursive for the Elementary Student* workbooks and reference cards, developed by Diana Hanbury King and Karen K. Leopold. These books provide everything the instructor needs to introduce students to cursive handwriting to both right- and left-handed students. <http://www.wvced.com/shop/>
- *Cursive Writing Skills for Students* (2nd Edition) workbooks are designed for older students who need to learn or refine cursive handwriting. This resource is available for both right and left-handed writers and were developed by Diana Hanbury King. They are available at a variety of bookstores, education supply centers, and online retailers.

RESOURCES

Keyboarding Programs

- <https://superkids.com/aweb/pages/reviews/typing>
 - This website reviews various typing programs that are available.
- *Keyboarding Skills, 2nd Edition*, as created by Diana Hanbury King, uses a revolutionary “alphabet method” to teach keyboarding skills.
 - They are available at a variety of bookstores, education supply centers, and online retailers.
- The *Keyboarding without Tears* programs and apps could also be utilized to enhance print and cursive writing, as well as to review keyboarding skills. Visit their website for additional information: <https://www.lwtears.com>
- *Mavis Beacon Teaches Typing* is available for free download. Visit their website: <http://www.mavisbeaconfree.com>

Resources for Successful Writing:

- Watch Our Writing (p. 22)
- Chart of Correct and Incorrect Handwriting Positions (p. 23)
- Checklist of Best Practices (p. 24)

RESOURCES

W.O.W

Watch Our Writing



Feet flat on floor



Keep back straight



Both hands on desk



Position paper



Pencil position

RESOURCES

Chart of **CORRECT** and **INCORRECT** Handwriting Positions

Correct



1. The pencil rests on the first joint of the middle finger with the thumb and index fingers holding the pencil in place.



2. Same as Figure 1, except the fingers are closer to the pencil point.



3. Same as Figure 1, except the pencil is held perpendicular to the table.

Incorrect



4. Thumb and index finger holding pencil, with index finger overlapping the thumb.



5. Pencil held by tips of fingers, thumb on one side, middle and index fingers on the other.



6. Thumb wraps around pencil with index and middle fingers pressing pencil to ring finger.



7. Pencil is held between the index and middle fingers, pressing pencil to the thumb.



8. Index, middle and ring finger tips hold one side of the pencil, the thumb holds the other.



9. Thumb on one side, index and middle fingers on the other, all pressing the pencil to ring finger.



10. Index finger holds pencil to middle finger with the thumb overlapping the index finger.



11. The thumb holds the pencil along the first joints of the rest of the fingers.



12. The pencil is grasped in the first and held up against the thumb.

Retrieved from <http://www.freepencilgrip.com> on March 19, 2020.

RESOURCES

Checklist of Best Practices

I Teach Children How to Write Each Letter by...

- Showing them how it is formed.
- Describing how it is similar to and different from other letters.
- Using visual cues, such as numbered arrows, as a guide to letter formation.
- Providing practice tracing, copying, and writing the letter from memory.
- Keeping instructional sessions short, with frequent reviews and practice.
- Asking them to identify or circle their best-formed letter or letters.
- Encouraging them to correct or rewrite poorly formed letters.
- Monitoring their practice to ensure that letters are formed correctly.
- Reinforcing their successful efforts and providing corrective feedback as needed.

I Help Children Become More Fluent in Handwriting by...

- Providing them with plenty of opportunities to write.
- Eliminating interfering habits that may reduce handwriting fluency.
- Having them copy a short passage several times, trying to write it a little faster each time.

I Promote Handwriting Development by...

- Making sure that each child develops a comfortable and efficient pencil grip.
- Encouraging children to sit in an upright position, leaning slightly forward, as they write.
- Showing them how to place or position their paper when writing.
- Teaching children to identify and name the letters of the alphabet.
- Teaching them how to write both uppercase and lowercase letters.
- Allotting 75 to 100 minutes per week to handwriting instruction (in grades 1 through 4).
- Providing children with plenty of opportunities to use different types of writing instruments and paper.
- Asking children to set goals for improving specific aspects of their handwriting.
- Implementing appropriate procedures for left-handed writers, such as how to properly place or position their paper when writing.
- Monitoring students' handwriting, paying special attention to their instructional needs in letter formation, spacing, slant, alignment, size, and line quality.
- Dramatizing children's progress in handwriting through the use of charts or graphs, praise, or posting neatly written papers.

I Assist Students Who Are Experiencing Difficulty by...

- Organizing my class so that I can provide additional handwriting instruction to children who need it.
- Coordinating my handwriting instruction with the efforts of other professionals, such as an occupational therapist.
- Placing special emphasis on teaching difficult letters, such as *a, j, k, n, q, u, and z*, as well as reversals.
- Ensuring that they master one style of handwriting before a second style is introduced.
- Considering if an alternative to handwriting, such as word processing or using a speech recognition program, is warranted.
- Helping them develop positive attitudes about handwriting.
- Talking with their parents about my handwriting program and soliciting advice.

I Make Sure That I...

- Encourage students to make all final drafts of papers neat and legible.
- Maintain a balanced perspective on the role of handwriting in learning to write.

SOURCE: STEVE GRAHAM AND KAREN R. HARRIS, "PREVENTION AND INTERVENTION FOR STRUGGLING WRITERS," IN *INTERVENTIONS FOR ACADEMIC AND BEHAVIOR PROBLEMS II: PREVENTIVE AND REMEDIAL APPROACHES*, ED. MARK R. SHINN, HILL M. WALKER, AND GARY STONER (BETHESDA, MD: NATIONAL ASSOCIATION OF SCHOOL PSYCHOLOGISTS, 2002), 599. COPYRIGHT 2002 BY THE NATIONAL ASSOCIATION OF SCHOOL PSYCHOLOGISTS. BETHESDA, MD. REPRINTED WITH PERMISSION OF THE PUBLISHER. WWW.NASPONLINE.ORG.

Graham, S. (Winter 2009-2010). Want to improve children's writing? Don't neglect their handwriting. *American Educator*; 20-40

GLOSSARY

Accommodations – Changes or adjustments in the learning environment, materials, delivery method, length of time, or response method.

Ambidextrous – A person who uses the right and left hands equally well.

Assessment – Use of the child's educational history, proven methods, and tools of psycho-educational evaluation to clarify and confirm teacher and parent concerns.

Automaticity (Handwriting) – Rapid, accurate formation of letters and words.

Cognitive – Relating to the mental action or process of acquiring knowledge and understanding, reasoning, and making judgements.

Cursive – A style of penmanship in which some characters are joined in a flowing manner.

Directionality – Refers to the direction of the strokes used to form a letter (e.g., top to bottom) or the relationship of letter features (e.g., *b* vs *d*).

Dyslexia – An impairment in reading and spelling words often related to a weakness in phonological processing.

Fine Motor Skills – Movements produced by the small muscles in the hand and wrist (writing, drawing, grasping, pinching).

Fluent (Handwriting) – Relating to how quickly, easily, and accurately a person writes.

Graphomotor – Of or related to the muscle movements used to write.

Gross Motor Skills – Movements produced by large muscle groups (walking, kicking, jumping, throwing).

Hand Dominance – The hand with which a person has the greatest comfort and ease of use.

Handwriting Efficiency – Relating to how quickly and easily a person writes.

Kinesthetic – Related to the position and movement of parts of the body.

Legibility – The extent to which a person's handwriting is easily read by another.

Letter Formation – The ability to form the letters of the alphabet correctly in shape, size, and direction, regardless of handwriting style or font.

Manuscript – Also known as “print” or “ball and stick” writing, manuscript is the style of penmanship that includes block letters, like those found in printed text.

Neurocognitive – Relating to the interaction between the brain/nervous system and one's knowledge and understanding.

Neuromotor – Relating to interaction between the brain/nervous system and the muscles of the body.

Orthographic Code – The symbols (letters) and their features (directionality, shape, etc.) that make up a written language.

Orthographic Processing – The way the brain perceives, stores, and remembers a language's orthographic code.

Phonological Processing – The way the brain perceives, stores, and remembers the sounds of a language.

Semantic – Related to the meaning of words and the relationships among words as they are used to represent knowledge of the world.

Working Memory – The memory system that is responsible for holding information temporarily so that other systems can act upon it.

Written Expression – A broad term that refers to the way in which an individual expresses their thoughts using written language. It encompasses many aspects of writing, including spelling, punctuation, grammar, and content.

REFERENCES

- Berninger, V.W., Richards, T.L., Abbott R.D. (2015) Differential diagnosis of dysgraphia and dyslexia and OWL LD: Behavioral and neuroimaging evidence. *Reading and Writing*. 28(8):1119-1153.
- Berninger, V.W. (2015). *Interdisciplinary frameworks for schools: Best practices for serving the needs of all students*. Washington, D.C.: American Psychological Association.
- Graham, S. (Winter 2009-2010). Want to improve children's writing? Don't neglect their handwriting. *American Educator*; 20-40
- Harris, S.R., Michelson, E.C.R., Zwicker, J.G. (2015), *Canadian Medical Association Journal*, 187:659-665.
- Hoy, M. M. P., Egan, M. Y., & Feder, K. P. (2011). A systematic review of interventions to improve handwriting. *Canadian Journal of Occupational Therapy*, 78(1), 13–25.
- Levine, M.D. (1999). *Developmental Variation and Learning Disorders*. Cambridge, MA: Educators Publishing Service, Inc.
- MacArthur, C. A. (2009), Reflections on Research on Writing and Technology for Struggling Writers. *Learning Disabilities Research & Practice*, 24: 93–103.
- Missiuna, C. & Pollock, N. (2005), To Write or to Type- That is the Question. CanChild Centre for Childhood Disability Research, McMaster University.
- Mueller, P. A., & Oppenheimer, D. M. (2014). The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. *Psychological Science*, 25(6), 1159-1168.
- Palatajka, H.J. and Cantin, N. (2006). Developmental coordination disorder (dyspraxia): An overview of the state of the art. *Seminars in Pediatric Neurology*, 12(4):250-258.
- Quinlan, T. (2004). Speech recognition technology and students with writing difficulties: Improving fluency. *Journal of Educational Psychology*, 96(2), 337-346
- Santangelo, T., & Graham, S. (2016). A comprehensive meta-analysis of handwriting instruction. *Educational Psychology Review*, 28(2), 225-265.
- Schwellnus, H., Cameron, D., & Carnahan, H. (2012). Which to choose: Manuscript or cursive handwriting? A review of the literature. *Journal of occupational therapy, schools, & early intervention*, 5(3-4), 248-258.
- Texas Education Agency. (2018, November). *The Dyslexia Handbook: Procedures Concerning Dyslexia and Related Disorders*. Retrieved from <https://tea.texas.gov/sites/default/files/2018-Dyslexia-Handbook-Approved-Accomodated-12-11-2018.pdf>

APPENDIX

Recommendations for Accommodating Handwriting Problems

Retrieved from: <https://www.canchild.ca/en/resources/123-m-a-t-c-h-flyers-a-resource-for-educators>

Change the demands of writing rate:

- Allow more time for written tasks including note taking, copying, and tests.
- Allow students to begin projects or assignments early.
- Include time in the student's schedule for being a 'library assistant' or 'office assistant' that could also be used for catching up or getting ahead on written work or doing alternative, non-writing activities related to the material being learned.
- Encourage learning keyboarding skills to increase the speed and legibility of written work.

Adjust the volume:

- Reduce the length requirements on written assignments – stress quality over quantity.
- Instead of having the student write a complete set of notes, provide a partially completed outline so the student can fill in the details under major headings (or provide the details and have the student provide the headings).
- Additional note taking assistance: Provide student with a copy of completed notes (perhaps through a note taking buddy) to fill in missing parts of their own notes.
- Allow the student to dictate some assignments or tests (or parts of tests) to a 'scribe'. Train the 'scribe' to write what the student says verbatim and then allow the student to make changes without assistance from the scribe. Once the student has learned to dictate to the scribe, then encourage the student to speak into a dictation tool (such as *Dragon NaturallySpeaking*) within a word processor document.
- Allow abbreviations in some writing (such as b/c for because). Help the student develop a repertoire of abbreviations that can be kept in a notebook. These will come in handy in future note-taking situations.
- Reduce copying aspects of work; for example, in math, provide a worksheet with the problems already on it instead of having the student copy the problems. On a computer, a student can make a rough draft of a writing assignment, copy it, and then revise the copy, so that both the rough draft and final product can be evaluated without extra typing.

APPENDIX

- Reduce the copying elements of assignments and tests. For example, if students are expected to ‘answer in complete sentences that reflect the question’, have the student do this for three questions that you select, then answer the rest in smaller phrases or words.
- If students are expected to copy definitions, allow the student to shorten them or give the definitions and have the student highlight the important phrases and words or draw an example of the word instead of copying the definition.
- Reduce copying aspects of tasks, such as providing a math worksheet rather than requiring student to copy problems from the book. Making a copy of the board or screen for the student is also a good option.

Change the complexity of the task:

- Allow the student to audio record important assignments and/or take oral tests.
- Staging: have the student complete tasks in logical steps or increments instead of all at once.
- Develop cooperative writing projects where different students can take on roles such as the ‘brain-stormer,’ ‘organizer of information,’ ‘writer,’ ‘proofreader,’ and ‘illustrator’.
- Provide extra structure and intermittent deadlines for long-term assignments. Help the student arrange for someone to coach them through the stages so that they do not fall behind. Discuss with the student and parents the possibility of enforcing the due dates by working after school with the teacher in the event a deadline arrives and the work is not up to date.

Change the tools:

- Allow the use of technology.
- Allow the student to use cursive or manuscript, whichever is most legible and efficient.
- Consider teaching cursive earlier than would be expected, as some students find cursive easier to manage, and this will allow the student more time to learn it.
- Encourage elementary school students to use paper with the raised lines to keep writing on the line.
- Allow older students to use the line width of their choice. Keep in mind that some students use small writing to disguise its messiness.
- Allow students to use paper or writing instruments of different colors.
- Allow student to use graph paper for math, or to turn lined paper sideways, to help with lining up columns of numbers.

APPENDIX

- Allow the student to use the writing instrument that is most comfortable. Many students have difficulty writing with ballpoint pens. They may prefer pencils or pens that have more friction in contact with the paper. Mechanical pencils are very popular. Let the student find a favorite pen or pencil and then get more than one like that.
- Have some fun grips available for everybody, no matter the grade. Sometimes high school kids will enjoy the novelty of pencil grips.
- Word processing should be an option. Bear in mind that for many of these students, learning to use a word processor will be difficult for the same reasons that handwriting is difficult. There are some keyboarding instructional programs that include teaching the keys alphabetically (instead of the home row sequence) or sensors to change the feel of the D and K key so that the student can find the right position kinesthetically.
- Consider whether use of speech recognition software will be helpful. As with word processing, the same issues which make writing difficult can make learning to use speech recognition software difficult. The challenge of training the software by passage reading and speech recognition errors due to misarticulation are added burdens for children with reading and speech problems. This can be reduced by advanced planning and graphic organizers.

Change the format of assignments and projects:

- Offer the student an alternative project such as an oral report, dramatic presentation, or visual project. Establish a rubric to define what you want the student to include. For instance, if the original assignment was a 3-page description of one aspect of the Roaring 1920s (record-breaking feats, the Harlem Renaissance, Prohibition, etc.) you may want the written assignment to include:
 - A general description of that aspect (with at least two details),
 - Four important people and their accomplishments,
 - Four important events – when, where, who, and what,
 - Three good things and three bad things about the Roaring 1920s.
- You can evaluate the student’s visual or oral presentation of that same information in the alternative format.