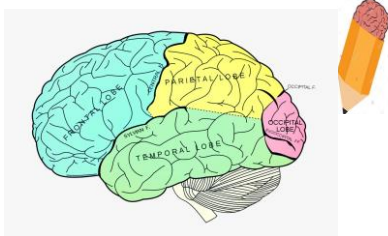


## The Neuropsychology of Learning Disabilities: Developing Evidence-Based Strategies for Reading, Writing, and Math

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PAR

1

## Course Outline

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- Three-part (12 hrs) webinar series on reading, writing, & math disabilities sponsored by Jack Hirose & Associates.
- Introduce a brain-based educational model of dyslexia, dysgraphia, and dyscalculia and classify each disability into distinct subtypes.
- Discuss targeted interventions for all students with academic learning issues.
- Discuss **evidenced-based** vs. **research-based** interventions for all students with academic learning issues.
- Introduce the concept of diagnostic achievement tests versus traditional achievement tests.
- Questions and Comments: **feifer@comcast.net**

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2

## Presentation Goals

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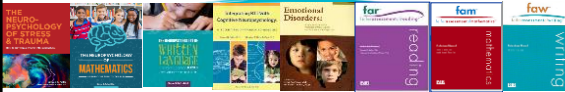
1. Discuss the neural architecture of language development in children and learn key brain processes responsible for the organization and production of written language.
2. Define "dysgraphia" and introduce a *brain-based* educational model of diagnosing written language disorders by classifying them into three distinct subtypes.
3. Differentiate between evidenced-based and research-based interventions and strategies pertaining to written language.
4. Introduce the **FAW** as a comprehensive diagnostic achievement measure to better diagnose and remediate written language disorders in children.

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3


3

Dr. Feifer's Journey 1992 – present  
www.schoolneuropsychpress.com




- School psychologist 20+ years
- Diplomate in school neuropsychology
- 2008 **Maryland School Psychologist of the Year**
- 2009 **National School Psychologist of the Year**
- Author: **8 books** on learning and emotional disorders
- Test Author: **FAR & FAM & FAW & PASS-12**
- Currently in private practice at Monocacy Neurodevelopmental Center in Maryland

**Disclosures:**  
**Financial** — Dr. Feifer is a test author for PAR publishers and receives royalty payments. He also receives book author royalties from School Neuropsych Press.  
**Nonfinancial** — none


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4

Canadian Survey on Disabilities (Stats Canada, 2017)



- Among adults aged 15 to 64, those with a learning disability were less likely to have completed high school than adults without any disability (33.0% versus 13.1%).
- Canadians with LD are up to three times more likely to report high levels of stress, depression, anxiety, suicidal thoughts and visits to a mental health professional, and also report poorer physical health.
- The employment rate of working-age adults, aged 15 to 64, with a learning disability is 28.8%, less than half the rate for those without any disability (73.6%).
- 1 in 4 inmates in Canadian prisons have LD.

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Canadian Survey on Disabilities (Stats Canada, 2017)



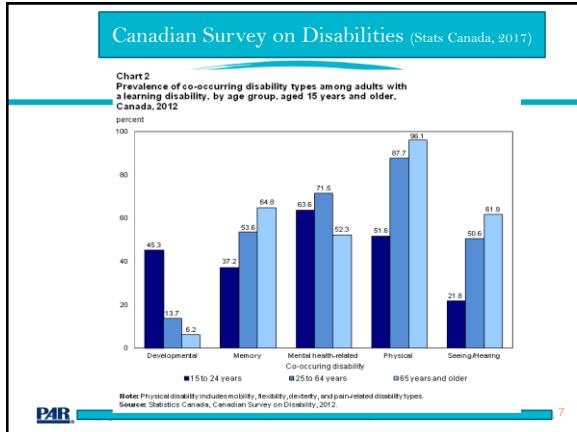
Table 3  
Canadian population aged 15 years and over with a disability, by disability type and sex, 2017

Disability type	Both		Women		Men	
	number	percent	number	percent	number	percent
<b>Total population - aged 15 years and over</b>	<b>28,008,880</b>	<b>100.0</b>	<b>14,345,330</b>	<b>100.0</b>	<b>13,663,550</b>	<b>100.0</b>
Pain-related*	4,062,000	14.5	2,374,230	16.6	1,687,770	12.4
Flexibility*	2,795,110	10.0	1,568,970	10.9	1,226,140	9.0
Mobility*	2,676,370	9.6	1,601,010	11.2	1,075,360	7.9
Mental health-related*	2,027,370	7.2	1,272,490	8.9	754,880	5.5
Seeing*	1,519,840	5.4	903,040	6.3	616,800	4.5
Hearing*	1,334,520	4.8	619,360	4.3	715,160	5.2
Dexterity*	1,275,610	4.6	784,120	5.5	491,490	3.6
Learning	1,105,680	3.9	560,970	3.9	544,700	4.0
Memory*	1,050,840	3.8	575,760	4.0	475,080	3.5
Developmental*	315,470	1.1	123,310	0.9	192,160	1.4
Unknown	155,810	0.6	75,150	0.5	80,660	0.6

\* significantly different between women and men at p < .05  
 Note: The sum of the values for each category may differ from the total due to rounding  
 Source: Statistics Canada, Canadian Survey on Disability, 2017

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6



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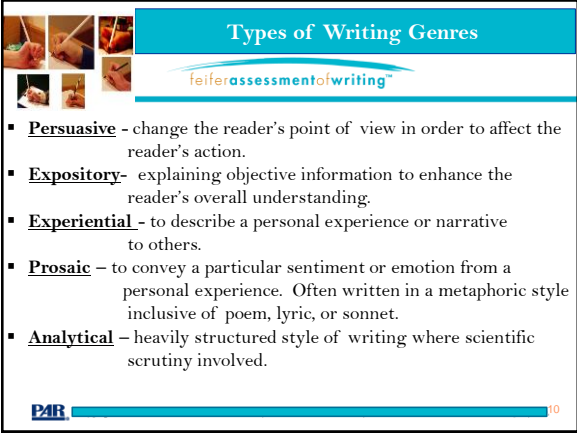
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**Five Quick Facts About Written Expression**

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- Most students rely on writing, either e-mail, text messages, word processing, or other computerized technology to communicate.
- According to NAEP, 54% of 8<sup>th</sup> graders and 52% of 12<sup>th</sup> graders perform at a Basic level in written expression.
- Males score significantly lower than females on standardized assessments of written language (NAEP, 2011).
- Children spend nearly 60% of their school day actively engaged in the process of written expression or some equivalent fine motor-related endeavor (Feder & Majnemer, 2007).
- Writing remains one of the most challenging skills to teach our students.

9



### Types of Writing Genres

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- **Persuasive** - change the reader's point of view in order to affect the reader's action.
- **Expository**- explaining objective information to enhance the reader's overall understanding.
- **Experiential** - to describe a personal experience or narrative to others.
- **Prosaic** - to convey a particular sentiment or emotion from a personal experience. Often written in a metaphoric style inclusive of poem, lyric, or sonnet.
- **Analytical** - heavily structured style of writing where scientific scrutiny involved.

PAR 10

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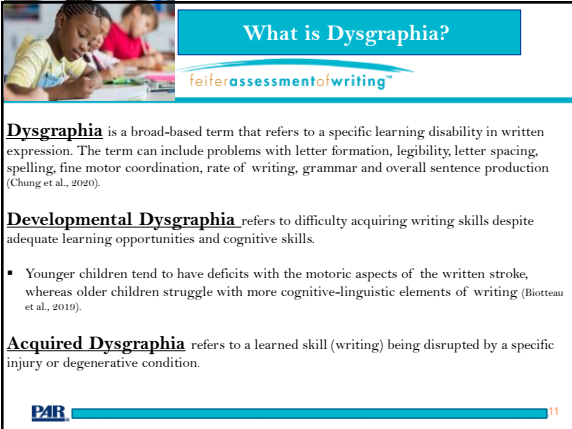
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### What is Dysgraphia?

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**Dysgraphia** is a broad-based term that refers to a specific learning disability in written expression. The term can include problems with letter formation, legibility, letter spacing, spelling, fine motor coordination, rate of writing, grammar and overall sentence production (Chang et al., 2020).

**Developmental Dysgraphia** refers to difficulty acquiring writing skills despite adequate learning opportunities and cognitive skills.

- Younger children tend to have deficits with the motoric aspects of the written stroke, whereas older children struggle with more cognitive-linguistic elements of writing (Biotteau et al., 2019).

**Acquired Dysgraphia** refers to a learned skill (writing) being disrupted by a specific injury or degenerative condition.

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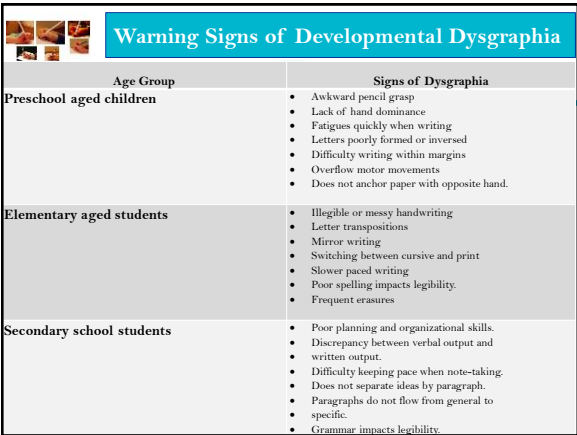
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Age Group	Signs of Dysgraphia
Preschool aged children	<ul style="list-style-type: none"> <li>• Awkward pencil grasp</li> <li>• Lack of hand dominance</li> <li>• Fatigues quickly when writing</li> <li>• Letters poorly formed or inverted</li> <li>• Difficulty writing within margins</li> <li>• Overflow motor movements</li> <li>• Does not anchor paper with opposite hand.</li> </ul>
Elementary aged students	<ul style="list-style-type: none"> <li>• Illegible or messy handwriting</li> <li>• Letter transpositions</li> <li>• Mirror writing</li> <li>• Switching between cursive and print</li> <li>• Slower paced writing</li> <li>• Poor spelling impacts legibility.</li> <li>• Frequent erasures</li> </ul>
Secondary school students	<ul style="list-style-type: none"> <li>• Poor planning and organizational skills.</li> <li>• Discrepancy between verbal output and written output.</li> <li>• Difficulty keeping pace when note-taking.</li> <li>• Does not separate ideas by paragraph.</li> <li>• Paragraphs do not flow from general to specific.</li> <li>• Grammar impacts legibility.</li> </ul>

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**Cole: 3<sup>rd</sup> grade...Attention/Writing issues**

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WISC V Composites	COMPOSITE SCORE	CONFIDENCE INTERVAL	RANGE	PERCENTILE RANK
Verbal Comprehension Index	85	78 - 92	Low Average	16%
Perceptual Reasoning Index	100	92 - 108	Average	50%
Fluid Reasoning Index	90	83 - 97	Average	25%
Working Memory Index	77	71 - 86	Very Low	6%
Processing Speed Index	78	72 - 80	Very Low	7%
<b>Full Scale Score</b>	<b>83</b>	<b>79 - 88</b>	<b>Low Average</b>	<b>13%</b>

**WHAT ARE WRITING SUBTYPES**

	SCORE	PERCENTILE	RANGE
<b>Spelling</b> - the student writes words dictated by the examiner from a word list.	86	18%	Below Average
<b>Sentence Composition</b> - this subtest has two separate parts. First, the student combines two or more sentences into a single sentence that maintains meaning, and also uses correct punctuation and grammar skills (Sentence Combining). In the second part, the student constructs a sentence from a stimulus word provided (Sentence Building).	80	9%	Below Average
<b>Essay Composition</b> - the student has ten minutes to construct an essay about a favorite game or activity, and must list specific reasons for liking the game or activity.	95	37%	Average
<b>WRITTEN EXPRESSION SCORE</b>	<b>85</b>	<b>16%</b>	<b>Below Average</b>

PAR 13

13

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**Questions....Questions....No Answers!**

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1. Why does Cole have difficulty with writing?
2. Which writing disorder subtype, if any, does Cole possess?
3. What are your primary recommendations for Cole?

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**A Neuropsychological Perspective**

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**The Human Brain**

**Frontal Lobe**  
Supervises socially appropriate behavior  
Predicts consequences of actions  
Plays a role in the choice between good and bad actions

**Parietal Lobe**  
Assists with the interpretation of touch  
Plays a role in the knowledge of numbers and the understanding of objects with the understanding of texture, shape, and space

**Temporal Lobe**  
Assists with the perception and interpretation of sound  
Plays a role in the recognition of objects and visual memory

**Occipital Lobe**  
Processes and makes sense of visual information

**Brainstem**  
Acts as the bridge of information between the brain and body  
Plays a role in automatic functions, such as the heartbeat and breathing

**Cerebellum**  
Plays a major role in balance and voluntary motor skills

**Neuropsychology:** An analysis of learning and behavior where the underlying assumption is that the brain is the seat of ALL learning; therefore, knowledge of cerebral organization should be the key to unlocking the mystery behind most academic tasks.

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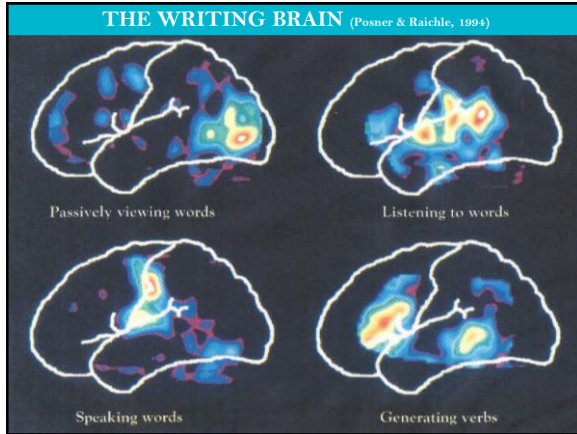
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**Cognitive Constructs and Written Language**

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**Attention:** (Selective & Sustained)

- Poor planning
- Uneven tempo
- Erratic legibility
- Inconsistent spelling
- Poor self monitoring
- Impersistence

**BRAIN REGION - Anterior Cingulate Gyrus**  
\* Effort control and top-down attention

**PAR** 17

17

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**Cognitive Constructs and Written Language**

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**Spatial Production**

- Poor spatial production
- Poor visualization
- Poor margination
- Organization problems
- Uneven spacing
- Poor use of lines

**BRAIN REGION - Right Parietal Lobe**

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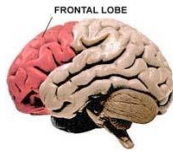
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## Cognitive Constructs and Written Language

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### Sequential Production

- Poor connected writing
- Letter reversals
- Organizational deficits
- Lack of cohesive ties
- Deficits in working memory, especially with ADHD kids, leads to sequential dysfunction.



BRAIN REGION – Left Prefrontal Cortex

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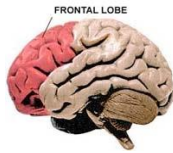
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## Cognitive Constructs and Written Language

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### Working Memory Skills

- Poor *word retrieval* skills
- Poor spelling
- Poor grammar rules
- Loss of train of thought
- Deterioration of continuous writing
- Poor elaboration of ideas
- Cortical mapping of language is *distributed* throughout brain (*i.e. nouns vs. verbs*)



BRAIN REGION – Semantic memories stored in temporal lobes. Retrieved by frontal lobes

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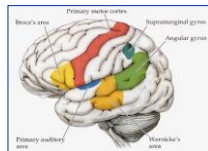
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## Cognitive Constructs and Written Language

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### Language

- Poor vocabulary
- Lack of cohesive ties
- Poor grammar
- Simplistic sentence structure
- Left hemisphere stores language by **converging** words into semantic baskets; right hemisphere excels in more **divergent** linguistic skills (simile and metaphor).
- Writing genre impacts retrieval!



BRAIN REGION – Temporal Lobes

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## Divergent Retrieval and Writing

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- “*Subdivisions*” (1982) written by Neil Peart and was used to express the loneliness of growing up in a bland suburb and being forced to conform to an unwanted norm:
 

*“Growing up it all seems so one-sided  
Opinions all provided  
The future pre-decided  
Detached and subdivided  
In the mass production zone  
Nowhere is the dreamer or the misfit so alone”*
- Ries and colleagues (2016) noted right frontal activity has been shown to increase when word selection difficulty is increased or more abstract, and greater cognitive flexibility is required.


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## Gender Differences in Phonological Processing

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## Gender Differences: What the research says....

Kradnick, A.J. & Evans, T. M. (2019). Neurobiological Sex Differences in Developmental Dyslexia. *Frontiers in Psychology*, 10(10), 214.

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- A **language-based learning disability** impacts 5–13% of the population due to poor decoding & spelling skills.
- **Language-based learning disabilities** have higher ratios for boys than girls.
- Lower levels of **testosterone** (*measured in utero*) correlate with less gray matter in language (temporal-parietal) regions for males.
- **Conclusion:** Deficits with **testosterone** impacts reading brain for males. Deficits with **estrogen** does not necessarily impact reading brain for females, but has been linked to deficits in sensorimotor areas.


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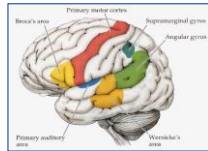


## Cognitive Constructs and Written Language

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### Intelligence

- Concrete ideation
- Poor development of ideas
- Poor audience awareness
- Weak opinion development
- Simplistic sentence structure



BRAIN REGION – Inferior Parietal Lobes

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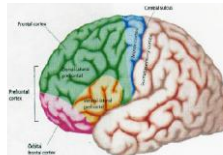
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## Cognitive Constructs and Written Language

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### Executive Functioning

- Organize and plan ideas
- Self monitor
- Task initiation
- Sustain attention to task
- Difficulty making cognitive shifts from one topical area to another.



BRAIN REGION – Dorsolateral Prefrontal Cortex

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26

26

## Cognitive Constructs and Written Language:

Motor Output Speed (Pollock et al, 2009)

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Grade Levels	Handwriting Speed
Grade 1	15 - 32 letters per minute
Grade 2	20 - 35 letters per minute
Grade 3	25 - 47 letters per minute
Grade 4	34 - 70 letters per minute
Grade 5	38 - 83 letters per minute
Grade 6	46 - 91 letters per minute

BRAIN REGION – Basal Ganglia

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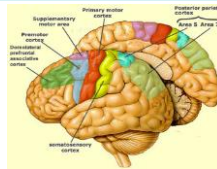
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### 3 Subtypes of Written Language Disorders:

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(1) **Graphomotor Dysgraphia** - apraxia refers to a wide variety of motor skill deficits in which the voluntary execution of a skilled motor movement is impaired.

- Premotor cortex** - plans the execution of a motor response.
- Supplementary motor area** - guides motor movement.
- Cerebellum** - provides proprioceptive feedback.
- Basal Ganglia** - procedural memory and automaticity of handwriting.



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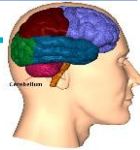
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28

### The Role of the Cerebellum in Writing

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- The cerebellum contains 50% of the neurons in the brain.
- Guides and corrects motor movements based upon proprioceptive feedback.
- Made up of purkinje cells and granule cells which are primarily excitatory, and help fine tune the writing process.
- Over time, the physical act of sequencing subtle motor movements becomes less effortful and more reflexive.
- Deficits mainly lead to motor coordination issues....ataxia....("3971" ATM Code spatial/sequential)



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29

29

### Motor Skill Deficits and Writing

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DISORDER	DESCRIPTION	BRAIN REGIONS
Developmental Coordination Disorder	Inability to properly develop the coordinated movements necessary to execute a particular motor response.	Premotor Cortex Supplementary Motor Cortex Motor Strip Basal Ganglia Cerebellum
Developmental Dyspraxia	Refers to a wide range of skills involved more in the planning and execution of a voluntary motor movement.	Premotor Cortex Supplementary Motor Cortex Motor Strip
Ataxia	A coordination disorder involving trouble regulating the force, range, direction, velocity and rhythm of muscle contractions due to specific dysfunction of the cerebellum.	Cerebellum
Idiomotor Dyspraxia	A failure to voluntarily carry out a motor act or gesture on command, though the self-same motor act can be effectively executed if done so in a spontaneous manner.	Exner's Area Supplementary Motor Area
Ideational Dyspraxia	Isolated motor skills are in tact, but difficulty arises when stitching together large chains or sequences of movements involving complex motor planning.	Left Superior Parietal Lobe
Constructional Dyspraxia	A breakdown in the visual-spatial synthesis of written production or what is often referred to as visual-motor integration.	Right Posterior Parietal Lobe

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30

30

## KEY OBSERVATIONS

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1. Does the student have enough space on their desk?
2. Are both feet on the floor?
3. Does the student complain their hand is tired?
4. Does the student use excessive force?
5. Does the student use an immature grip?
6. Does the student constantly rub their eyes when writing or put their head down on the desk?
7. Does the student appear distracted?
8. Does the student use their opposite hand to anchor the page?

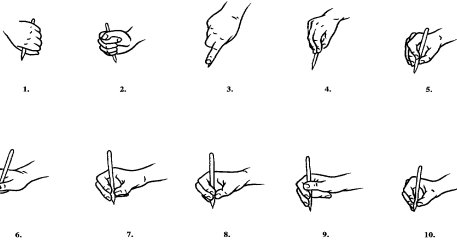
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31

## TYPES OF PENCIL GRIPS

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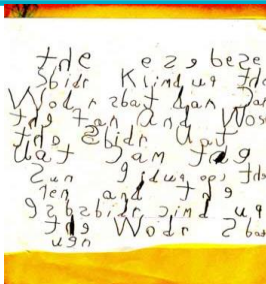
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32

## Graphomotor Dysgraphia: Example

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33

33

### 3 Subtypes of Written Language Disorders

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#### (2) Dyslexic Dysgraphias: (Spelling Miscues)

- a) **Dysphonetic dysgraphia** - the hallmark feature of this disorder is an inability to spell by *sound* due to poor *phonological* skills. There is often an over-reliance on the visual features of words when spelling (*i.e.* "sommr" for "summer").
- b) **Surface dysgraphia** - a breakdown in the *orthographic* representation of words. Miscues made primarily on phonologically irregular words (*i.e.* "laf" for "laugh"; "juse" for "juice"; "mte" for "mighty").
- c) **Mixed Dysgraphia** - characterized by a combination of both *phonological* errors and *orthographical* errors depicting faulty arrangement of letters and words (*i.e.* "ceshinte" for "kitchen").

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34

34

### Key Spelling Strategies

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1. Incorporate nonsense words into weekly spelling instruction to make sure students can represent each sound with a letter.
2. Use tile spelling markers to color-code vowel digraphs in words by families (*i.e.* Sauce, Pause, cause, etc...)
3. Place a heavy focus on prefixes and suffixes during instruction.
4. Have students write each word with white space in between each syllable in the word using the box approach. (*i.e.* fascinate)

f a s c i n a t e

5. Show multiple spellings of a word and have the student select the correct choice (*i.e.* was, was, was).

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35

35

### 3 Subtypes of Written Language Disorders

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(3) **Executive Dysgraphia** - an inability to master the implicit rules for grammar which dictate how words and phrases can be combined. Deficits in *working memory* and *executive functioning* in frontal lobes hinders output.

- Word omissions
- Word ordering errors
- Incorrect verb usage
- Word ending errors
- Poor punctuation
- Lack of capitalization
- Oral vs. written language discrepancy

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36

36

## Features of Executive Dysgraphia

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- Verbal Retrieval Skills** – the frontal lobes are critical in retrieving words stored throughout the cortex, often stored by semantic categories.
- Working Memory Skills** – helps to recall spelling rules and boundaries, grammar rules, punctuation, and maintaining information in mind long enough for motoric output.
- Organization & Planning** – syntactical arrangement of thought needed to sequence mental representations.

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37

37

## Verbal Retrieval and Writing

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### Transition Words

- |  |  |  |
|--|--|--|
| <ul style="list-style-type: none"> <li>• first, second, third</li> <li>• first, also, besides</li> <li>• one, another, last</li> <li>• one example, another example, a full example</li> <li>• initially, then, after that</li> <li>• a good, a better, the best</li> <li>• Although</li> <li>• However</li> <li>• Instead of</li> <li>• Additionally</li> <li>• In contrast</li> <li>• Similarly</li> <li>• While</li> <li>• A couple</li> <li>• Before</li> <li>• After</li> </ul> | <ul style="list-style-type: none"> <li>• to begin, then, consequently</li> <li>• as soon as, next, later</li> <li>• to start, furthermore, in conclusion</li> <li>• first, another, next</li> <li>• initially, another, then, finally</li> <li>• Because</li> <li>• Since</li> <li>• Even though</li> <li>• Until</li> <li>• Moreover</li> <li>• In order</li> <li>• Unless</li> <li>• Likewise</li> </ul> | <ul style="list-style-type: none"> <li>• meanwhile</li> <li>• A number of</li> <li>• As if</li> <li>• As soon as</li> <li>• In conclusion</li> <li>• Finally</li> <li>• Most importantly</li> <li>• In fact</li> </ul> |
|--|--|--|

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38

38

## Working Memory and Writing & Spelling

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- **Phonological Loop** - holds and manipulates acoustic information. Housed in *left temporal lobes* and plays a role in holding and manipulating words through verbal rehearsal, and hearing the temporal order of sounds when spelling.
- **Visual-Spatial Sketchpad** - holds visual, spatial, and kinesthetic information in temporary storage by way of mental imagery. Housed along inferior portions of *right parietal lobes* and plays role in visualizing word forms when spelling.
- **Episodic Buffer** – a temporary storage system integrating both phonological and visual-spatial information. Modulated by temporoparietal regions and left hippocampus.
- **Central Executive System** – coordinates working memory systems and allocates attention resources. Impacted by *anxiety* and *emotional distress!!!*

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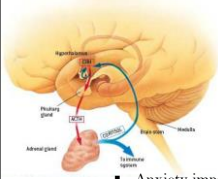
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39

## Anxiety and Written Production: Timed Tests!

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### STRESS RESPONSE SYSTEM



**Cortisol** – a glucocorticoid (glucose-cortex-steroid) that regulates the metabolism of glucose in the brain. A balance or homeostasis of cortisol is needed for optimal brain functioning. Too much (*Cushing's Syndrome*)...too little (*Addison's Disease*).

- Anxiety impacts cognition and learning by way of working memory (Dowker et al., 2015).
- Anxiety impacts writing by hindering retrieval of information from long term memory (Wirth, 2015).
- Time management is the biggest cause of anxiety when writing!

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40

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## Executive Functioning and Written Language

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### Classification

(1) Initiating

(2) Sustaining

(3) Inhibiting

(4) Shifting

### Writing Dysfunction

\* Poor idea generation

\* Poor independence

\* Lose track of thoughts

\* Difficulty finishing

\* Sentences disjointed

\* Impulsive/Distractible

\* Perseverations

\* "Stuck" on topic

PAR

41

41

## Executive Functioning and Written Language

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### Classification

(5) Poor Organization

(6) Poor Planning

(7) Poor Word Retrieval

(8) Poor Self Monitor

### Writing Dysfunction

\* Frequent erasers

\* Forget main idea

\* Disjointed content

\* Poor flow of ideas

\* Lack of cohesive ties

\* Limited word choice

\* Simplistic sentences

\* Careless miscues

\* Sloppy work

PAR

42

42



### Evidenced Based vs Research Based

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- **Evidence-Based Practices** refers to individual practices that are considered effective based on scientific evidence. To deem a program or practice “evidence-based,” researchers will typically study its impact in a controlled research setting, examining the validity, reliability and fairness of the program
- **Research Based or Evidenced Informed Practices** are practices which were developed based on the best research available in the field, which is often **anecdotal**. Unlike “Evidence-Based Practices”, these practices have not been researched in a controlled setting

**PAR** 43

43

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### EBP VS Pseudoscience

Lee & Hunsley, 2015

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1. Avoidance of peer review.
2. Emphasis on confirmation rather than refutation.
3. Lack of connection with basic or applied research.
4. Overreliance on anecdotal evidence.
5. Reversed burden of proof in which proponents of an intervention demand that critics refute claims of treatment efficacy.

- Written language remains the most difficult academic subject to quantify, leaving educators with a relative void of evidence based research.

**PAR** 44

44

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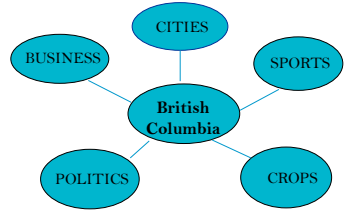
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### GRAPHIC ORGANIZERS

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**Graphic Organizers** – this involves a pre-writing activity whereby the student simply lists a word or phrase pertaining to the topic. An example may include a brainstorming web:



**PAR** 45

45

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## Self Monitoring Strategies

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**COPS strategy** – a directional proof-reading strategy where the student re-reads a passage four times prior to completion.



- 1) **Capitalize** the first word of each sentence.
- 2) **Organize** the information by reviewing topic sentences and double check paragraph breaks.
- 3) **Punctuation** miscues must be reviewed.
- 4) **Spelling** miscues must be reviewed.

PAR

46

46

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## Self Monitoring Writing Rubric

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### IDEAS

- 4 The topic and details are well developed.
- 3 The topic is clear but more details are needed.
- 2 Details that don't fit the topic confuse the reader.
- 1 The topic is not clear.

### ORGANIZATION

- 4 The beginning, middle, and ending work well.
- 3 Some parts of the essay are unclear.
- 2 All parts of the essay run together.
- 1 The order of information is confusing.

PAR

47

47

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## Self Monitoring Writing Rubric

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### WORD CHOICE

- 4 Words make the meaning clear.
- 3 Clearer words are needed.
- 2 Some words are overused.
- 1 Words are used incorrectly.

### CONVENTIONS

- 4 Conventions are used well.
- 3 There are few errors.
- 2 Errors make the essay hard to understand.
- 1 Help is needed to make corrections

### AUDIENCE AWARENESS

- 4 The passage is clear and understandable for the intended audience.
- 3 The reader may need background knowledge to fully comprehend.
- 2 There are some parts of the passage that are difficult to understand.
- 1 The passage is extremely confusing for the intended audience.

PAR

48

48

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## Strategies for Secondary Students

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- **Inspirations** – teaches how to craft concept maps, idea maps, and other visual webbing techniques to assist in planning, organizing, and outlining. Very effective word predictive software.
- **Kurzweil Technology** – adaptive technology to further practice grammar, spelling, and punctuation. Voice activated software also an option.
- **Journal or Diary** – can be a fun and effortless way to practice writing on a daily basis.
- **Keyboarding** – speed up output to reduce pressure from working memory skills to retain information over longer periods of time.
- **Livescribe** – a “smart” pen which would both record lecture information in the class, as well as transcribe notes to a computer screen. Smart pens allow students to better organize their notes.

PAR

49

49

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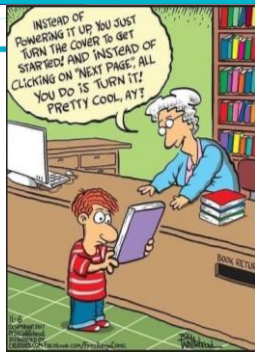
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## Over-Relying on Technological Interventions



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## Handwriting Supplemental Programs

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Name	Supplemental Program
1. Handwriting Without Tears	Developmentally appropriate and multisensory approach using innovative letter order and style.
2. Zaner-Bloser	Apps, writing games, and other reading and writing resources.
3. Big Strokes for Little Folks	Geared for students who can recognize letters but struggle to write them.
4. Sensible Pencil	Applicable to both home and school in teaching letter writing skills.
5. Loops and Other Groups	A kinesthetic approach to teach writing in cursive.

PAR

51

51

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## 10 Research Based Strategies (Graham & Perin, 2007)

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- (1) Writing Strategies (*effect size .82*)
- (2) Summarization (*effect size .82*)
- (3) Collaborative Writing (*effect size .75*)
- (4) Specific Product Goals (*effect size .70*)
- (5) Word Processing (*effect size .55*)
- (6) Sentence Combining (*effect size .50*)
- (7) Prewriting (*effect size .32*)
- (8) Inquiry activities (*effect size .32*)
- (9) Process Writing Approach (*effect size .32*)
- (10) Study of Models (*effect size .25*)

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52

52

## 5 Steps for Executive Dysgraphia (Ray, 2001)

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- (1) Prewriting - use graphic organizers.
- (2) Drafting - use model to take notes and model how to organize in a text form using topic sentences.
- (3) Revising - second draft emphasizing content, and elaboration of ideas and making connections.
- (4) Editing - re-read for capitalization and punctuation errors.
- (5) Publishing - peer assisted strategies and teaching students to give and receive feedback base upon a writing rubric.



PAR

53

53

## EmPOWER & SRSD

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**EmPOWER** - developed by Dr. Bonnie Singer through Architects for Learning. Can use in any class in any grade. Six steps include:

- Evaluate** - break down the task to determine what I have to do.
- Plan** - identify my purpose for writing and select strategies.
- Organize** - show my thinking and organize my ideas.
- Work** - work my ideas into a well structured text.
- Evaluate** - assess my work.
- Re-Work** - make necessary changes.

**SRSD** - Self-Regulated Strategy Development. Research based to improve planning, editing and written product (De la Paz, 2007; De la Paz & Graham, 2002; Englert, 2009; Graham, 2006; Graham & Perin, 2007; Perin, 2007).

- 5 steps include: Discuss It, Model It, Make It Your Own, Support It, Independent Performance.

PAR

54

54

## Comprehensive Dysgraphia Evaluation

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1. **Intelligence Measures (Gc):** WISC5, SB5, CAS2, RIAS2, KABCII, WJIV, DASII...
2. **Visual-Motor Integration (G?):** VMI, WRAPMA, WIAT IV, PAL II, NEPSYII...
3. **\*Attention\* (Gs):** NEPSYII, Tea-CH2, CAS2, WJIV, Conners Scale, BASC3, TOVA....
4. **\*Working Memory\* (Gsm):** WISC5, KABCII, WRAML2, SB5, ChAMP, WJIV...
5. **\*Executive Functions\* (Gf):** BRIEF2, CEFI, MEFS, WCST, WIATIV Sent Comp...
6. **Writing and Spelling Skills:** WJIV, KTEAIII, WIATIV, OWLS II, TOWL4, AAB...
7. **Phonological Awareness Skills: (Ga):** CTOPP2, FAR, KTEAIII, WJIV, TAPSL...
8. **\*Retrieval Fluency Skills (Glr):** DKEFS, NEPSYII, FAR, WJIV, KTEAIII, CIFA...
9. **Social Emotional Measures (G?):** RCMAS2, MASC2, BASC3, PAI-A, CDII2...

PAR

55

55

## Comprehensive Dysgraphia Evaluation

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1. **Graphomotor Dysgraphia:**
  - ▶ Visual-motor integration deficits
  - ▶ Slower motor speed
  - ▶ Sloppy penmanship
2. **Dyslexic Dysgraphia:**
  - ▶ Major spelling deficits
  - ▶ Poor phonological processing
  - ▶ Poor variety of words displayed
3. **Executive Dysgraphia:**
  - ▶ Poor executive functioning skills
  - ▶ Limited attention
  - ▶ Slower retrieval fluency skills
  - ▶ Limited working memory skills
  - ▶ Limited output....careless miscues..grammar errors.... simplistic sentence structures.

PAR

56

56



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- A neurodevelopmental assessment of written language disorders.
- Pre-K to College (Ages 4-21)
- 12 subtests in complete battery/10 subtests core
- Diagnoses 3 subtypes of writing disorders:
  - 1) Graphomotor Dysgraphia
  - 2) Dyslexic-Dysgraphia
  - 3) Executive Dysgraphia
- Includes the FAW-S dysgraphia screening battery
- Yields a Compositional Writing Index (CWI)

PAR

57

57

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Structure of the FAW			
Index	Subtest	Grade range	Approximate administration time in minutes
Graphomotor Index (GI)	Alphabet Tracing Fluency (ATF)	PK to college	1 - 2
	Motor Sequencing (MS)	PK to college	3 - 4
	Copying Speed (CS)	K to college	3 - 4
	Motor Planning (MP)	PK to college	2 - 3
Dyslexic Index (DI)	Homophone Spelling (HS)	K to college	3 - 4
	Isolated Spelling (IS)	PK to college	4 - 6
	Executive Working Memory (EWM)	Grade 2 to college	10 - 12
Executive Index (EI)	Sentence Scaffolding (SS)	Grade 2 to college	13 - 16
	Retrieval Fluency (RF)	PK to college	7 - 8
	Expository Writing (EW)	Grade 2 to college	6
	Expository Writing (EW)	Grade 2 to college	6
Compositional Writing Index (CWI) (optional)	Copy Editing (CE) (optional)	Grade 2 to college	4
	Story Mapping (SM) (optional)	Grade 2 to college	6

58

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faw <sup>™</sup> feifer assessment of writing <sup>™</sup>									
Alphabet Tracing Fluency  30 seconds									
Part B: Grades 2+									
Response Form					Record Form				
Alphabet Tracing Fluency Part B					Part B: Grade 2+				
brick	orange	knee			brick	orange	knee	15	
stripe	movie	watch			stripe	movie	watch	30	
kite	ball	head			kite	ball	head	45	
tiger	under	island			tiger	under	island	60	
ear	lost	king			ear	lost	king	75	
yellow	reject	spider			yellow	reject	spider	90	
rabbit	knock	farm			rabbit	knock	farm	105	
					Alphabet Tracing Fluency (ATF) Grade 2+ total				
					Number correct: /105 Time (seconds): /30				

59

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faw <sup>™</sup> feifer assessment of writing <sup>™</sup>									
Motor Sequencing  60 seconds									
Part B: Grades 2+									
Response Form					Record Form				
Motor Sequencing Part B					Part B: Grade 2+				
Example									
					gu	mow	zx	dtp	8
mow	zx	dtp	gu		mow	zx	dtp	16	
					mow	dtp	gu	24	
					gu	gu	zx	32	
					zx	dtp	mow	40	
					zx	dtp	mow	48	
					mow	gu	dtp	56	
					mow	zx	gu	64	
					Motor Sequencing (MS) Grade 2+ total				
					Number correct: /64 Time (seconds): /60				

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**Executive Working Memory**

Response Form      Record Form


Item      Target words      Prompt      Prompt score      Target score      Grammar/sentence structure score      Total score      Time

60 seconds per item

1.	poppy, television, carpet, rabbit	Write one sentence about heads people eat.	0	1	2	0	1	1	15
2.	poppy, cat, pencil, cat	Write one sentence about types of pet people have.	0	1	2	0	1	1	15
3.	how, not, hammer, work	Write one sentence that explains how to work a car.	0	1	2	0	1	1	15
4.	ball, either, table, coat	Write one sentence that tells what some people wear when it is cold outside.	0	1	2	0	1	1	15
5.	chair, leg, football, bus	Write one sentence about different room activities.	0	1	2	0	1	1	15
6.	breakfast, books, movie, airplane	Write one sentence that tells how some people prepare for school each morning.	0	1	2	0	1	1	15
Item total:			/10	+	/10	+	16	+	120

61

61



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**Cole: 3<sup>rd</sup> grade...Attention/Writing issues**


WISC-V Composites	COMPOSITE SCORE	CONFIDENCE INTERVAL	RANGE	PERCENTILE RANK
Verbal Comprehension Index	85	78 - 92	Low Average	16%
Perceptual Reasoning Index	100	92 - 108	Average	50%
Fluid Reasoning Index	90	83 - 97	Average	25%
Working Memory Index	77	71 - 86	Very Low	6%
Processing Speed Index	78	72 - 90	Very Low	7%
<b>Full Scale Score</b>	<b>83</b>	<b>79 - 88</b>	<b>Low Average</b>	<b>13%</b>

WIAT-III WRITING SUBTESTS	SCORE	PERCENTILE	RANGE
<b>Spelling</b> - the student writes words dictated by the examiner from a word list.	86	18%	Below Average
<b>Sentence Composition</b> - this subtest has two separate parts. First, the student combines two or more sentences into a single sentence that maintains meaning, and also uses correct punctuation and grammar skills ( <i>Sentence Combining</i> ). In the second part, the student constructs a sentence from a stimulus word provided ( <i>Sentence Building</i> ).	80	9%	Below Average
<b>Essay Composition</b> - the student has ten minutes to construct an essay about a favorite game or activity, and must list specific reasons for liking the game or activity.	95	37%	Average
<b>WRITTEN EXPRESSION SCORE</b>	<b>85</b>	<b>16%</b>	<b>Below Average</b>

62

62




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**Cole: 3<sup>rd</sup> grade...Attention/Writing issues**

Score Summary					
Page range	Subtest	Raw score	Standard score	Index standard score	Percentile
7	Isolated Tracing Fluency (AT)	21	105		63
8-9	Motor Sequencing (MS)	20	95		37
18	Crossing Speed (CS) -K-	17	95		37
20-21	Motor Planning (MP)	7	75		5
2-5	Graphomotor Index (GI)	37	90	80-100	25
2-5	Homophone Spelling (HS) -K-	51	86		15
23-24	Isolated Spelling (IS)	53	104		61
A-B-C	Dyadics Index (DI)	190	94	87-101	34
10-12	Executive Working Memory (EWM) -2%	2	64		1
13-14	Sentence Scrambling (SS) -2%	9	86		15
15-18	Memory Fluency (MF) -2%	28	102		55
22	Expressive Writing (EW) -2%	6	75		7
	Executive Index (EI)	330	76	67-85	5
	GI + DI + DI + EWM Total Index (TI)	890	83	76-90	13
25	Expressive Writing (EW) -2%	6	75		7
26-27	Crossing Speed (CS) -2%	132	1109		66
28-29	Story Mapping (SM) -2%	1	7	1741	4
30-31	Compositional Writing Index (CWI)	257	82	72-92	12

63

63



**Cole: 3<sup>rd</sup> grade...Attention/Writing issues**

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- **Graphic Organizers:** a pre-writing activity where Cole lists words and phrases pertaining to a topic that has been organized.
- **KLS Charts:** a pre-writing activity for fact finding assignments where Coles divides his paper into three columns to determine "*What I know*"; "*What I want to learn*"; and "*Possible sources*."
- **Keyboarding:** use on longer assignments to address working memory limitations by speeding up output.
- **EmPOWER:** an executive dysgraphia intervention developed by Dr. Bonnie Singer. Students talk themselves through 6 key steps of the writing process (Evaluate, Make a Plan, Organize, Work, Evaluate, Re-work).

PAR 64

64

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**faw™**

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- A **diagnostic achievement test** in written language based upon a neurodevelopmental model of brain functioning.
- Explains **WHY** a student is having writing difficulty, by examining **3 subtypes** of written language disorders.
- Can diagnose, screen, or use for progress monitoring.
- Ecologically valid because neurocognitive processes are built into the test.
- Directly informs intervention decision making using the **PAR I-Connect** interpretive report writer.
- Puts the "**I**" back in **IEP's!!!**

PAR 65

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[@schoolneuropsychpress](https://twitter.com/schoolneuropsychpress)

Tests: FAR- 2015 FAM- 2016 FAW - 2020

PAR 66

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