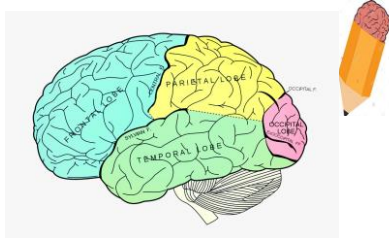**The Neuropsychology of Written Language Disorders:**
Developing Evidenced Based Interventions

feifer**assessment**of**writing**™

Steven G. Feifer, D.Ed., ABSNP
feifer@comcast.net

PAR

1

Course Outline

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➢ Six part 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.
➢ Introduce the concept of diagnostic achievement tests versus traditional achievement tests.
➢ Questions and Comments: **feifer@comcast.net**

PAR   2

2

Dr. Feifer's Journey 1993 – present

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➢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 coming soon)
➢Currently in private practice at Monocacy Neurodevelopmental Center in Maryland
www.schoolneuropsychpress.com

PAR   3

3

Presentation Goals

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1. Discuss the prevalence rate of learning disorders in both Canada and the United States.

2. Explore the neural architecture of language development in children and learn key frontal lobe brain processes responsible for the **organization** and **production** of written language.

3. Introduce a *brain-based* educational model of diagnosing written language disorders by classifying them into **three** distinct subtypes, with specific remediation strategies for each subtype.

4. Introduce the **FAW** as a comprehensive diagnostic achievement measure to better diagnose and remediate written language disorders in children.
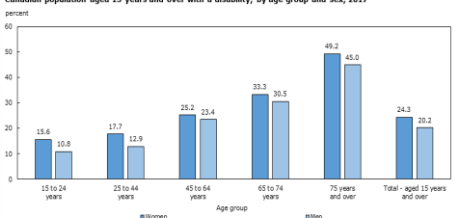
PAR

4

Canadian Survey on Disabilities (Stats Canada, 2017)

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Chart 1
Canadian population aged 15 years and over with a disability, by age group and sex, 2017

percent

Age group	Women	Men
15 to 24 years	15.6	10.8
25 to 44 years	17.7	12.9
45 to 54 years	25.2	23.4
65 to 74 years	33.3	30.5
75 years and over	49.2	45.0
Total - aged 15 years and over	24.3	20.2

Note: Differences between women and men are significantly different for all age groups (p<0.05).
Source: Statistics Canada, Canadian Survey on Disability, 2017.

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Canadian Survey on Disabilities (Stats Canada, 2017)

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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
Total population - aged 15 years and over	28,008,860	100.0	14,345,330	100.0	13,663,530	100.0
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	1,075,350	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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Slide 7

Canadian Survey on Disabilities (Stats Canada, 2017)

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- ➢ Among adults aged 15 to 64, currently not attending school, those with a learning disability were more likely than adults without any disability to have not completed high school (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 as well.

- ➢ 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.

PAR

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Slide 8

Canadian Survey on Disabilities (Stats Canada, 2017)

Chart 2
Prevalence of co-occurring disability types among adults with a learning disability, by age group, aged 15 years and older, Canada, 2012

percent
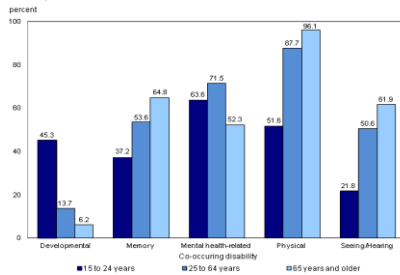
Note: Physical disability includes mobility, flexibility, dexterity, and pain-related disability types.
Source: Statistics Canada, Canadian Survey on Disability, 2012.

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8

Slide 9

Canadian Survey on Disabilities (Stats Canada, 2017)

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42% of youth with a disability have experienced bullying at school because of their condition. This increases to 62% among those with a more severe disability.

Top four school accommodations required:
- 43% Extended time to take tests and exams
- 28% Individualized Education Plan (IEP)
- 24% Computer/laptop/tablet with specialized software or adaptation
- 22% Modified or adapted course curriculum

Over half of youth with a more severe disability feel that their condition influenced their choices of courses or career.

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9

9

Five Quick Facts About Written Expression

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1. Most students rely on writing, either e-mail, text messages, word processing, or other computerized technology to communicate.
2. According to NAEP, 54% of 8th graders and 52% of 12th graders perform at a _**Basic**_ level in written expression.
3. Males score _**significantly**_ lower than females on standardized assessments of written language (NAEP, 2011).
4. 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).
5. Writing remains one of the most challenging skills to teach our students.

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Cole: 3rd 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 – 90	Very Low	7%
Full Scale Score	83	79 – 88	Low Average	13%

WIAT-III WRITING SUBTESTS	SCORE	PERCENTILE	RANGE
Spelling - the student writes words dictated by the examiner from a word list.	86	18%	Below Average
Sentence Composition – 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
Essay Composition - 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
WRITTEN EXPRESSION SCORE	85	16%	Below Average

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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

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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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

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THE WRITING BRAIN (Posner & Raichle, 1994)

Passively viewing words   Listening to words

Speaking words   Generating verbs

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Cognitive Constructs and Written Language

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Spatial Production

PARIETAL LOBE

- Poor spatial production
- Poor visualization
- Poor margination
- Organization problems
- Uneven spacing
- Poor use of lines
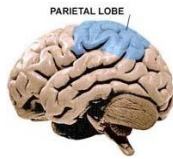
BRAIN REGION –Right Parietal Lobe

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16

Cognitive Constructs and Written Language

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Sequential Production

FRONTAL LOBE

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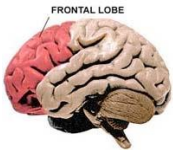
BRAIN REGION – Left Prefrontal Cortex

17

17

Cognitive Constructs and Written Language

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Working Memory Skills

FRONTAL LOBE

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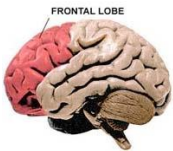
BRAIN REGION – Semantic memories stored in temporal lobes. Retrieved by frontal lobes

18

18

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!**
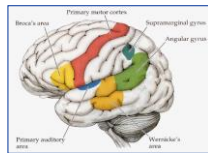
BRAIN REGION – Temporal Lobes

PAR

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Gender Differences in Phonological Processing

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PAR
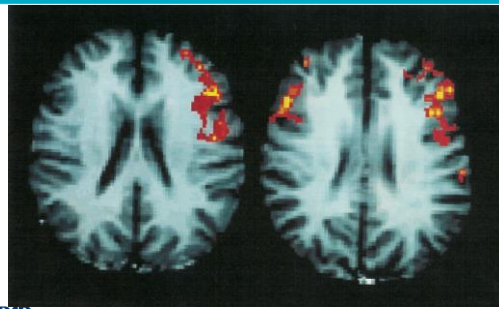
20

Gender Differences: What the research says….

Krafnick, A.J. & Evans, T. M. (2019). Neurobiological Sex Differences in Developmental Dyslexia. Frontiers in Psychology, Vol.9,1-14.

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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**
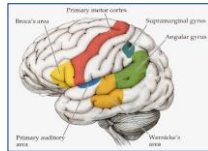
BRAIN REGION – Inferior Parietal Lobes

22

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.**
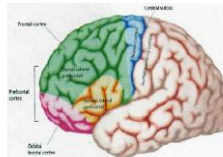
BRAIN REGION – Dorsolateral Prefrontal Cortex

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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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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.

   a) **Premotor cortex** – plans the execution of a motor response.
   b) **Supplementary motor area** – guides motor movement.
   c) **Cerebellum** - provides proprioceptive feedback.
   d) **Basal Ganglia** – procedural memory and automaticity of handwriting.
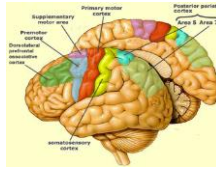
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The Role of the Cerebellum in Writing

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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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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 executive 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
Ideomotor 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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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?

PAR

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TYPES OF PENCIL GRIPS

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Graphomotor Dysgraphia: Example

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3 Subtypes of Written Language Disorders

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(2) Dyslexic Dysgraphias: (Spelling Miscues)

a) <u>Dysphonetic dysgraphia</u> – 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) <u>Surface dysgraphia</u> – a breakdown in the *orthographic* representation of words. Miscues made primarily on phonologically irregular words *(i.e. "laf" for "laugh"; "juse" for "juice"; "mite" for "mighty")*.

c) <u>Mixed Dysgraphia</u> – 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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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. S<u>au</u>ce, P<u>au</u>se, c<u>au</u>se, 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 wuz, was, whas).*

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3 Subtypes of Written Language Disorders

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(3) <u>Executive Dysgraphia</u> – 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 syntax!

- **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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Features of Executive Dysgraphia

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a) <u>Verbal Retrieval Skills</u> – the frontal lobes are critical in retrieving words stored throughout the cortex, often stored by semantic categories.

b) <u>Working Memory Skills</u> – helps to recall spelling rules and boundaries, grammar rules, punctuation, and maintaining information in mind long enough for motoric output.

c) <u>Organization & Planning</u> – syntactical arrangement of thought needed to sequence mental representations.

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Verbal Retrieval and Writing

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Posterior parietal association cortex

Dorsolateral prefrontal association cortex

Arcuate Fasciculus
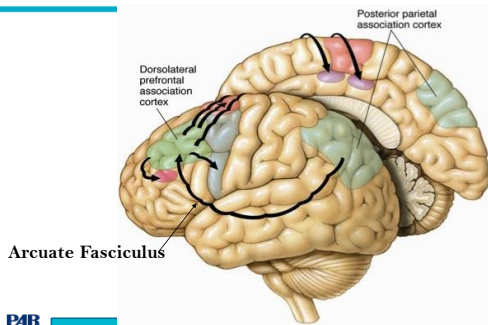
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Verbal Retrieval and Writing

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Transition Words

· first, second, third
· first, also, besides
· one, another, last
· one example, another example, a final example
· initially, then, after that
· a good, a better, the best

· to begin, then, consequently
· as soon as, next, later
· to start, furthermore, in conclusion
· first, another, next
· initially, another, then, finally

· Although
· However
· Instead of
· Additionally
· In contrast
· Similarly
· While
· A couple
· Before
· After

· Because
· Since
· Even though
· Until
· Moreover
· In order
· Unless
· Likewise

· meanwhile
· A number of
· As if
· As soon as
· In conclusion
· Finally
· Most importantly
· In fact

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Slide 37

Verbal Retrieval and Writing

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Writing Conclusions

☐ Restate, reword or summarize your topic sentence or your thesis statement.

☐ Use different words (synonyms) than the words you used in topic sentence and/or thesis.
· different action verbs · different adjectives

☐ Begin concluding sentences with one of these words or phrases in them.
· In Conclusion   · illustrates   · recommend
· To sum up   · suggests   · supports
· Obviously   · confirms   · clearly
· In closing   · summarize   · surely
· captures   · describes   · expresses

☐ Remind the reader of the main points in your writing.

☐ Convince the reader one more time of your position or opinion.

☐ Make general statements that widen the reader's perspective.

☐ Challenge the reader, give them something to think about, and encourage the reader to take action.

☐ Make a statement about how the writing may affect their life, give some advice or help them in some way.

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Slide 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 a role in visualizing word forms when spelling.

➤ **Episodic Buffer** – a temporary storage system integrating both phonological and visual-spatial information *(i.e. spatial position of letters on keyboard)*. 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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Slide 39

Working Memory and Writing & Spelling

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A) Phonological Loop (left)   B) Visual-Spatial Sketch Pad (right)

Broca's area (inner speech)   Phonological Stage (inner voice)   Visual-Spatial Sketch Pad   Central Executive   Central Executive
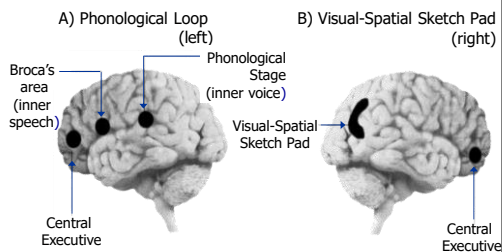
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Anxiety and Written Production: Timed Tests!
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STRESS RESPONSE SYSTEM
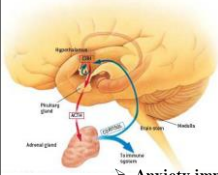
Cortisol – a glucocorticoid (glucose-cortex-steroid) that regulates the metabolism of glucose in the brain. A balance or homeostasis of cortisol is needed for optimal brain functioning. Too much *(Cushing's Syndrome)…*too little *(Addison's Disease)*.

➢ Anxiety impacts cognition and learning by way of <u>working memory</u> (Dowker et al., 2015).

➢ Anxiety impacts writing by hindering retrieval of information from long term memory (Wirth, 2015).

➢ <u>Time management</u> is the biggest cause of anxiety when writing!

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Academic Pitfalls of Working Memory Limitations
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▪ <u>Listening</u> – confusion following multiple step directions.

▪ <u>Speaking</u> – word finding issues, tip-of-the tongue phenomena, losing train of thought.

▪ <u>Behavior</u> – tendency for more immediate needs to undermine long-term goals.

▪ <u>Math</u> – tendency to forget sequence of steps when solving longer math equations.

▪ <u>Reading</u> – poor comprehension

▪ <u>Writing</u> – difficulty simultaneously recalling rules for <u>spelling,</u> punctuation, spacing, organization, and clarity.

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Executive Functioning and Written Language
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➢ Executive functions are the directive capacities of the mind housed in the frontal lobes of the brain.

➢ Key to strategic **planning, organization**, and strategy formation skills.

➢ Coordinates linguistic output through proper **sequential arrangement** of language (syntax)

➢ The concept of **executive functions** is not necessarily synonymous with the concept of **IQ.**

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Executive Functioning and Written Language

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Classification	Writing Dysfunction
(1) Initiating	* Poor idea generation
	* Poor independence
(2) Sustaining	* Lose track of thoughts
	* Difficulty finishing
	* Sentences disjointed
(3) Inhibiting	* Impulsive/Distractible
(4) Shifting	* Perseverations
	* "Stuck" on topic

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Executive Functioning and Written Language

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Classification	Writing Dysfunction
(5) Poor Organization	* Frequent erasers
	* Forget main idea
	* Disjointed content
(6) Poor Planning	* Poor flow of ideas
	* Lack of cohesive ties
(7) Poor Word Retrieval	*Limited word choice
	* Simplistic sentences
(8) Poor Self Monitor	* Careless miscues
	* Sloppy work

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Executive Functioning Interventions

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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 a web:

CITIES

BUSINESS

SPORTS

Maryland

POLITICS

CROPS
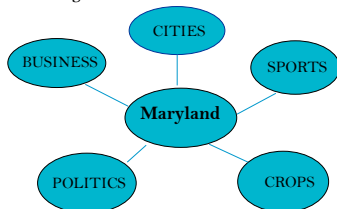
PAR 45

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Self Monitoring Strategies

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

1) **C**apitalize the first word of each
  sentence.

2) **O**rganize the information by reviewing topic sentences and
  double check paragraph breaks. separations.

3) **P**unctuation miscues must be reviewed.

4) **S**pelling miscues must be reviewed.

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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.

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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.

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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.

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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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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.

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Comprehensive Dysgraphia Evaluation

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1. **Intelligence Measures (Gc):** WISC5, SB5, CAS2, RIAS2, KABCII, WJIV, DASII...

2. **Visual-Motor Integration (G?):** VMI, WRAVMA, WIAT III, 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, WIATIII Sent Comp...

6. **Writing and Spelling Skills:** WJIV, KTEAIII, WIATIII, OWLS II, TOWL4, AAB...

7. **Phonological Awareness Skills: (Ga):** CTOPP2, FAR, KTEAIII, WJIV, TAPS4..

8. ***Retrieval Fluency Skills (Glr):** DKEFS, NEPSYII, FAR, WJIV, KTEAIII,CIFA...

9. **Social Emotional Measures (G?):** RCMAS2, MASC2, BASC3, PAI-A, CDI2...

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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.**

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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)

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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 Index (EI)	Executive Working Memory (EWM)	Grade 2 to college	10 - 12
	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
Compositional Writing Index (CWI) *(optional)*	Expository Writing (EW)	Grade 2 to college	6
	Copy Editing (CE) *(optional)*	Grade 2 to college	4
	Story Mapping (SM) *(optional)*	Grade 2 to college	6

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Alphabet Tracing Fluency
Part A: PK – 1st grade

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Alphabet Tracing Fluency
Part B: Grades 2+

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Motor Planning
Part A: PK – 1st grade
60 seconds

Student must fit each item in the boxes provided.

Stimulus Book

1. r u c
2. cat   puppy
3. I wear tennis shoes.
4. My soccer team played well and won the game.

Response Form
Motor Planning: Part A (continued)

Record Form
Part A: PK–Grade 1

	Item
1.	r u c
2.	cat puppy
3.	I wear tennis shoes.
4.	My soccer team played well and won the game.
	Time (seconds) /60

Category	Item 1 scores	Item 2 scores	Item 3 scores	Item 4 scores
Legibility	0 1 2	0 1 2	0 1 2	0 1 2
Placement	0 1 2	0 1 2	0 1 2	0 1 2
Spacing	0 1 2	0 1 2	0 1 2	0 1 2
Sizing	0 1 2	0 1 2	0 1 2	0 1 2
Completion	0 1	0 1	0 1	0 1
Item totals	/9 +	/9 +	/9 +	/9

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Motor Planning
Part B: Grades 2+
60 seconds

Stimulus Book

1. Oceans are much bigger than lakes.
2. The view from the mountain top was stunning.
3. Writing my history essay was a daunting undertaking.
4. The dessert was simply magnificent. White chocolate with strawberries is nothing short of pure ecstasy.

Response Form
Motor Planning: Part B (continued)

Record Form
Part B: Grade 2+

	Item
1.	Oceans are much bigger than lakes.
2.	The view from the mountain top was stunning.
3.	Writing my history essay was a daunting undertaking.
4.	The dessert was simply magnificent. White chocolate with strawberries is nothing short of pure ecstasy.
	Time (seconds) /60

Category	Item 1 scores	Item 2 scores	Item 3 scores	Item 4 scores
Legibility	0 1 2	0 1 2	0 1 2	0 1 2
Placement	0 1 2	0 1 2	0 1 2	0 1 2
Spacing	0 1 2	0 1 2	0 1 2	0 1 2
Sizing	0 1 2	0 1 2	0 1 2	0 1 2
Completion	0 1	0 1	0 1	0 1
Item totals	/9 +	/9 +	/9 +	/9

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Homophone Spelling
Student must point to correct spelling of target word.

Stimulus Book

Record Form

		Item			Score	
1.	wred	read	**red**	ret	0	1
2.	know	**no**	now	noh	0	1
3.	sen	**sun**	son	som	0	1
4.	**feet**	feat	fete	feete	0	1
5.	and	annt	aunt	**ant**	0	1
6.	**night**	knight	nite	knite	0	1

wred   read   red   ret

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Isolated Spelling

1st+ start points: Student must correctly write word that is dictated to them.

Response Form

Isolated Spelling (continued)

16. _____   34. _____
17. _____   35. _____
18. _____   36. _____
19. _____   37. _____
20. _____   38. _____
21. _____   39. _____
22. _____   40. _____
23. _____   41. _____
24. _____   42. _____
25. _____   43. _____

Record Form

	Item	Pronunciation	Score	
16.	hop	hŏp	0	1
17.	mug	mŭg	0	1
18.	pen	pen	0	1
19.	fix	fĭks	0	1
20.	grow	grō	0	1
21.	milk	milk	0	1
22.	job	jäb	0	1
23.	went	went	0	1
24.	cute	kyūt	0	1
25.	chomp	chämp	0	1

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Executive Working Memory

Response Form

Executive Working Memory (continued)

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____

Record Form

Item	Target words	Prompt	Prompt idea score	Target word score	Grammar/sentence structure score	Total score	Time
		60 seconds per item					
1.	pizza, television, carpet, salad	Write one sentence about foods people eat.	0 1 2	0 1 2	0 1	/5	
2.	puppy, car, pencil, cat	Write one sentence about types of pets people have.	0 1 2	0 1 2	0 1	/5	
3.	hose, nails, hammer, water	Write one sentence that explains how to wash a car.	0 1 2	0 1 2	0 1	/5	
4.	ball, mittens, table, coat	Write one sentence that tells what some people wear when it is cold outside.	0 1 2	0 1 2	0 1	/5	
5.	chair, tag, kickball, bus	Write one sentence about different recess activities.	0 1 2	0 1 2	0 1	/5	
6.	breakfast, books, movie, airplane	Write one sentence that tells how some people prepare for school each morning.	0 1 2	0 1 2	0 1	/5	
		Item totals	/12 +	/12 +	/6 =	/30	

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Sentence Scaffolding

Student must put in sequence a series of sentence cards presented to them in a random order.

1

My favorite swing is the blue one.

2

Tomorrow, I will try the red swing.

3

I like to play in the park.

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Retrieval Fluency – Convergent Retrieval

Student is asked to verbally list four objects in a specific category.

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Retrieval Fluency – Divergent Retrieval

Student is asked to name another word in the same category that 3 presented words belong to.

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Expository Writing

Student is given 5 minutes to write a paragraph about one of two prompts.

Record Form

Category	Score
Organization	/4
Word Choice and Grammar	+ /4
Sentence Fluency	+ /4
Elaboration	+ /4
Prompt Incorporation	+ /4
Spelling	+ /3
Expository Writing (EW) total	= /23
Time (seconds)	/300

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Copy Editing (optional)

Student must correct spelling, capitalization, punctuation,
and grammatical mistakes.

Response Form

Copy Editing (optional—continued)

Editing Key

Capitalization mistake:	i like pie.	➡	i like pie. or I like pie.
	I like Pie.	➡	I like Pie.
Spelling mistake:	answer	➡	answer or answer
Punctuation mistake:	What time is it	➡	What time is it?
Grammatical mistake:	I want to played.	➡	I want to played.

1. i like ice cream

2. most cats have soft fur

3. Do you have a red bicycle

Record Form

	Item	Score	Unnecessary corrections
1.	I like ice cream.	/3	
2.	Most cats have soft fur.	/2	
3.	Do you have a red bicycle?	/1	

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Story Mapping (optional)

Student is given 5 minutes to construct a story using provided story elements.

Stimulus Book

Characters: Ella, Timothy, Zoo Keeper
Setting: Zoo
Main Event: During a field trip to the zoo,
the students noticed the monkey cage
was left open.
Conclusion: The monkeys were safely
returned to their cage.

Record Form

Category		Score
Organization		/4
Word Choice and Grammar	+	/4
Sentence Fluency	+	/4
Elaboration	+	/4
Story Elements	+	/4
Spelling	+	/3
Story Mapping (SM) total	=	/23
Time (seconds)		/300

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4 Levels of Interpretation

1. Determine the FAW **Total Index Score**

2. Determine the FAW **Graphomotor, Dyslexic,** and
Executive Index Scores (**CWI** is optional). Compare each
Index score to each other.
   a) <u>Absolute</u> Weaknesses = Disorder
   b) <u>Relative</u> Weaknesses = Intervention

3. Key Subtest Interpretations

4. Relevant behavioral observations

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Slide 73

Cole: 3rd 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 – 90	Very Low	7%
Full Scale Score	83	79 – 88	Low Average	13%

WIAT-III WRITING SUBTESTS	SCORE	PERCENTILE	RANGE
Spelling - the student writes words dictated by the examiner from a word list.	86	18%	Below Average
Sentence Composition – 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
Essay Composition - 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
WRITTEN EXPRESSION SCORE	85	16%	Below Average

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Slide 74

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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Slide 75

Cole: 3rd grade…Attention/Writing issues

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Page range	Subtest	Raw score	Standard score	Index standard score	Confidence interval 90% 95%	Percentile
	Score Summary					
7	Alphabet Tracing Fluency (ATF)	21	105			63
8-9	Motor Sequencing (MS)	20	95			37
19	Copying Speed (CS)	17	95			37
20-21	Motor Planning (MP)	7	75			5
	Graphomotor Index (GI)	= 370		90	80-100	25
5-6	Homophone Spelling (HS)	31	86			18
22-24	Isolated Spelling (IS)	53	104			61
	Dyslexic Index (DI)	= 190		94	87-101	34
10-12	Executive Working Memory (EWM)	2	64			1
13-14	Sentence Scaffolding (SS)	9	86			18
15-18	Retrieval Fluency (RF)	28	102			55
25	Expository Writing (EW)	6	78			7
	Executive Index (EI)	= 330		76	67-85	5
	GI + DI + EI = FAW Total Index (TI)	= 890		83	76-90	13
	Supplemental Index					
25	Expository Writing (EW)	6	78			7
26-27	(Copy Editing (CE) optional	(32)	(108)			66
28-29	(Story Mapping (SM) optional	(17)	(74)			4
	Compositional Writing Index (CW)	= 257		82	72-92	12

PAR   75

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Cole: 3rd 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.
- **KWS 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).**

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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 77

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Tests: FAR- 2015   FAM- 2016   FAW - 2020

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