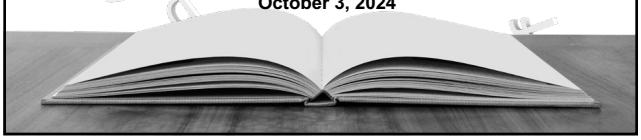
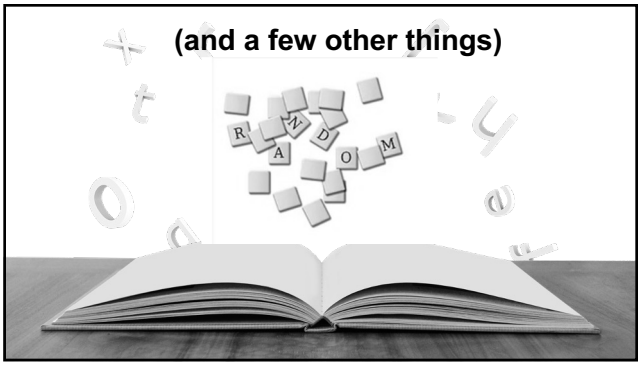
## Ten Things Everyone Should Know about Dyslexia

**Decoding Dyslexia Utah**

**Wasatch Reading Summit**
**Improving Literacy Using the Science of Reading**
**Nancy Mather, Ph.D.**
**October 3, 2024**

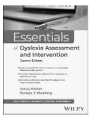


## (and a few other things)

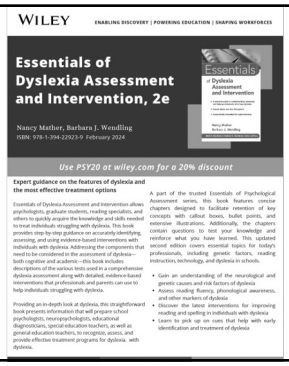


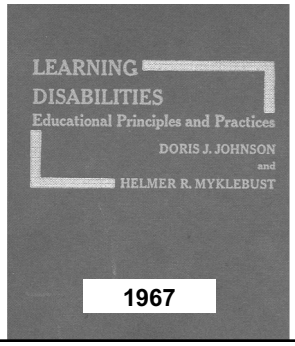

## Disclosures

I am a co-author of:




- Tests of Dyslexia (TOD™) (Mather, McCallum, Bell, & Wendling, 2024)
- WJ IV
- Test of Orthographic Competence-2 (Mather et al., 2023)
- *Essentials of Dyslexia: Assessment and Intervention (2nd ed.)* (Mather & Wendling, 2024)



## Visual Dyslexia

- Confuses letters and words with similar appearance
- Slow rate of perception
- Reversals in reading and writing
- Difficulty retaining visual sequences

**Source:** Johnson, D. J., & Myklebust, H. R. (1967). *Learning disabilities: Educational principles and practices.* Grune & Stratton.

Auditory Dyslexia

- Difficulty hearing the differences among speech sounds
- Difficulty discriminating short vowel sounds
- Difficulty with blending and segmentation

**Source:** Johnson, D. J., & Myklebust, H. R. (1967). *Learning disabilities: Educational principles and practices.* Grune & Stratton.

1. Dyslexia is real and we should say the word dyslexia.

"We do not understand why the term "dyslexia" is often viewed as if it were a four-letter word, not to be uttered in polite company" (p. 187).

**Source**: Siegel, L. S., & Mazabel, S. (2013). Basic cognitive processes and reading disabilities. In H. L. Swanson, K. R. Harris, & S. Graham (Eds.), *Handbook of learning disabilities* (2nd ed.) (pp. 186-213). Guilford Press.

Dyslexia and Alternate Terms

- Specific Reading Disability
- Specific Learning Disability in Basic Reading Skills
- Specific Reading Fluency/Rate Disability
- Developmental learning disorder with an impairment in reading (ICD-11)
- Specific learning disorder with an impairment in reading (DSM-5 TR)

**Specific Reading Disability = Dyslexia**

Labels

"…without a label we have no way of talking about a problem."

**Source**: Johns, B. H., & Kauffman, J. M. (2009). Caution: Response to intervention (RtI). *Learning Disabilities: A Multidisciplinary Journal, 15*, 157-160.

## The Term Dyslexia

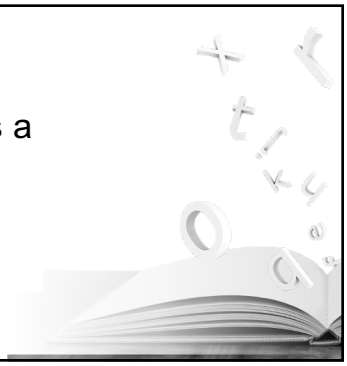
"In the first half of this century the story of dyslexia has been one of decline and fall; in the second half it has culminated in a spectacular rise. From being a rather dubious term, dyslexia has blossomed into a glamorous topic; and rightly so, for with a prevalence of around 5% the condition is remarkably common" (Frith, 1999, p. 192).

**Source**: Frith, U. (1999). Paradoxes in the definition of dyslexia. *Dyslexia, 5,* 192–214.

## Prevalence

Most researchers say the prevalence rate is between 5 and 8%.

## 2. Dyslexia has a genetic basis.



## Hereditary Factors

Strong converging evidence indicates that:

1. Dyslexia has a genetic basis but there is not one specific gene for reading.
2. Family history is a key risk indicator.
3. If one parent is affected, there is a 34 to 54% chance, their child will have dyslexia.

**Sources**:

Lasnick, O., Feng, J., Quirion, A., Hart, S., & Hoeft, F. (2022). The importance of family history in dyslexia. *Reading League Journal,* 3(2), 35-40.

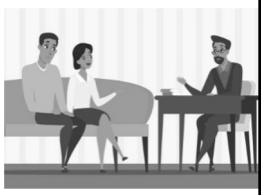
Snowling, M. J., & Melby-Lervåg, M. (2016). Oral language deficits in familial dyslexia: A meta-analysis and review. *Psychological Bulletin*, *142*, 498–545

## At-Risk Indicators

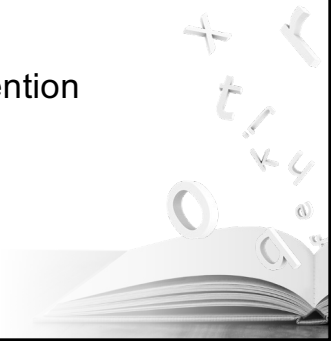
Two questions you always want to ask:

Did anyone in your family have difficulty learning to read?

Did your child have difficulty with speech or language development?



## 3. Early intervention is critical.



## The Dyslexia Paradox

Dyslexia is typically not identified until a child is in second grade and has not learned to read as expected. Early intervention is most effective when provided from Pre-K to Grade 1 prior to reading failure.

**A Paradox**

**Source:**
Ozernov-Palchik, O. & Gaab, N. (2016). Tackling the 'dyslexia paradox': Reading brain and behavior for early markers of developmental dyslexia. *WIREs Cognitive Science*, *7*, 156-176. https://doi.org:10.1002/wcs.1383

## The Importance of Early Intervention

"It is evident that it is a matter of the highest importance to recognise as early as possible the true nature of this defect, when it is met with in a child. It may prevent much waste of valuable time and may save the child from suffering and cruel treatment…The sooner the true nature of the defect is recognised, the better are the chances of the child's improvement" (p. 10).

**Source**: Hinshelwood, J. (1902). *Congenital word-blindness with reports of two cases.* John Bale, Sons & Danielsson, Ltd.

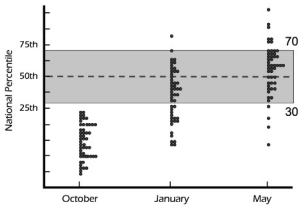
## 4. We have some children who are very hard to teach to read.

## Design of the Study

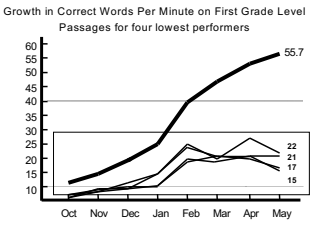
- Most "at-risk" first graders from five elementary school-PPVT scores above 70
- Instruction was provided in 45-min. sessions every day from October through May in groups of three or five by experienced teachers or well-trained paraprofessionals
- Used a structured (scripted) reading program that contained instruction and practice in phonemic awareness, phonics, fluency, and comprehension
- Used a number of methods to achieve fidelity of implementation:
- 3 days of initial training, weekly supervisory visits, and monthly in-services (3 hours)

**Source:** Torgesen, J. K. (2004, January). *Setting new goals for reading interventions: Evidence from research* [Keynote presentation]. Northern California Branch of the International Dyslexia Association, San Francisco.

## Growth in Word Reading Ability




**Source:** Torgesen, J. K. (2004, January). *Setting new goals for reading interventions: Evidence from research* [Keynote presentation]. Northern California Branch of the International Dyslexia Association, San Francisco.



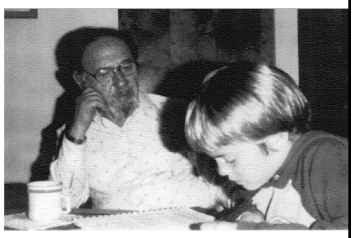
## A Consistent Finding

"The remedial work was unsuccessful in about 4 or 5 percent of the cases, in that this percentage of cases did not show improved scores on the retests" (p. 151).

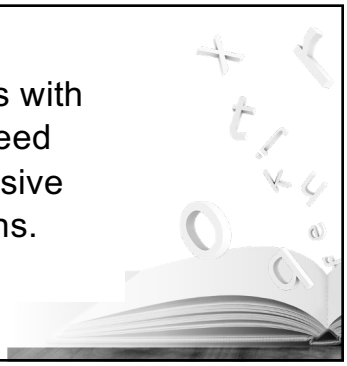
**Source:** Monroe, M., & Backus, B. (1937). *Remedial reading.* Houghton Mifflin.

## Charlie, 3rd Grade

- **Strengths:**
  - **Mathematics**
  - **Oral vocabulary**
  - **Academic knowledge**
- **Weaknesses:**
  - **Word identification**
  - **Word perception speed**
  - **Spelling**



## 5. Individuals with dyslexia need comprehensive evaluations.



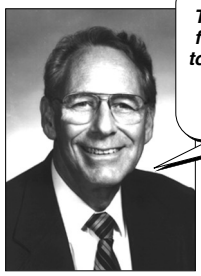
## What are common roadblocks for identifying students with dyslexia?

## WPS LDA 2024 Poll

- Time constraints
- Finding a tool that does it all
- Districts refusing to write dyslexia in the IEP
- Not allowed to diagnose/identify dyslexia in the school district
- Determining if a student is behind because of attention issues, dyslexia, or both
- Lack of appropriate instruction/exposure versus dyslexia
- Schools refusing to look at SLD before 3rd grade

**WPS CEC 2024 Poll: What is the biggest roadblock for identifying individuals with dyslexia where you work?**

- Not recognized
- No one can actually define dyslexia
- Does not apply to our students
- We do not diagnose dyslexia
- Parents don't want their children tested
- That we have to refer out
- Time
- It's a medical diagnosis
- No program to help
- Not realizing it falls under SLD
- No personnel with training and knowledge
- No formal assessment
- **None**



*The primary purpose for testing should be to find out more about the problem, not to just get a score.*

**Dr. R. W. Woodcock**

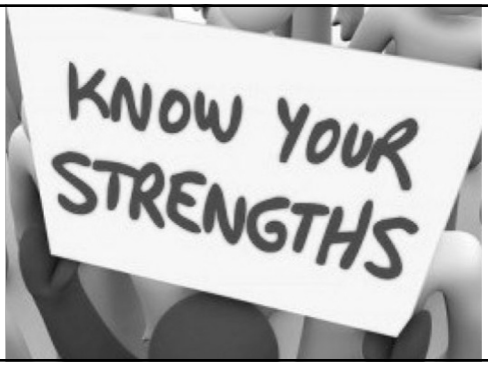
"To be effective, remedial instruction in reading must be preceded by careful diagnosis."

**Source:** Stanger, M. A., & Donohue, E. K. (1937). *Prediction and prevention of reading difficulties.* Oxford University Press.

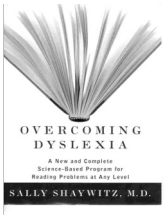
## Comprehensive Evaluations

Ensure that students with dyslexia get a comprehensive evaluation that:

- Explains the reason(s) why a student is struggling with reading
- Determines where the student is developmentally and what type of instruction is needed (phonemic awareness, phonics, structural analysis, reading fluency, spelling, vocabulary, reading comprehension)
- Describes what accommodations are needed
- Identifies the strengths




The importance of an "island of competence" (Brooks, 2001)…




"The diagnosis of dyslexia is as precise and scientifically informed as almost any diagnosis in medicine" (p. 165).

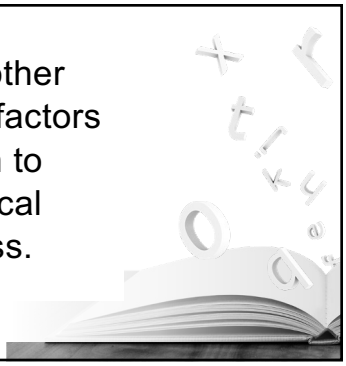
Source: Shaywitz, S. (2003). *Overcoming dyslexia: A new and complete science-based program for reading problems at any level.* Alfred Knopf.

## Diagnosis of Word Blindness

"With the possession of a knowledge of the symptoms, there is little difficulty in the diagnosis of congenital word-blindness when the cases are met with, since the general picture of the condition stands out as clear-cut and distinct as that of any pathological condition in the whole range of medicine" (p. 88).

Source: Hinshelwood, J. (1917). *Congenital word-blindness.* H. K. Lewis.

## 6. Assess other linguistic risk factors in addition to phonological awareness.



Many students with dyslexia have poor phonological awareness and difficulty connecting sounds to print, which results in slow word perception, a delay in developing instant word reading, and poor spelling.

In summarizing results about the factors that impede reading, Monroe (1932) concluded:

"No one factor was present in all cases. It is probable that the reading defect is caused by a constellation of factors rather than by one isolated factor" (p. 110).

**Source**: Monroe M. (1932). *Children who cannot read.* University of Chicago Press.

## Multiple Deficit View

Adherence to a single deficit profile has limited utility; using only poor phonological awareness as a criterion for dyslexia would result in missing about one half of the cases.

**Source:** Pennington, B. F., Santerre-Lemmon, L., Rosenberg, J., MacDonald, B., Boada, R., Friend, A., Leopold, D. R., Samuelsson, S., Byrne, B., Willcutt, E. G., & Olson, R. K. (2012). Individual prediction of dyslexia by single versus multiple deficit models. *Journal of Abnormal Psychology, 121*(1), 212–224. https://doi.org/10.1037/a0025823

## Multiple Deficit View

Approximately 50% of children with dyslexia *do not* have a phonological awareness deficit (Pennington et al., 2012).

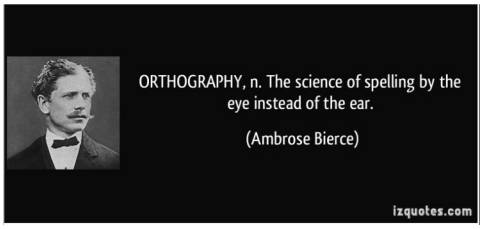
**Source:** Pennington, B. F., Santerre-Lemmon, L., Rosenberg, J., MacDonald, B., Boada, R., Friend, A., Leopold, D. R., Samuelsson, S., Byrne, B., Willcutt, E. G., & Olson, R. K. (2012). Individual prediction of dyslexia by single versus multiple deficit models. *Journal of Abnormal Psychology, 121*(1), 212–224. https://doi.org/10.1037/a0025823

**Other Linguistic Risk Factors**

- **Orthographic processing** (the writing system of a language, including the recall of spelling patterns and words)
- **Rapid automatized naming** (RAN) (quick naming of colors, objects, letters, and/or digits)
- **Working memory** (recalling and rearranging stimuli)

Orthographic processing is also a linguistic risk factor. Findings from a recent meta-analysis indicated that individuals with dyslexia have a deficit in orthographic knowledge that is as large as that of phonological awareness and rapid automatized naming (RAN).

**Source:** Georgiou, G. K., Martinez, D., Vieira, A. P. A., & Guo, K. (2021). Is orthographic knowledge a strength or a weakness in individuals with dyslexia? Evidence from a meta-analysis. *Annals of Dyslexia, 71*, 5–27. https://doi.org/10.1007/s11881-021-00220-6




How do you know the correct spelling?

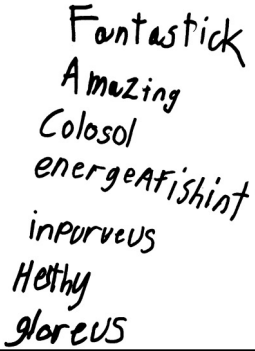
- rain
- rane
- sope
- soap

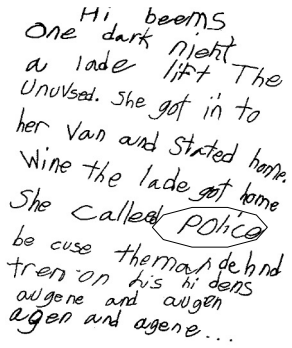
Phonological processing can occur but it is insufficient for identifying the correct spelling of the word.

The Major Question

**Gary, Grade 5**

**How can this be a phonological processing problem when a student spells words exactly the way they sound?**




Hi, beems
One dark night
a lade lift The
Unuvsed. She got in to
her Van and Stated home.
Wine the lade got home
She Called POlica
be cuse themast de hnd
tren on his hi dens
augene and augen
agen and agene...

Rapid Automatized Naming (RAN)

Measures response time or rapid retrieval for a visual stimulus (objects, colors, letters, or numbers or a combination)

6 8 9 6 4 9 3 6 9 4

8 1 3 9 6 8 4 3 1 9

What Do Rapid Automatized Naming Tests Measure?

1. Ability to sustain attention to identify and name the symbols
2. Ability to discriminate among the symbols rapidly
3. Ability to retrieve verbal labels rapidly
4. Ability to articulate words rapidly

RAN Research Findings

a) RAN letters and then numbers are the strongest predictors of both reading and spelling.

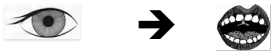
b) RAN is distinct from phonological awareness and most strongly related to speeded measures of reading.

c) The contribution of RAN is larger for younger readers and readers with more severe reading disabilities.

d) Pause time is significantly correlated with reading accuracy and fluency, whereas articulation time is not.

Dr. Martha Denckla

The Visual-Verbal Highway



Slow word perception

See it….Say it

During an evaluation for dyslexia, Ella, age 9 said:

"I have to read out loud because if I don't, I don't understand anything I'm reading. But then when I try to read out loud, I look at the word - I know the word and I know how to say it, except I can't get it to come out of my mouth."

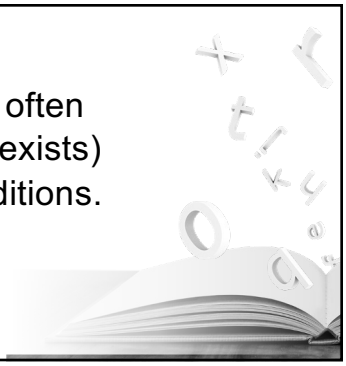
**Working Memory**

Ability to hold information in memory and rearrange it

Related to attention and executive functioning

Affects many aspects of academic performance

7. Dyslexia is often co-morbid (co-exists) with other conditions.



## Comorbidity

High comorbidity (two or more disorders in the same person) exists between dyslexia and other learning disorders. 40% of children with dyslexia will have another learning disorder as well.

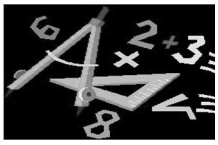
**Source:** Moll, K., Snowling, M. J., & Hulme, C. (2020). Introduction to the special issue "Comorbidities between reading disorders and other developmental disorders." *Scientific Studies of Reading*, *24*(1), 1–6. https://doi.org/10.1080/10888438.2019.1702045

## Three Most Common Comorbid Disorders

- Mathematics (Dyscalculia)
- ADHD
- Developmental Language Disorder

## Mathematics

- Working memory
- Storing and retrieving facts
- Processing speed
- Rapid number naming
- ADHD



"…specific language impairment and reading disability are best considered as distinct disorders that are often comorbid" (Ramus et al., 2013) (p. 25).

**Source**: Elliott, J. G., & Grigorenko, E. L. (2014). *The dyslexia debate*. Cambridge University Press.

## Reading Comprehension

"Individuals with problems in reading comprehension that are not attributable to poor word recognition have comprehension problems that are general to language comprehension rather than specific to reading." (p. 3)

**Source:** Spencer, M., Quinn, J. M., Wagner, R. K. (2014). Specific reading comprehension disability: Major problem, myth, or misnomer? *Learning Disabilities Research & Practice, 29*, 3-9.

## But...

Students with dyslexia do have reading comprehension problems because of poor decoding and/or slow reading

And...

There is high comorbidity between dyslexia and developmental language disorders so that there are some students who struggle with both.

## Two Questions to Ask

- Is listening comprehension higher than word reading?
- Did the student receive early speech and language services?

It is much more difficult to assess reading comprehension than word reading skills.

## Reading Comprehension Test Differences

Keenan and Meenan (2014) compared the performances of approximately 1,000 children on four standardized tests:

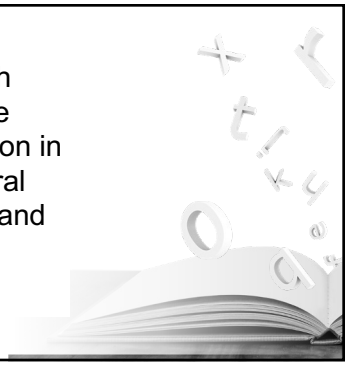
- Gray Oral Reading Test-3 (Wiederholt & Bryant, 1992)
- Peabody Individual Achievement Test (Dunn & Markwardt, 1970)
- Qualitative Reading Inventory-3 (Leslie & Caldwell, 2001)
- Woodcock-Johnson III Tests of Achievement: Passage Comprehension (Woodcock, McGrew, & Mather, 2001).

**Source**: Keenan, J., & Meenan, C. (2014). Test differences in diagnosing reading comprehension deficits. *Journal of Learning Disabilities, 47,* 125-135.

## Results

- The median correlation between the different tests was only .54.
- The average consistency between two tests in diagnosing a comprehension problem was only 43%.
- Some tests are more influenced by word recognition ability, others involve working memory and background knowledge.

8. Students with dyslexia require systematic instruction in phonics, structural analysis, fluency, and spelling.



## Importance of Phonics

"… that the logical training for these children would be that of extremely thorough repetitive drill on the fundamentals of phonic associations with letter forms, both visually presented and produced in writing, until the correct associations were built up…" (Orton, 1925, p. 614).

## Other Things

A good word for practicing reading multisyllabic words:

hippopotomonstrosesquippedaliophobia

Meaning:

hippopotomonstrosesquippedaliophobia

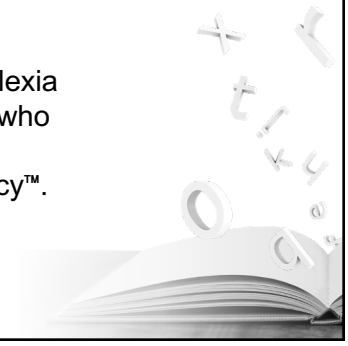
refers to the phobia or fear of long words. Feelings of shame or fear of ridicule for mispronouncing long words when speaking or reading may cause distress or anxiety.

Other symptoms can include:

- trembling
- sweating
- dizziness
- fainting
- dry mouth
- headache
- trouble breathing
- avoiding reading because of your fear
- feeling distressed over academics or work involving long words

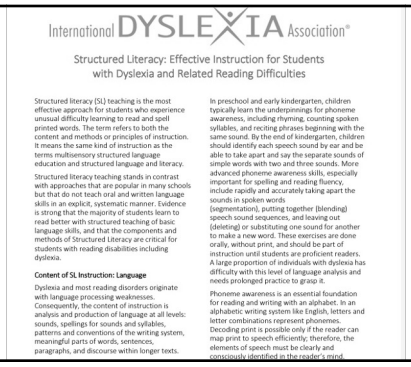
Source:
https://www.healthline.com/health/hippopotomonstrosesquippedaliophobia

Students with dyslexia require teachers who are trained in Structured Literacy™.



IDA Fact Sheet on Structured Literacy (2020)

Systematic and explicit instruction in basic reading and spelling skills- critical for students with dyslexia.



International DYSLEXIA Association®

Structured Literacy: Effective Instruction for Students with Dyslexia and Related Reading Difficulties

Structured literacy (SL) teaching is the most effective approach for students who experience unusual difficulty learning to read and spell printed words. The term refers to both the content and methods or principles of instruction. It means the same kind of instruction as the terms multisensory structured language education and structured language and literacy.

Structured literacy teaching stands in contrast with approaches that are popular in many schools but that do not teach oral and written language skills in an explicit, systematic manner. Evidence is strong that the majority of students learn to read better with structured teaching of basic language skills, and that the components and methods of Structured Literacy are critical for students with reading disabilities including dyslexia.

**Content of SL Instruction: Language**

Dyslexia and most reading disorders originate with language processing weaknesses. Consequently, the content of instruction is analysis and production of language at all levels: sounds, spellings for sounds and syllables, patterns and conventions of the writing system, meaningful parts of words, sentences, paragraphs, and discourse within longer texts.

In preschool and early kindergarten, children typically learn the underpinnings for phoneme awareness, including rhyming, counting spoken syllables, and reciting phrases beginning with the same sound. By the end of kindergarten, children should identify each speech sound by ear and be able to take apart and say the separate sounds of simple words with two and three sounds. More advanced phoneme awareness skills, especially important for spelling and reading fluency, include rapidly and accurately taking apart the sounds in spoken words (segmentation), putting together (blending) speech sound sequences, and leaving out (deleting) or substituting one sound for another to make a new word. These exercises are done orally, without print, and should be part of instruction until students are proficient readers. A large proportion of individuals with dyslexia has difficulty with this level of language analysis and needs prolonged practice to grasp it.

Phoneme awareness is an essential foundation for reading and writing with an alphabet. In an alphabetic writing system like English, letters and letter combinations represent phonemes. Decoding print is possible only if the reader can map print to speech efficiently; therefore, the elements of speech must be clearly and consciously identified in the reader's mind.

"To be successful, the most struggling child requires the most expert teacher."
Lose, 2007

Rather than a knowledge gap, we have an action gap…
(Shaywitz & Shaywitz, 2014)

"…lower level language mastery is as essential for the literacy teacher as anatomy is for the physician" (p. 99).

**Source**: Moats, L. C. (1994). The missing foundation in teacher education: Knowledge of the structure of spoken and written language. *Annals of Dyslexia, 44*, 81–102.

Teaching reading really is rocket science
(Moats, 1999).

**Source**: Moats, L.C. (1999). *Teaching reading is rocket science*. American Federation of Teachers.

"If teachers are better prepared, the impact of reading difficulties, including dyslexia, will be lessened, and many more students will receive the instruction and support they require to reach their potential."

**Source**: Press Release: International Dyslexia Association Recognizes Nine Universities for Meeting Teacher Training Standards in Reading. *Teachers who are Better Prepared Lessen the Impact of Reading Difficulties.* BALTIMORE, May 2, 2012

**MINDPLAY Online Comprehensive Reading Course for Educators (40-45 hours)**

Increases understanding of how to provide explicit instruction in:

- Phonological awareness
- Phonics
- Grammar
- Fluency
- Vocabulary
- Reading Comprehension

https://academy.mindplay.com/coursedemo

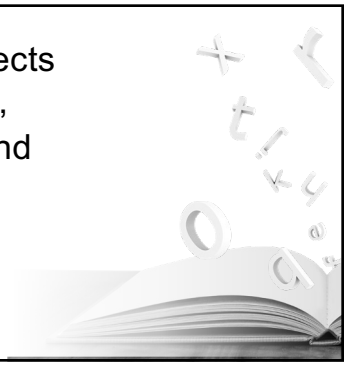
The main question participants ask is:

Why didn't anyone ever teach me this?

"In the final analysis, reading difficulties can be prevented to the degree that the teacher has a professional understanding of her work" (p. 245).

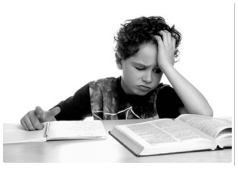
**Source**: Betts, E. A. (1936). *The prevention and correction of reading difficulties.* Row, Peterson and Company.

9. Dyslexia affects self-esteem, motivation, and behavior.



Behavior and Motivation

Reading and writing are so hard and frustrating that sometimes these kids act out or just give up.



In discussing his own realization that he had dyslexia, Schultz (2011), a Pulitzer prize winning poet, reflected: "My ignorance of my dyslexia only intensified my sense of isolation and hopelessness. Ignorance is perhaps the most painful aspect of a learning disability" (p. 64).

**Source:** Schultz, P. (2011). *My dyslexia.* W. W. Norton & Company.

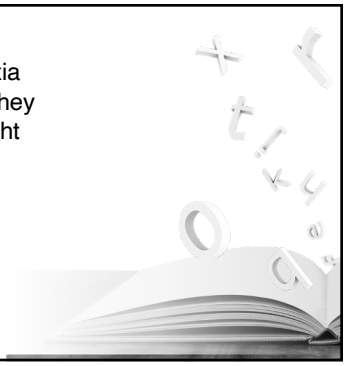
"Every child would read if it were in his power to do so" (Betts, 1936, p.5).

**Source**: Betts, E. A. (1936). *The prevention and correction of reading difficulties.* Row, Peterson and Company.

"Failure in reading is likely to lead to a general sense of inferiority that will cripple the individual's whole life. One of the greatest compensations in remedial reading work is to see the transformation in a child when you have shown him, in spite of his conviction, that he can read" (p. 3).

**Source:** Dolch, E. W. (1939). *A manual for remedial reading.* Garrard Press.

10. Students with dyslexia can be successful when they are provided with the right supports.

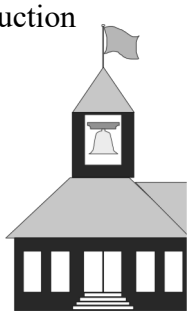


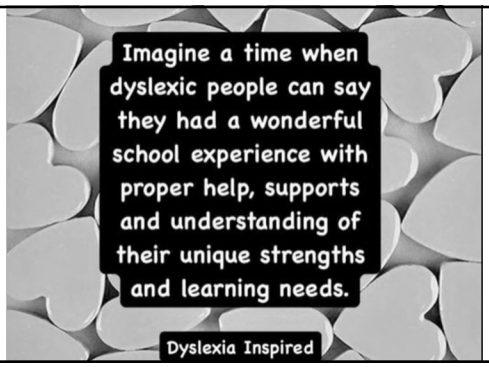
Students with Dyslexia Need Understanding Teachers

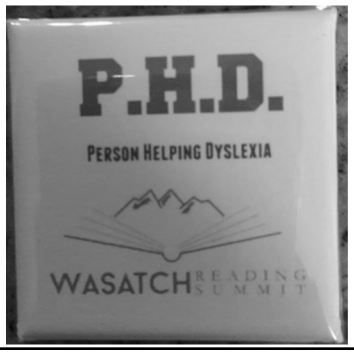
- Sympathetic
- Interested
- Developmental
- Supportive
- Inspiring

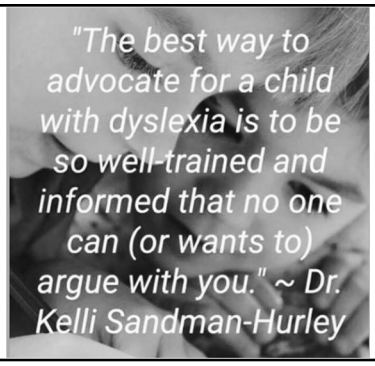
Successful Instruction

1. Provide instruction slightly above the present performance level.
2. Adapt and modify instruction, as needed.
3. Be eclectic in methodologies.
4. Provide systematic, intensive reading and spelling instruction in the most effective setting for the student.








A Guardian Angel

Dr. Martha Denckla, Learning Disabilities/ Learning Abilities Tapes

Quote by Robert G. Ingersoll

"We rise by lifting others."

Thank you for all that you do!