Advocacy and Support for English Learners (ELs) with Dyslexia

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Advocacy and Support for English Learners (ELs) with Dyslexia

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Why Should CABE Care?

**In bilinguals/ELs:**

- Dyslexia is **highly prevalent** at similar rates as in the general population.
- Dyslexia leads to **more adverse outcomes** because of under & delayed (or over) identification, lack of English proficiency, cultural differences, and lack of resources.
- Dyslexia can be identified early.
- **Effective early literacy intervention is available.** These are effective even in those without dyslexia or those that are not bilingual.


https://www.cde.ca.gov/sp/se/ac/documents/cadyslexiaguidelines.pdf
Stop the Downward Spiral

RISKS

BRAIN NETWORKS

RISK GENES

DYSLEXIA

POOR OUTCOME

Education

Psycho-Social

Health

Income

ENVIRONMENT

POOR OUTCOME

ENGLISH LANGUAGE LEARNERS
Stop the Downward Spiral

1) There is no enjoyment in reading
2) Doesn't get enough practice
3) Doesn't develop automaticity
4) Reading becomes unpleasant
5) Poor vocabulary growth
6) Poor attitude toward school
7) Affects motivation to read

Downward spiral

Brain networks
Risk genes

Education
Psycho-Social
Health
Income

Environment
English Language Learners
Stop the Downward Spiral

Evidence-based, Early & Accurate Identification & Intervention, Promote Resilience.
OUTLINE

DYSLEXIA
- Characteristics
- Identification
- Intervention
- Across languages

ELs (MULTILINGUALS) WITH DYSLEXIA
- Identification
- Intervention

CONCLUSION
- Resources
- Tools & Programs
- Our initiatives
OUTLINE

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DYSLEXIA CHARACTERISTICS
Typical Dyslexia Myths

He is slow to learn to read because he is learning 2 languages
We can’t identify dyslexia because he is bilingual
He has dyslexia so he shouldn’t learn another language
We can’t identify dyslexia because he is still in kindergarten
He will grow out of it- 48% believes in this
If he tried hard enough, he can over come it (laziness)- 78 (51)%
He is less intelligent than others- 18 (parents) to 33 (educators)% (80%)
He is cheating (when receiving accommodations)
It is related to poor parenting & teaching- 33-55%

OTHERS:
Autism (75%), Too much screen time (22%), Poor diet (31%), Vaccination (24%)

What is Dyslexia?

Characteristics

- A specific learning disability or reading (a.k.a. decoding-based reading disorder, specific reading disabilities)
- **Neurobiological** in origin.
- Difficulties with accurate and/or fluent word recognition, spelling and decoding abilities (*sounding out written words; matching the letters to sounds*).
  - Not just decoding
  - Irregular words (e.g. yacht)
  - Mistakes written words with similar meaning (e.g. city read as town)
  - Fluency
  - Spelling

International Dyslexia Association (IDA) 2002; https://dyslexiaida.org/definition-of-dyslexia; DSM-5; NIH (NICHD); CA AB1369 State Guideline
What is Dyslexia?

- Often result from unexpected deficits in **phonological processing** (understanding, manipulation, or memory of word sounds) in relation to other cognitive abilities and effective classroom instruction.

- **Secondary consequences** may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge.

- **Characteristics vary widely** from student to student. See CA Guideline Ch4 for characteristics by age-group.

- **High occurrence**: 5-10% of all children. Up to 20% with some characteristics. Up to 85% of all learning disabilities may have dyslexia. 60% of SPED are learning disabled or speech/language impaired.

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International Dyslexia Association (IDA) 2002; https://dyslexiaida.org/definition-of-dyslexia; DSM-5; NIH (NICHD); CA AB1369 State Guideline
What is Dyslexia? High Heritability

Dyslexia is neurobiological and often passed on by genes. Exact mechanisms are still unclear.

Approximately 1/3 to 2/3 chance of developing dyslexia if you have a close family history (identical twin: 68%; 1st degree relative 40-60%)

Risk is 4-8x higher with a family history than the general population.

Ozernov-Palchik & Gaab. Wiley Interdiscip Rev Cogn Sci 2016; http://www.well.ox.ac.uk/dyslexia-2; DSM-5; CA AB1369 State Guideline
What is Not Dyslexia?

- Sensory impairment (e.g. blindness, deafness)
- Intellectual disability (IQ: lowest 2.26%, <70 standard score)
- Other disabilities
  - Lack of opportunities (e.g. little books at home, poor schooling)
  - English as 2\textsuperscript{nd} language (L2)

\textit{But does not preclude them from having dyslexia.}

\textit{This exclusion criteria is problematic for ELLs!}

International Dyslexia Association (IDA) 2002; https://dyslexiaida.org/definition-of-dyslexia; DSM-5; NIH (NICHD); CA AB1369 State Guideline
<table>
<thead>
<tr>
<th>Disorder</th>
<th>Difficulties</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific language impairment (SLI)</td>
<td>grammar, understanding (ages 3-5)</td>
<td>7-8% of all K, 1/2 to 1/3 have dyslexia</td>
</tr>
<tr>
<td>Auditory processing disorders (APD)</td>
<td>memory &amp; sequencing of info, speech in noise, auditory attention &amp; discrimination</td>
<td>1/2 to 1/3 have dyslexia</td>
</tr>
<tr>
<td>Writing disorders / Dysgraphia</td>
<td>spelling, hand-writing, written composition</td>
<td>1/2 to 1/3 of dyslexia</td>
</tr>
<tr>
<td>Math disorders / Dyscalculia</td>
<td>calculation, math reasoning</td>
<td>1/2 to 1/3 of dyslexia</td>
</tr>
<tr>
<td>Attention Deficit Hyperactivity Disorder (ADHD)</td>
<td>attention</td>
<td>1/2 to 1/3 of dyslexia</td>
</tr>
<tr>
<td>Mental Health</td>
<td>emotion/behavior, e.g. anxiety, depression</td>
<td>2-5 times higher in dyslexia</td>
</tr>
</tbody>
</table>

Brain Basis of Dyslexia

NOTE:
- Each dyslexic brain is very different.
- Patterns change with intervention.

Compensation

Left temporo-parietal

Left occipito-temporal

Bilateral inferior frontal - striatal

DYSLEXIA IDENTIFICATION
How do you Assess Dyslexia?

Typically diagnosed in 2nd-4th grade.

**CORE MEASURES**
- Reading real and fake (pseudo) words
- Spelling
- Reading fluency
- Phonological processing (awareness, memory)
- Rapid naming
- Orthographic processing

**OTHERS (Primarily to rule out other issues)**
- Vision, Hearing, Reading comprehension, Receptive vocabulary / Listening comprehension,
- Writing, Syntax, Morphological awareness

Lower than peers. Lowest 7-16% (<78-85 standard score, 1.5-2.0 standard deviation)

Does not respond to intervention (Response to intervention, RTI). >6m

If >17yo, documented history ok for DSM diagnosis.

https://dyslexiaida.org/dyslexia-assessment-what-is-it-and-how-can-it-help/; IDA; DSM-5; NIH (NICHD); CA AB1369 State Guideline
"Dyslexia Paradox"
Early (K) Intervention Important but Currently Identified Too Late (Gr2-4)

- Early intervention 4x effective
- Return of investment $16 to 31 per $1 spent
- Solution for dyslexia Works for all

- Waiting 1 year 25-50% diminished
- Risk prediction 60-80% accurate

How do We Identify Dyslexia Early?

FAMILY HISTORY (e.g. parents) (3-15 min per parent; Assess 0 & up)
- A number of questionnaires exist (see Tools & Programs)
- 4-8 question screener. Validation in progress. (see Tools & Programs)

PRELITERACY MEASURES (20 min per student; Assess in PreS-Gr1)
- Phonological awareness
- Letter (sound) knowledge
- Rapid naming
- [Receptive vocabulary to rule out oral language problems]

See CA Guideline Ch4 for characteristics by age-group

See CA Guideline Ch4 for characteristics by age-group; Ozernov-Palchik & Gaab. Wiley Interdiscip Rev Cogn Sci 2016;
DYSLEXIA INTERVENTION
Structured Literacy Instruction is effective. General ed often implicit & insufficient.

**PRINCIPLES**
- Systematic & cumulative
- Explicit
- Diagnostic Teaching

**ELEMENTS**
- Phonology (sound structure of spoken words)
- Sound-Symbol Association (phonics)
- Syllable Instruction
- Morphology (morpheme: smallest unit of meaning in the language)
- Syntax (sequence and function of words in a sentence)
- Semantics (meaning)

**EXAMPLES**
- Orton-Gillingham Approach, Alphabetic Phonics, Association Method, Language!

Early Intervention for At-Risk Children

1. School Instruction: Implicit PA/phonics-focused (Harcourt Brace; Farr & Strickland, 1995), (Stein, Johnson, & Gutlohn, 1999).

2. Explicit & systematic supplemental class-wide reading intervention

   **Peer-Assisted Learning Strategies (PALS) K-6**
   [http://wwwpeerassistedlearningstrategies.net](http://wwwpeerassistedlearningstrategies.net)

   Developed by Fuchs & Fuchs, Professors of SPED at Vanderbilt University. 1-day training.
   Proven effectiveness as literacy instruction in early childhood, for those with disabilities, and in EIs & low income.
   Proven instructional principles + practices + peer mediation.
   Effective, feasible, and enjoyable. Teachers assigns “coaches” and “players” that changes.
   Phonological awareness, Phonics, Sight word, Connected text
   30min 3d/wk 20wks. Total: 30Hr

See US Dept of Ed (DoE)’s Institute for Education Sciences (IES) What Works Clearinghouse (WWC) for research evidence of other programs.

Early Intervention for At-Risk Children

Quality K add-on intervention:
4x reduction in # of later poor readers (57 vs. 16%)

1 year delay:
50% reduction in effectiveness (57 vs. 27%)

Response to Intervention (%)

Al Otaiba et al. J Learn Disabilities 2006
DYSEXIA ACROSS LANGUAGES
Globally, Writing Systems Vary Widely

**OPAQUE WRITING SYSTEMS**
*(DEEP ORTHOGRAPHY)*
E.g. English, French, Hebrew, Chinese / Japanese Kanji (logographic)

**TRANSPARENT WRITING SYSTEMS**
*(SHALLOW ORTHOGRAPHY)*
E.g. Spanish, Finnish, Italian, Japanese Kana
Speed of Learning is Different Across Languages

OPAQUE WRITING SYSTEMS (DEEP ORTHOGRAPHY) e.g. English, Chinese
Grapheme – phoneme relationship is less direct and complex (e.g. dough), so phonology is derived from the internal lexicon. -> Learning to read words is more difficult.
Easier to identify dyslexia (with for example phonological awareness, untimed word reading measures).

TRANSPARENT WRITING SYSTEMS (SHALLOW) e.g. Spanish
Spelling-sound correspondence is more direct (e.g. pasta), so phonology is generated directly from print. -> Learning to read words is easier.
Harder to identify dyslexia (need to measure fluency, spelling, rapid naming)

Learning speed depends on:
(2) The level of detail with which phonology is represented in the orthography (known as grain size of lexical representation) “Grain Size Theory” (Ziegler & Goswami, 2005; Kyle, Kujala, Richardson, Lyytinen, & Goswami, 2013).

IDA https://dyslexiaida.org/the-myths-and-truths-of-dyslexia/
Yet Different Writing Systems Show Universal Mechanisms


Recent brain science parallels this view of “invariance in the reading network”. (Bolger et al. Human Brain Mapp 2005; Nakamura et al. PNAS 2012; Rueckl et al. PNAS 2015)

Same for dyslexia. (Xia et al. Neuropsychologia 2014)

Chinese Dyslexia

ENGLISH vs. FRENCH vs. ITALIAN = similar (Paulesu et al. Science 2001)

Functional MRI of Reading (Print-Speech Binding) Common Across the 4 Languages

Rueckl et al. PNAS 2015
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Dyslexia is Complicated in Multi-Linguals

- Some will have neurobiological risk for dyslexia and other learning issues.
- Difficulty in learning and cultural differences impact motivation.
- Amount of exposure varies by child.
- Often English is learned later.
- Combination of languages might impact their learning.

Learning and cultural differences impact motivation.
How Should We Identify Dyslexia in ELs?

<table>
<thead>
<tr>
<th>Skills in English</th>
<th>ELs compared to English Monolinguals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid Naming</td>
<td>SAME</td>
</tr>
<tr>
<td>Phonological Awareness</td>
<td>SAME</td>
</tr>
<tr>
<td>Vocabulary</td>
<td>Weaker</td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td>Weaker</td>
</tr>
</tbody>
</table>

**FAMILY HISTORY** (e.g. parents) (3-15min per parent)

**PRELITERACY MEASURES** (20 min per student in IDEALLY IN ALL LANGUAGES spoken by the student)

- Phonological awareness
- Rapid naming
- Letter (sound) knowledge (dominant language)
- (Receptive vocabulary) (dominant language)

Farnia & Geva, 2013; Geva. Harvard The Dyslexia Foundation (TDF) 2017 Conference
How Should We Remediate in ELs?

- **STRUCTURED LITERACY INSTRUCTION**
- **DUAL IMMERSION** (6% develop Dyslexia), **ESL** (11-27%), & **ENG ONLY** (60%)
- **MORE FOCUS ON VOCABULARY & COMPREHENSION**
- **UNIVERSAL DESIGN FOR LEARNING (UDL)**
  - A set of principles for curriculum development that give all individuals equal opportunities to learn.
  - Not a one-size-fits-all solution. Flexible approaches that can be customized & adjusted for individual needs.
  - For ELs, rich English-language instruction that provides students with oral and written access to their native languages using multiple means of representation.
  - Provide ways to enhance background knowledge etc.

CAST.org
UDLcenter.org
(National Center on UDL)
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TAKE HOME MESSAGE

Bilinguals/ELs with dyslexia:

- Highly prevalent at similar rates (5-10%).
- Often under-identified (or over-identified in older students)
- More at risk for adverse outcomes because of lack of English proficiency, cultural differences, and often lack of resources. – Supplemental native language instruction as a way to provide content knowledge?
- Can be identified early, through family history, phonological awareness and rapid naming, among others.
- Structured Literacy Instruction (which is not provided by most schools) is important. Effective even to those without dyslexia or those that are not bilingual.


https://www.cde.ca.gov/sp/se/ac/documents/cadyslexiaguidelines.pdf
RESOURCES

- CA Dept of Ed. CA Dyslexia Guidelines. https://www.cde.ca.gov/sp/se/ac/dyslexia.asp
## Literacy Instructions. For those with Disabilities

Programs known to be relatively effective according to a federal database (IES WWC). PALS: Disabilities + EL

<table>
<thead>
<tr>
<th>Name</th>
<th>Grades</th>
<th>Method</th>
<th>Alpha- betics</th>
<th>Comm/ Lang</th>
<th>Read Comp</th>
<th>Oral Lang</th>
<th>Phono Proc</th>
<th>Read Ach</th>
<th>Read Flu</th>
<th>Writing Ach</th>
<th>EL (%)</th>
<th>Low SES (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dialogic Reading</td>
<td>PK</td>
<td>Ind/Sm/Cl</td>
<td>+</td>
<td>++</td>
<td>0</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>Fast Track: Elementary School</td>
<td>K</td>
<td>Ind</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lindamood Phoneme Sequencing</td>
<td>1-4</td>
<td>Ind/Sm</td>
<td>+</td>
<td>+</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>35</td>
</tr>
<tr>
<td>Peer-Assisted Learning Strategies</td>
<td>K-6</td>
<td>Sm/Cl</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>24</td>
</tr>
<tr>
<td>Phonological Awareness Training</td>
<td>PK</td>
<td>Ind/Sm/Cl</td>
<td>++</td>
<td>++</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Read Naturally</td>
<td>2-6</td>
<td>Ind/Sm</td>
<td>0</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>Repeated Reading</td>
<td>5-12</td>
<td>Ind/Sm</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>+</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Self-Regulated Strategy Development</td>
<td>2-10</td>
<td>Ind</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Spelling Mastery</td>
<td>2-4</td>
<td>Cl</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>-</td>
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</tr>
</tbody>
</table>

# Early Literacy Instruction

## Computerized Programs

PK-K Programs known to be relatively effective according to a federal database (IES WWC). Earobics: EL

<table>
<thead>
<tr>
<th>Name</th>
<th>Grades</th>
<th>Method</th>
<th>Eng Lang</th>
<th>Alpha-betics</th>
<th>Comm /Lang</th>
<th>Read Comp</th>
<th>Early Read/Write</th>
<th>Oral Lang</th>
<th>Phono Proc</th>
<th>Print</th>
<th>Read Ach</th>
<th>Read Flu</th>
<th>EL (%)</th>
<th>SES (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waterford Early Reading Level One</td>
<td>PK</td>
<td>CI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0</td>
<td>+</td>
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<tr>
<td>Fast ForWord®</td>
<td>K-10</td>
<td>Ind/Sm/Cl</td>
<td>+</td>
<td>±</td>
<td>+</td>
<td></td>
<td>0</td>
<td>+</td>
<td>28</td>
<td>65</td>
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<tr>
<td>Accelerated Reader</td>
<td>K-8</td>
<td>Ind/Cl</td>
<td>+</td>
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<tr>
<td>Waterford Early Reading Program</td>
<td>K-12</td>
<td>Ind/Cl</td>
<td>+</td>
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<tr>
<td>Lexia Reading</td>
<td>K-1</td>
<td>Ind/Sm</td>
<td>+</td>
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<td>+</td>
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<tr>
<td>DaisyQuest</td>
<td>PK-1</td>
<td>Ind</td>
<td>++</td>
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</tr>
<tr>
<td>Earobics®</td>
<td>K-3</td>
<td>Ind</td>
<td>++</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>+</td>
<td>58</td>
<td>58</td>
<td></td>
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</tbody>
</table>

## Early Literacy Instruction. Non-Computerized

PK-K Programs known to be relatively effective according to a federal database (IES WWC).

<table>
<thead>
<tr>
<th>Name</th>
<th>Grades</th>
<th>Method</th>
<th>Eng Lang Develop</th>
<th>Alpha-betics</th>
<th>Comm/Lang</th>
<th>Read Comp</th>
<th>Early Re/WR</th>
<th>Oral Lang</th>
<th>Phono Proc</th>
<th>Print</th>
<th>Read Ach</th>
<th>Read Flu</th>
<th>EL (%)</th>
<th>SES (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Curiosity Corner</td>
<td>PK</td>
<td>School</td>
<td>+/-</td>
<td>+</td>
<td>0</td>
<td>0</td>
<td>+</td>
<td>+</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Success for All®</td>
<td>PK-4</td>
<td>Ind/Sm/Ci/Sch</td>
<td>++</td>
<td>++</td>
<td>0</td>
<td>0</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>14</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bright Beginnings</td>
<td>PK</td>
<td>Cl</td>
<td>+/-</td>
<td>-</td>
<td>+</td>
<td>0</td>
<td>0</td>
<td>+</td>
<td>0</td>
<td>0</td>
<td>+</td>
<td>3</td>
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<tr>
<td>Doors to Discovery</td>
<td>PK</td>
<td>Cl</td>
<td>+</td>
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<td>+</td>
<td>0</td>
<td>0</td>
<td>+</td>
<td>0</td>
<td>0</td>
<td>+</td>
<td>3</td>
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<tr>
<td>Ladders to Literacy</td>
<td>PK-K</td>
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<td>0</td>
<td>0</td>
<td>+</td>
<td>0</td>
<td>+</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ready, Set, Leap!*</td>
<td>PK</td>
<td>Cl</td>
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</table>

Literacy Instruction. For Older Students

Programs known to be relatively effective according to a federal database (IES WWC).

**GRADES 1-2**
- Reading Recovery (1)
- Instructional Conversations & Literature Logs (2-5)
- Lindamood Phoneme Sequencing (LiPS) (1-4)
- Start Making a Reader Today (SMART) (1-2)
- Read Naturally (2-6)
- Bilingual Cooperative Integrated Reading & Composition (BCIRC) (2-3)
- Achieve2000 (2-9)
- Open Court Reading (1-5)
- Early Intervention in Reading (EIR) (1)
- Self-Regulated Strategy Development (2-10)
- Enhanced Proactive Reading (1)
- Spelling Mastery (2-4)
- ClassWide Peer Tutoring (1-4)
- Fluency Formula (2)
- Read, Write & Type!

**GRADE 3 AND UP**
- Knowledge is power program (KIPP) (5-12)
- Read 180 (4-10)
- SpellRead (5-6)
- Green Dot Public Schools (9-12)
- Cooperative Integrated Reading & Composition (CIRC) (2-6)
- Vocabulary Improvement Program for English Language Learners & Their Classmates (VIP) (5)
- Repeated Reading (5-12)
- Student Team Reading & Writing (6-8)
- Project CRISS (4-6)
- Corrective Reading (3-5)
- Reading Plus (5-9)
- Reading Apprenticeship (9)
- Failure Free Reading (3)
- Wilson Reading System (3)

Literacy Instruction. For ELs

Programs known to be relatively effective according to a federal database (IES WWC). PALS: EL + Disabilities

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<tr>
<th>Name</th>
<th>Grades</th>
<th>Method</th>
<th>Eng Lang Develop</th>
<th>Alphabets</th>
<th>Read Comp</th>
<th>Read Ach</th>
<th>Read Flu</th>
<th>EL (%)</th>
<th>Low SES (%)</th>
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PROGRAMS & TOOLS
Family History Screener  (under validation)

EXISTING QUESTIONNAIRES
- ARQ: Adult Reading Questionnaire (Snowling et al. Dyslexia 2012) http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3382192/

OUR FAMILY HISTORY SCREENER
1. How much difficulty did you have learning to read when you were younger (ages 6-10)?
2. How would you compare your reading skill to that of others when you were younger (ages 6-10)?
3. How much difficulty did you have learning to spell when you were younger (ages 6-10)?
4. Did you have difficulty learning letter and/or color names when you were a child?
5. I have trouble sounding out words when reading. Do you agree? If so, please indicate the frequency with which this occurs.
6. I mix up letters and/or words when reading. Do you agree? If so, please indicate the frequency with which this occur.
7. Dyslexic individuals have problems particularly related to reading, not necessarily comprehension (understanding written text). Based on this definition, would you consider yourself dyslexic?
8. How would you rate your difficulties in reading?

Rate on a scale from 0 (definite no / not at all) to 4 (definite yes / a lot). Items 1-4 from ARHQ : Lefly, Pennington. J Learn Disabil. 2000; Items 5-6 from ATLAS: Giménez et al. Ankles de Psicologia 2015; Items 7-8 from ARQ: Snowling et al. 2012
Learning Success Program
Science classes & more! Contact learning@ucsf.edu for details. brainlens.org/learning

Funded by NIH R01HD078351
Learning Success Program

Science classes & more! Contact learning@ucsf.edu for details. brainlens.org/learning

**SFUSD Cantonese immersion, Spanish immersion, Any public GenEd K students (2019- school year).**

Stay up to date on your student’s cognitive & academic development (K through Grade 2).

Visits include assessment of critical skills that predict future success.

It’s completely **free**! Typically costs ~$3,000. We also cover travel, & provide cash prize, lunch & snacks.

Free reports & in-person consultation.

Funded by NIH R01HD078351
AppRISE. School Readiness & Dyslexia Screener App

Contact info@PrecisionLearningCenter.org. More info PrecL.org

For kindergarteners (~3-7 years old). Parents, teachers & pediatricians.

Validation in progress. Research-based. Initial validation in East Bay Public Schools look promising – free reports & consultation.

Tablet-Based Games. Goal: 20min to screen. 60min for full.

Assess strengths and weaknesses. 13 areas of cognition, language & literacy. Personalized Learner Profiles

For Everyone. No instructions & scalable. Universal screener.
Socio-Emotional Toolkit
Contact sel@UCSF.edu. Visit brainlens.org/sel

For Grades 3-12. Parents, schools, mentoring program (e.g. Eye to Eye), etc. e.g. emotion regulation and comfort with their identity predict self-esteem, both modifiable targets with mentoring.

Online tool. Visual & audio. ~45min.

Comprehensive. Strengths and weaknesses. e.g. motivation, resilience, self-esteem, stigma consciousness, emotion regulation, sense of belonging, anxiety, depression

Reports. Individualized & aggregate SE profiles. Evidence-based resources.

Funded by ORIO-16-012
Another Computer Assisted Reading Instructional (CARI) Tool. GRAPHOLEARN

- Computerized learning tool for early reading (decoding).
- Tool that can provide differentiated learning for all kids.
- Developed by researchers with 25 years of history.
- All students in Finland use GraphoLearn at school entry.
- 15 languages available including American English, Spanish & Chinese.
- Teachers can monitor progress.
- Currently raising R&D funds to develop vocabulary, morphology, reading comprehension and to do large-scale trials in the U.S.
Another Computer Assisted Reading Instructional (CARI) Tool. **GRAPHOLEARN**

**READING GAINS WITH GRAPHOLEARN ARE SUPERIOR TO OTHER PROGRAMS**

- Other effective early interventions ~0.3 SS/Hr (Hatcher et al. 2006)
- GL to learn the alphabet <5 Hrs
- GL Phoneme game 0.47 SS/Hr
- GL Rime game 0.68 SS/Hr

**Growth in spelling skill**

**TRAINING.** Students - 1 min, Teachers -5 min

**COMPATIBILITY.** All but iPads

**COST.** Free for beta version used as ‘research’ with Hoeft. Even after commercialization, cost should be minimal.

Kyle, Goswami et al., Reading Res. Q. 2012
OUR INITIATIVES
LEADERSHIP & BOARD

MariLu Gorno Tempini MD PhD.
Robert Hendren DO.
Fumiko Hoeft MD PhD.
Bruce Miller MD.
Steve Carnevale. Board Co-Chair
David Evans. Board Co-Chair
Jessica Miller. Head of Charles Armstrong School

Gavin Newsom – Honorary Chair.
Has dyslexia. Top-runner for CA Gov
Goal: State-Funded Center

MISSION: Leverage neuroscience to reduce the negative impact of dyslexia.
Phenotyping Project

Precision Ed App

Outcomes Study

Orthographic
Phonological
Semantics
Sentence/Syntax
Vocabulary
Attention
Executive Function

Major Reading Systems

IFGorb
IFGop
PreCG
IFGtri
aSMG
pSMG
AG
ACC
DLPFC
pSTG
mFG
aFG
Temporal Pole
PPC
pMTG

Articulation
Semantic
MISSION. Leverage the technology and cognitive neuroscience insights for the R&D & validation of mobile assessment & training tools, to drive evidence-based decision-making and personalized learning.

UNDERSERVED POPULATIONS

MISSION. Tackling education & health disparity in CA & US through science-based innovation
EFFORTS IN CA

Scientists +
Districts/Schools +
EdTech +
Policy/Advocacy

NON-CA

CA Dept of Ed (9846 schools)
Oakley (11)
San Ramon Valley (19)
Mt Diablo (9)
Pleasanton (18)
Stanislaus (17 districts, 221)
Oakland Dicose (7)
Pajaro Valley (16)
Monterey (9)
LA (2410)

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Vic Vuchic

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E2E: David Flink
CCC: Elizabeth Rood
Curious Learning: Tinsley Galyean, Stephanie Gottwald
AIM: Pat Roberts, Nancy Blair

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Global L² (Language & Literacy) Innovation Hub

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Mark Seidenberg
UW-Madison/Haskins
Modeling

Charles Perfetti
U Pitt LDRC
Comprehension

Maryanne Wolf
UC/L/Tufts
Global Literacy

Fumiko Hoeft
UCSF/Haskins

Robin Morris
Georgia State U
Adult Literacy

Don Compton
FSU FCRR
Statistics

Dick Aslin
Haskins/Yale/UConn
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Maureen Lovett
H for Sick Children
Intervention

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Early childhood

Susan Brady
Rhode Isl/Haskins
Research to practice

Linda Mayes
Yale
Child Psychiatry

Nandini Chatterjee Singh
UNESCO, Nat’l Brain Res Ctrr, India
India, Literacy & Music

Heikki Lyytinen
UNESCO, Finland, Africa
EdTech

Ovid Tzeng
Univ System of Taiwan/Haskins
Chinese

Ludo Verhoven
Nat’l Lit Ed Center, Netherlands
Literacy acquisition

Geographical reach
Integrative STAR Model

**SERVICES:** Teachers, parents & pediatricians. Tools. Resources

**TRAINING:** Next generation of learning engineers

**ADVOCACY/POLICY:** Int’l & local orgs

**RESEARCH:** Neuroscience. R&D. Validation
Leveraging Multidisciplinary Collaboration

Leveraging tech and insights from neuroscience for R&D of a dyslexia-screener app
Acknowledgement.

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Lab Members & Collaborators

See brainLENS.org