Slide 1

Dyslexia

Slide 2

“A teacher sent the following note home with a six-year-old boy: “He is too stupid to learn.” That boy was Thomas A. Edison.”

“Our greatest weakness lies in giving up. The most certain way to succeed is always to try just one more time.”

“My mother was the making of me. She was so true, so sure of me and I felt I had someone to live for, someone I must not disappoint.”

Slide 3

Famous Dyslexics

George Washington
Walt Disney
JFK
Whoopi Goldberg
Hans Christian Anderson
Steve Jobs
Henry Ford
Tom Cruise
Steven Spielberg
Common Characteristics of Successful People with Dyslexia

Questions

- What is dyslexia? How do we identify dyslexia?
- Does dyslexia exist in all languages or is it distinctive to those languages with poor grapheme-phoneme correspondence?
- Is the reading process different across languages?
- If dyslexia is universal, but the reading process is different across languages, how is dyslexia manifested differently from one orthographic system to another?
- What tests can be used to identify dyslexia in ELLs?
- How is dyslexia in bilingual students identified?
- How is a report on dyslexia written?
- How can you tell if the student’s reading difficulties are due to language differences or dyslexia?
- What interventions are appropriate for ELL students with dyslexia?

Definition Adopted by the International Dyslexia Association and the NIH 2002

Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede the growth of vocabulary and background knowledge. (Lyon, Shaywitz, and Shaywitz, 2003)
State Definition of Dyslexia

- Texas Education Code (TEC) §38.003 defines dyslexia in the following way:
  1. "Dyslexia" means a disorder of constitutional origin manifested by a difficulty in learning to read, write, or spell, despite conventional instruction, adequate intelligence, and sociocultural opportunity.
  2. "Related disorders" include disorders similar to or related to dyslexia such as developmental auditory imperceptions, dysphasia, specific developmental dyslexia, developmental dysgraphia, and developmental spelling disability.

Related Disorders

- Developmental auditory imperceptions is difficulty hearing the difference in sounds in words.
- Dysphasia is difficulty recalling specific words.
- Developmental dysgraphia is the difficulty in expressing thoughts on paper and with the act of handwriting.
- Developmental spelling disability is difficulty with spelling words.

Myths About Dyslexia

Dispelled by research
Myth: Dyslexia does not exist

• Fact: Dyslexia is one of the most researched and documented conditions that will impact children. Over 30 years of independent, scientific, replicated, published research exists on dyslexia—much of it done through the National Institutes of Health, funded by taxpayer dollars.

Myth: Dyslexia is rare

• Fact: According to the NIH researchers, in the United States, dyslexia impacts 20% of our population. That’s 1 out of every 5 people. But it does come in degrees. Some have it only mildly, some have it moderately, some have it severely, and some have it profoundly.
• Very few children with dyslexia are in the special education system. Only 1 in 10 will be eligible for an IEP (when tested in second or third grade) under the category of Learning Disability (LD).

Myth: Dyslexia affects more boys than girls

• Fact: Although more boys are sent for testing than girls, research shows that dyslexia impacts just as many girls as boys.
Myth: People with dyslexia see things backwards

*Fact:* People with dyslexia do not see things backwards. Dyslexia is not caused by a vision problem. That is why vision therapy does not work for this population.

- Yes, they reverse their b's and their d's and say “was” for “saw.” But that’s caused by their lifelong confusion over left versus right and by their difficulty reading by sounding out.
- Most children will reverse some of their letters and numbers while they are learning. Up to a certain point, that is considered perfectly normal. But letter or number reversals after two years of handwriting instruction and practice is a warning sign of dyslexia.

Myth: Reading disabilities are caused by visual perception problems.

*Fact:* The current consensus based on a large body of research (e.g., Lyon et al., 2003; Morris et al., 1998; Rayner et al., 2001; Wagner & Torgesen, 1987) is that dyslexia is best characterized as a problem with language processing at the phoneme level, not a problem with visual processing.

Myth: Children outgrow dyslexia

*Fact:* Dyslexia is lifelong. It will not go away. The child will only get further and further behind—unless that child gets the right type of intervention or tutoring.

- There are effective research-based methods that will bring their reading, spelling, and writing skills up to—and beyond—grade level.
- Although it is never too late to greatly improve their skills, early intervention is the best way to prevent or minimize the damage to their self-esteem, their emotional distress, and their fear of going to school.
- Late bloomers are rare. Statistically, nearly 90% of poor readers in first grade remain poor readers.
Myth: There is no way to diagnose dyslexia

• **Fact:** Evaluation professionals with in-depth training can accurately diagnose dyslexia as early as age 5.
• Doctors do not test for dyslexia. Dyslexia is not classified as a medical problem. Doctors have no training in how to test for reading, spelling, and writing problems. And there is no medical solution (no pill or operation) for those types of academic struggles.

Myth: Intelligence and ability to read are related.

• **Fact:** Dyslexia is not related to IQ. That means you can have a very high IQ and be dyslexic, you can have an average IQ and be dyslexic, and you can have low IQ and be dyslexic.
• Many people with dyslexia are very bright and accomplish amazing things as adults.

Myth: People with dyslexia cannot read

• **Fact:** Everyone with dyslexia can read—up to a point. They will, however, “hit the wall” in reading development by 3rd, if not sooner. They have great difficulty sounding out unknown words—despite being taught phonics. They might read a word fine on one page, but not recognize the same word on the next.
• But it is spelling that separates kids with dyslexia from kids who struggle with reading for other reasons. If the child and their parents spend hours studying the spelling list, the child may be able to learn the list of 20 spelling words long enough to do “okay” on Friday’s test, but not over the long term.
Myth: Every child who struggles with reading is dyslexic

- **Fact:** Dyslexia is not the only reason a child will struggle with reading, but it is the most common in reading.
- Reading difficulties might also be caused by:
  - Oral language deficits resulting from
  - Linguistic diversity issues
  - Socioeconomic factors
  - A language delay/disorder
  - Specific reading disability resulting from
    - Difficulties in visual-orthographic coding
    - Memory difficulties
    - Reasoning & inferential thinking deficits

Myth: Dyslexia is caused by a lack of phonics instruction

- **Fact:** Research has shown that a teacher can use the best phonics instruction, but the child will experience significant difficulty.
- Children with dyslexia can learn phonics, but it requires consistent, intensive training. Learning phonics will help the child become a better reader, but the child will still have dyslexia and experience difficulties due to the dyslexia.

Myth: Dyslexia is mostly found in orthographies (writing systems) that are irregular like English. Dyslexia does not exist in Spanish, a transparent orthography.

- **Fact:** Educational & brain research has found that dyslexia in other languages exists. Often the student exhibits serious deficits in phonological processing.
- Dyslexia in a transparent orthography may manifest itself differently than in an opaque orthography.
- More reading problems are seen in opaque orthographies.
In the early 1980's, the United States Congress mandated the National Institutes of Health (NIH) to research learning disabilities and answer 7 specific questions:

- How many children are learning disabled?
- Clearly define each specific type of learning disability.
- What causes each learning disability?
- How can we identify each learning disability?
- How long does each disability last? Map its developmental course.
- What is the best way to teach these children?
- Can we prevent any of these learning disabilities?

NIH investigated dyslexia first because it is the most prevalent learning disability. NIH coordinated 18 university research teams throughout the United States to answer the questions posed by Congress.

Most people are unaware of these results.

The National Institutes of Health conducted a longitudinal study by tracking 5,800 children at random from all over the country starting when they were 4 years old until they graduated from high school. The researchers had no idea which children would develop reading difficulties and which ones would not.

The researchers tested these children 3 times a year for 14 years using a variety of tests that would either support or disprove competing theories. But the researchers did NOT provide any type of training or intervention. They simply watched and tested.

From that research, they were able to determine which tests are most predictive of reading failure, at what age we can test children, and whether children outgrow their reading difficulties.

The results of these studies were released in 1994.
NIH 1994 RESULTS

NEUROLOGICAL BASIS
• Dyslexia is clearly related to neurophysiological differences in brain function.

PREVALENCE
• Dyslexia affects at least 1 out of every 5 children in the US.
• Dyslexia represents the most common and prevalent of all known learning disabilities and is the most researched.
• Dyslexia affects as many boys as girls.
• Some forms of dyslexia are highly heritable.

SOURCE OF DEFICIENCIES
• Dyslexia is primarily due to a difficulty processing language. It is not due to visual problems, and people with dyslexia do not see words or letters backwards. Dyslexic children display difficulty with the sound/symbol correspondences.

NIH 1994 RESULTS
Dr. Criselda Alvarado/Karin Marshall

DIAGNOSIS
• Early intervention is essential for this population.
• Dyslexia is identifiable, with 92% accuracy, at ages 5½ to 6½.
• Reading failure caused by dyslexia is highly preventable through direct, explicit instruction in phonemic awareness.
• Children do not outgrow reading failure or dyslexia.
• Of children who display reading problems in the first grade, 74% will be poor readers in the ninth grade and into adulthood unless they receive informed and explicit instruction on phonemic awareness. Children do not mature out of their reading difficulties.
• The "discrepancy model" testing utilized by many of our nation's public schools to establish eligibility for special education services is not a valid diagnostic marker for dyslexia.

NIH 1994 RESULTS
Dr. Criselda Alvarado/Karin Marshall

DYSLEXIA AND READING
• Dyslexia is the leading cause of reading failure and school dropouts in our nation.
• Reading failure is the most commonly shared characteristic of juvenile justice offenders.
• Research evidence does not support the use of "whole language" reading approaches to teach dyslectic children.

DYSLEXIA AND ADD/ADHD
• Dyslexia and ADD/ADHD are two separate and identifiable entities.
• Dyslexia and ADD/ADHD so frequently coexist within the same child that it may be best to test for both.
• Children with both dyslexia and ADD/ADHD are at dramatically increased risk for substance abuse and felony convictions if they do not receive appropriate interventions.
More NIH Research Results after their 1994 Study

NIH Research Results (after 1994)

- Difficulty in word recognition is the most reliable indicator of dyslexia in older children and adults. Slow, labored, and inaccurate reading of real and nonsense words in isolation are key warning signs.
- This laborious reading of single words frequently impedes comprehension. Listening comprehension is adequate.
- Even among children and adults who score within normal ranges on reading achievement tests, many report that reading is so laborious and unproductive that they rarely read for learning or pleasure.

NIH Research Results (after 1994)

- Developing adequate awareness of phonemes is not dependent on intelligence, socio-economic status, or parents' education, but can be fostered through direct, explicit instruction.
- Direct, explicit instruction is shown to accelerate reading acquisition in general and reduce reading failure.
- Disabled readers require highly structured programs that explicitly teach application of phonologic rules to print. Longitudinal data indicate that explicit systematic phonics instruction results in more favorable outcomes for disabled readers than does a context-emphasis (whole-language) approach.
What are some common characteristics of people with dyslexia who have excelled in their field?

Once we accept our limits, we go beyond them. —Albert Einstein

If I had not been dyslexic, I would not have won the Olympic decathlon games. Dyslexia made me outwork the next guy. —Bruce Jenner

Dyslexics: Don’t let what you can’t do in life stop you from what you can do. —John Wooden

Our Story

Brain Research
First, let’s see a video
http://www.readingrockets.org/shows/launching/brain
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Human Brain

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The brain is divided into the right and the left hemisphere. This is a view of the brain from the bottom.

Corpus Collosum

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- Broca's area—area of the brain that produces language (expressive language)
- Wernicke's area—area of the brain that understands speech. (receptive language)

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fMRI

- Functional Magnetic Resonance Imaging (fMRI) measures brain activity by detecting associated changes in blood flow. Researchers used fMRI to identify the neural pathways involved in reading.

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- Using fMRI researchers now know that dyslexia involves a weakness in the part of the brain that decodes the sounds of written language. That region sits above the left ear, at the junction of the brain’s temporal and parietal lobes.

- Dyslexia has been identified in many languages throughout the world. Comparisons of fMRI results have shown a universal dyslexic signature.

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TYPICAL LANGUAGE ACTIVATION AREAS

- TYPICAL LANGUAGE ACTIVATION AREAS
- SPEECH PRODUCTION AREA
- AUDITORY PROCESSING AREA
- VISUAL-LANGUAGE ASSOCIATION AREA
- VISUAL / VERBAL AREA
- LEFT HEMISPHERE
Three pathways for reading

1. Inferior frontal gyrus (articulation/word analysis)
   - Subvocalization
2. Parieto-temporal (word analysis)
   - Analyzing a word
   - Pulling it apart
   - Linking letters to their sounds
3. Occipito-temporal (word form)
   - Express pathway
   - Automatic sight words

TYPICAL READING ACTIVATION AREAS

BRAIN ACTIVATION WITH READING

"SIGNATURE" BRAIN, Shaywitz, 2005
Simos, Fletcher, Bergman, et al 2002

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Researchers have also shown that the right kind of intensive instruction can rewire the brain and help overcome reading deficits.

There was a study comparing corpus callosum among illiterate and literate women. They found that in illiterate women, the fibers crossing the corpus callosum were thinner.

When Carnegie Mellon scanned the brains of youngsters who received a year of concentrated reading instruction, they showed 40 percent more activity in the word decoding areas of their brains.

A similar study at Yale showed that a year after receiving such instruction, boys and girls continued to show increased activity in both the word-decoding and word-forming areas of their brains.

A study at Georgetown University showed that intensive intervention also helps adults with dyslexia.

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**Brain Plasticity**

- Decreased activity in right hemisphere
- Increased activity in left hemisphere

*TREATMENT EFFECTS ON BRAIN ACTIVITY*

Simos et al 2002
FYI: There are male and female differences observed while reading.

This journal article brings together research on dyslexia and the bilingual brain that has been conducted around the world.


Bilingual Brain Research

- Learning a second language will increase the density of grey matter in the left inferior parietal cortex for both early and late bilinguals. Earlier and higher proficiency of the bilingual = more developed brain

- "...there is a universal neurobiological basis for dyslexia, and that differences in reading performance among dyslexics of different countries are due to different orthographies and cultural diversity."—Paulesu et al. (2001)
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Bilingual Brain Research

- There appears to be a shared frontal lobe system for semantic analysis in alphabetic languages, indicating that the two languages do not require the addition of new cortical regions for semantic processing in the second language.
- However, the first language shapes the brain, while the second language is shaped by the first language.

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Bilingual Brain Research

- Researchers have seen a difference in fMRI activation areas while participants read in their various native languages. While the general regions for word processing remain the same, the localization differs between writing systems.

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Bilinguals with Language Reorganization due to Brain Pathology

- The second language is restricted from certain language areas of the brain dedicated to the first language.
- The second language may also be in a unique area of the brain, not used by the first language.
- It is for this reason that in bilinguals, there may be different impairments for apparently similar lesions.
- There is considerable variability in brain organization or reorganization in bilinguals.
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Chasm between research and practice

Researcher’s Findings

Educator’s Practice

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I believe that the reason I’ve been able to discover the things my very intelligent colleagues couldn’t, is because of my dyslexia. I look at things from a different perspective.

--Dr. R. Wyatt

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Questions

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- What interventions are appropriate for ELL students with dyslexia?
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Basic Information on ELLs and Special Lang Programs

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- Percent of ELL students who speak:
  - Spanish 76.9%
  - Vietnamese 2.4%
  - Hmong 1.8%
  - Korean 1.2%
  - Arabic 1.2%
  - Haitian Creole 1.1%
  - Cantonese 1.0%
  - Tagalog .9%
  - Russian .9%
  - Navajo .9%
  - All Others 11.8%

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- Culturally and Linguistically Diverse (CLD) students are students who are English language learners (ELLs), as well as students who are fluent in English, but have had significant exposure to another language.
- CLD students include:
  (a) Students who are identified as Limited English Proficient/English Language Learners (LEP/ELLs) by their school district or charter school, as well as,
  (b) Students who are not identified as LEP/ELLs by the district or charter school, but come from a home, community, or school environment where another language has had a real and significant impact on the student’s development of English language proficiency.
- This second group of students may not be completely understood and their linguistic diversity not taken into account by their school district or charter school, thus special education evaluation may be imprecise which can lead to an incorrect diagnosis.

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FACTORS INFLUENCING 2ND LANGUAGE LEARNING

- General Intellectual Ability
- Motivation
- Personality
- Auditory Memory
- Auditory Discrimination
- Opportunity
- Quality of Instruction
- First Language Skills
- Etc.

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SECOND LANGUAGE ACQUISITION THEORIES

- TIME ON TASK THEORY--the amount of exposure to the new language is directly related to the learning of that language
  
  THE MORE ENGLISH, THE BETTER ENGLISH

- FACILITATION THEORY--the level of development of the first language is directly related to the learning of the second language
  
  THE MORE SPANISH, THE BETTER ENGLISH
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Bilingual School Conditions

**ADDITIVE LEARNING ENVIRONMENT**— second language added, while first language is maintained or developed.

*Result:* Student becomes literate in English & native lang.

*Implication:* Native language has significant educational value.

**SUBTRACTIVE LEARNING ENVIRONMENT**— the first language is not actively maintained or developed while second language is introduced.

*Result:* Student is often not literate in native language.

*Implication:* Native language has little or no educational value.

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Special Language Programs

**Bilingual**
- Early-Exit/Transitional Bil Ed
- Late-Exit/Maintenance/Developmental Bil Ed (AKA One-Way Bil Ed)
- Two-Way/Dual Language Bil Ed

**ESL**
- ESL Pull-Out
- Content ESL
Impact of Special Language Programming on Language Learning

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A National Study of School Effectiveness for Language Minority Student’s Long-Term Academic Achievement
Wayne P. Thomas and Virginia P. Collier

The study investigated the academic achievement of students who entered school speaking a language other than English. The study involved:

• Five school districts from across the U.S.
• The total number of students records included in the study was 210,054.
• Over 80 primary languages were represented.

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Research says the more and better developed the first language, the more and better developed the second language.

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National Literacy Panel (2006) conducted a meta-analysis on the research of ELLs learning to read in English.

- Instruction that provides substantial coverage in the key components of reading — identified by the National Reading Panel (NICHD, 2000) as phonemic awareness, phonics, fluency, vocabulary, and text comprehension — has clear benefits for language-minority students.

National Literacy Panel (2006)

- Instruction in the key components of reading is necessary — but not sufficient — for teaching language-minority students to read and write proficiently in English. Oral proficiency in English is critical as well — but student performance suggests that it is often overlooked in instruction.
Oral proficiency and literacy in the first language can be used to facilitate literacy development in English. However, language-minority students can acquire English literacy skills in English-only classrooms as well.

National Literacy Panel (2006)

Individual differences contribute significantly to English literacy development. Most assessments do a poor job of gauging individual strengths and weaknesses.

National Literacy Panel (2006)

There is surprisingly little research conducted on the impact of sociocultural variables on literacy achievement or development. However, home language experiences can have a positive impact on literacy achievement.

National Literacy Panel (2006)
In case you missed it:
Spanish Reading Transfers to English Reading

- There is a high level of correspondence in the sound relationship between most Spanish and English consonant letters.
- Research has found that Spanish phonemic awareness and Spanish word reading and fluency are reliable predictors of English performance on parallel tasks in English.
- The effect of Spanish phonemic awareness on English phonemic awareness emerges for almost all students. However, the effect of Spanish word reading on English word reading emerges only for students who receive formal instruction in Spanish reading.

Cross-Transfer Between Languages

- Oral proficiency and literacy in the first language can be used to facilitate literacy development in English. (National Literacy Panel, 2006)
- Native-language (i.e., alphabetic-based) phonological awareness training can facilitate student's ability to read in English. (Durgunoglu et al., 1993)
- Spanish word recognition significantly predicts performance on English word and pseudo word reading tasks (Durgunoglu et al., 1993, August et al., 2002).
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Cross-Transfer Between Languages

- Students who have developed good meaning-making strategies in their first language use those strategies in their second language, even when they are not as fluent in that second language (Langer et al., 1990).
- A significant positive relationship is found between Spanish passage comprehension at the end of second grade and English passage comprehension at the end of fourth grade (August et al., 2002).

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Dyslexia and the ELL

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- When slow progress is made by children who are learning to read and write in their second or third language, it is assumed that the difficulty is due to their linguistic diversity. If they knew the target language better, they would find it easier to learn to read. While that is often true, there is a risk that learning difficulties associated with dyslexia will sometimes be overlooked.
- There is evidence that linguistically diverse students are under-served in dyslexia 504 and dyslexia special education programs.
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- Traditional assessment approaches are likely to under-identify bilingual children with dyslexia.
- Assessment of dyslexia for bilingual children and the interpretation of test results is different than traditional assessment approaches and requires extensive training on:
  - Second language acquisition process,
  - How dyslexia is manifested in ELLs, and
  - Assessment and interpretation of test results.

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Discussion Point for Groups

What additional information is needed for a student who is an English language learner (ELL) and is being considered for dyslexia testing?

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Dyslexic tells of his tortured childhood by Mark Roth, Pittsburgh Post-Gazette

When Paul Caldera was a boy, he would sit down at the kitchen table every night after supper so his mother, an English teacher, could tutor him in reading. It was the worst experience of his life.

The boy had dyslexia, although he wouldn’t find that out for another 33 years, in part because his mother refused to accept that explanation for his tortured, error-filled reading.

When he later tried to write an essay to explain his disability, he needed that evening in Middleboro, Mass. “Every night after dinner Dad would wash the dishes and often — all the smooth utensils, like wooden spoons, which was used to encourage me to concentrate and guide me in my intellectual pursuits.

“It must have been extremely frustrating for my mother. There, right before her very eyes, was the word ‘that’ and I was saying, ‘was’ or ‘where.’ After a couple of good cracks with the spoon or her hand, I would utter the word ‘that’ or whatever word I was stuck on.”

Because he was quick to understand new things and could speak fluently, his mother was convinced he just wasn’t trying hard enough to learn how to read.

“I can remember mentioning to her this word dyslexia,” he said in an interview. “I had heard it on the playground, and I said, ‘Hey, maybe I have dyslexia,’ and she said, ‘Yes, you don’t have dyslexia.’

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Today, Mr. Caldera, 54, is a software engineer with Edvocacy Research Corp., working with the Allegheny Intermediate Unit in Pittsburgh to test a digital pen that can be used by teachers to score reading assessment tests and upload the results directly into a computer.

Eventually, Mr. Caldera became a computer programmer. The logic of software made sense to him, and his inability to spell didn’t matter as much as it would have in other fields. He rose through the ranks to become a principal software engineer at Digital Equipment Corp., a pioneering computer firm. As DEC began to falter, though, a seventh round of layoffs put him on the street in the early 1990s.

In the past 15 years, Mr. Caldera has become a better reader, but not a good one. “I probably have to read a sentence three times before I get it,” he said. “Knowing that dyslexia can be inherited, he told his wife he didn’t want to have children, that it would have been like carrying sacks of sand up a hill. It’s exhausting to me to look at a whole page of text. The thought of having to read that whole page is just such a mental effort for me.”

Like many other bright, dyslexic people, he found ingenious ways to hide or compensate for his disability. He got through Springfield College in Springfield, Mass., by using his ears instead of his eyes. “I was a political science and economics major,” he said, “and I made it by listening and not missing class. I had to go to class because I knew the only way I was going to get the input was from the teacher’s mouth. I’ve never read a book cover to cover in my life.”

When he did have to read, he said, “It was like carrying sacks of sand up a hill. It’s exhausting to me to look at a whole page of text. The thought of having to read that whole page is just such a mental effort for me.”

He emphasizes to his students that diagnoses reading problems, the Lindamood approach is not for normal people. “That’s great for a normal person,” he said, “but I’m not your normal Joe. So I just try to do it my way.”

“I would love to see a kid be assessed early, for someone to identify his problem and figure out the remediation and get him on his way so that by the time he’s in first grade, he’s reading at the same level as other kids.”

“I was not a sad day for me—quite the contrary. Now I knew what was wrong. I had a learning disability; I was not stupid. Oh, I was different, to be sure, but not stupid. That was the most important affirmation for me.”

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At the age of 43, he was faced with using his severance money to seek retaining in his field. “That’s great for a normal person,” he said, “but I’m not your normal Joe. So I just try to do it my way.”

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Common Characteristics of Successful People with Dyslexia