The Challenge of Teaching all Students to Read Proficiently: Lessons from the Science of Reading

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Reading First Seminar for Speech/Language Pathologists, October, 2005
First Reader
By Billy Collins

I can see them standing politely on the wide pages that I was still learning to turn, Jane in a blue jumper, Dick with his crayon-brown hair, playing with a ball or exploring the cosmos of the backyard, unaware they are the first characters, the boy and girl who begin fiction.

Beyond the simple illustrations of their neighborhood, the other protagonists were waiting in a huddle: frightening Heathcliff, frightened Pip, Nick Adams carrying a fishing rod, Emma Bovary riding into Rouen.

But I would read about the perfect boy and his sister even before I would read about Adam and Eve, garden and gate, and before I heard the name Gutenberg, the type of their simple talk was moving into my focusing eyes.
It was always Saturday and he and she were always pointing at something and shouting, “Look!” pointing at the dog, the bicycle, or at their father as he pushed a hand mower over the lawn, waving at aproned mother framed in the kitchen doorway, pointing toward the sky, pointing at each other.

They wanted us to look but we had looked already and seen the shaded lawn, the wagon, the postman. We had seen the dog, walked, watered and fed the animal, and now it was time to discover the infinite, clicking permutations of the alphabet’s small and capital letters. Alphabetical ourselves in the rows of classroom desks, we were forgetting how to look, learning how to read.
“Current difficulties in reading largely originate from rising demands for literacy, not from declining absolute levels of literacy.”

Increasing demands for higher levels of literacy in the workforce require that we do better than we have ever done before in teaching all children to read well.
A positive outcome nationally….

Latest results from the National Assessment of Educational Progress

No difference

Slight long term improvement - No recent difference

Recent improvement is largest in 30 years
In the meantime, Florida is improving faster than the national average…. 

Improvements since 1998 on the NAEP

- 1998
- 2005

Florida
Nation

Red
Yellow
Why do we have Reading First?

1. Far too many poor and minority children are being “left behind” when it comes to growth of proficient reading skills

2. Prevention of reading problems is far more effective and humane than trying to remediate after children fail

3. New discoveries from scientific research about reading can provide the basis for improved outcomes for all children
The broad Reading First model for preventing reading failure in grades K-3:

1. Increase the quality, consistency, and reach of instruction in every K-3 classroom

2. Conduct timely and valid assessments of reading growth to identify struggling readers

3. Provide immediate, intensive, skillful, and properly focused interventions to prevent students from falling too far behind
State level implementation support: The Engineering and Leadership Team

Director of Reading First in Just Read, Florida! office

Florida Center for Reading Research at FSU

Reading First Professional Development at UCF
When we say that our goal is to help all students read “at grade level or above” what do we really mean?

We want students to be able to read grade level text with a reasonable level of understanding.

We usually also mean we want them to be able to do this fluently, so that reading the text doesn’t take an inordinate amount of time.

And we would like them to find pleasure in reading, which also means we would like them to be able to read a book like we read books, without having to struggle with the words, and be able to focus on the meaning.
What skills, knowledge, and attitudes are required for good reading comprehension, or proficient “grade level reading”? 
### What we know about the factors that affect reading comprehension

Proficient comprehension of text is influenced by:

- Accurate and fluent word reading skills
- Oral language skills (vocabulary, linguistic comprehension)
- Extent of conceptual and factual knowledge
- Knowledge and skill in use of cognitive strategies to improve comprehension or repair it when it breaks down.
- Reasoning and inferential skills
- Motivation to understand and interest in task and materials
In other words, student’s reading comprehension depends on:

- How well they read the words on the page
- How much knowledge they have, and how well they think
- How motivated they are to do “the work” of comprehension
Reading is a multifaceted skill, gradually acquired over years of instruction and practice.

The Many Strands that are Woven into Skilled Reading
(Scarborough, 2001)

- Language Comprehension
- Background Knowledge
- Vocabulary Knowledge
- Language Structures
- Verbal Reasoning
- Literacy Knowledge

- Word Recognition
- Phon. Awareness
- Decoding (and Spelling)
- Sight Recognition

Skilled Reading—fluent coordination of word reading and comprehension processes
Three potential stumbling blocks to becoming a good reader (NRC Report, 1998)

1. Difficulty learning to read words accurately and fluently

2. Insufficient vocabulary, general knowledge, and reasoning skills to support comprehension of written language

3. Absence or loss of initial motivation to read, or failure to develop a mature appreciation of the rewards of reading.
Reading is a multifaceted skill, gradually acquired over years of instruction and practice.
State accountability measures of reading comprehension are not all alike, and the FCAT has two features that present special challenges to many students.

It was specifically created to place high demands on vocabulary (word knowledge) and reasoning/inferential skills; these demands accelerate significantly after elementary school.

It requires students to read relatively long passages before asking them to answer questions. This places special demands on reading fluency.
Big questions of the study:

What reading and language factors are most strongly related to individual variability in performance on the FCAT at grades 3, 7, and 10?

What reading and language factors are most deficient in students who perform below grade level on the FCAT?
How the study was conducted:

Gave 2 hour battery of language, reading, nonverbal reasoning, and memory tests to approximately 200 children in each grade (3rd, 7th, and 10th) at 3 locations in the state

**Language** – Wisc Vocab and Similarities
Listening comprehension with FCAT passage

**Reading** – Oral reading fluency, TOWRE, Gray Oral Reading Test

**NV Reasoning** – Wisc Matrix Reasoning, Block Design

**Working Memory** – Listening span, Reading Span
Fluency

Individually

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>3rd Grade</td>
<td>Fluency</td>
<td>Verbal</td>
<td>Non Verbal</td>
</tr>
<tr>
<td>55</td>
<td>47</td>
<td>23</td>
<td>12</td>
</tr>
</tbody>
</table>

Percent of variance accounted for
What skills are particularly deficient in level 1 and level 2 readers in 3rd grade?

<table>
<thead>
<tr>
<th>Skill/ability</th>
<th>FCAT Performance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>WPM on FCAT</td>
<td>54</td>
</tr>
<tr>
<td>Fluency percentile</td>
<td>6th</td>
</tr>
<tr>
<td>Phonemic decoding</td>
<td>25th</td>
</tr>
<tr>
<td>Verbal knowledge/reasoning</td>
<td>42nd</td>
</tr>
</tbody>
</table>
Fluency
Individually                   Unique
10
20
30
40
116
535
Verbal
Percent of variance accounted for
60
50
40
30
20
10
Non Verbal
Memory

7th Grade

Percent of variance accounted for
Individually
22
10
5
8
2
Unique
What skills are particularly deficient in level 1 and level 2 readers at 7th grade?

<table>
<thead>
<tr>
<th>Skill/ability</th>
<th>FCAT Performance Level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>WPM on FCAT</td>
<td>88</td>
</tr>
<tr>
<td>Fluency percentile</td>
<td>7th</td>
</tr>
<tr>
<td>Phonemic decoding</td>
<td>27th</td>
</tr>
<tr>
<td>Verbal knowledge/reasoning</td>
<td>34th</td>
</tr>
</tbody>
</table>
What skills are particularly deficient in level 1 and level 2 readers at 10th grade?

<table>
<thead>
<tr>
<th>Skill/ability</th>
<th>FCAT Performance Level</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>WPM on FCAT</td>
<td>130</td>
<td>154</td>
<td>175</td>
<td>184</td>
<td>199</td>
<td></td>
</tr>
<tr>
<td>Fluency percentile</td>
<td>8th</td>
<td>30th</td>
<td>68th</td>
<td>87th</td>
<td>93rd</td>
<td></td>
</tr>
<tr>
<td>Phonemic decoding</td>
<td>18th</td>
<td>27th</td>
<td>45th</td>
<td>56th</td>
<td>72nd</td>
<td></td>
</tr>
<tr>
<td>Verbal knowledge/reasoning</td>
<td>30th</td>
<td>60th</td>
<td>66th</td>
<td>84th</td>
<td>89th</td>
<td></td>
</tr>
</tbody>
</table>
Most important Conclusions from the Study

1. The FCAT works the way it was designed to work: it becomes increasingly sensitive to differences among children in verbal knowledge and reasoning ability as they become older.

2. At every grade level, the FCAT shows high construct validity. It consistently identifies students who are both more accurate and fluent readers and who have more verbal knowledge and reasoning ability.

3. The major problem associated with Level 1 performance in 3rd grade is failure to learn to read accurately and fluently. Level 1 students appear to have adequate verbal ability (42nd percentile), but reading fluency is very low (6th percentile).
Most important Conclusions from the Study (cont.)

4. Level 1 students in 10\textsuperscript{th} grades have two significant problems. They continue to have a problem with reading fluency (8\textsuperscript{th} percentile), and their verbal knowledge and reasoning ability (30\textsuperscript{th} percentile) is not sufficient to meet the demands of the FCAT for these skills.
Where do our most significant challenges lie?

A central problem in reading instruction arises, not from the absolute level of children’s preparation for learning to read, but from the diversity in their levels of preparation.

(Olson, 1998)
What are the most important ways children are diverse—when it comes to learning to read?

1. They are diverse in their talent and their preparation for learning to read words accurately and fluently.

2. They are diverse in their oral language knowledge and abilities—vocabulary and world knowledge.

3. They are diverse in their abilities to manage their learning behaviors and their motivation to apply themselves to learning to read.
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Problems in this area begin with difficulties mastering the use of “phonics” skills as an aid to early, independent reading

- difficulties with the skills of blending and analyzing the sounds in words (phonemic awareness).
- difficulties learning letter-sound correspondences

Slow development of “sight vocabulary” arising from:

- limited exposure to text
- lack of strategies to reliably identify words in text
The nature of the underlying difficulty for most children who struggle in learning to read words accurately and fluently

Weaknesses in the phonological area of language competence

- inherent, or intrinsic, disability
- lack of opportunities to learn in the pre-school environment

Expressed primarily by delays in the development of phonemic awareness and phonics skills
A three part definition of phonemic awareness

1. Understanding that words are composed of segments of sound smaller than a syllable. Words are made up of small reusable chunks of sound.

Phonemic awareness is a skill that applies to the acoustic, or auditory features of words (oral language) and can be taught without using letters or print. However, having some awareness of the phonemic structure of words is very useful in understanding the way words are represented in print.
A three part definition of phonemic awareness

1. Understanding that words are composed of segments of sound smaller than a syllable. Words are made up of small reusable chunks of sound.

2. Awareness of the critical distinctive features of phonemes so that their identity, order, and number can be specified in words.
lap
clap
pulverize
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2. Awareness of the critical distinctive features of phonemes so that their identity, order, and number can be specified in words.

3. Awareness of the way phonemes are coarticulated when they are blended.
Blending c-l-a-m
Important fact about talent in the phonological language domain:

It is like most other talents in that it is distributed normally in the population.
“Phonological talent” is normally distributed in the population.

Children can be strong in this talent-like my grandson Andrew.
“Phonological ability” is normally distributed in the population.

Children can be moderately weak in this talent-like David.
Each of these kinds of weakness is normally distributed in the population.

Percentile Ranks

2nd 16th 50th 84th 98th
70 85 100 115 130

Standard Scores

Serious difficulties-probably require special interventions and a lot of extra support-like Alexis.
Alexis....
Another important fact about talent in the phonological language domain:

It is only weakly correlated with broad verbal ability or general intelligence.
Phonological Language Ability is not highly Correlated with General Verbal Ability as measured by IQ tests.
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One more important fact about talent in the phonological language domain:

Children’s ability in this area when they come to school is influenced both by biologically based talent, and by opportunities to learn from their pre-school environment.
Children come to school very different from one another in the experience they have had that prepares them for learning to read.
Development of Phonological Sensitivity

Cross-sectional study comparing the performance of 250 children from higher income families to 170 children from lower income families.

Children were between two- and five-years of age.
SES Differences in Phonological Sensitivity

Children completed tests of phonological sensitivity and awareness that assessed their ability to identify and blend words, syllables, onset-rimes, or phonemes.
To summarize:

Children can come to school weak in phonological ability either because of their biology or their language experience.

Regardless of whether they also have broader weaknesses in verbal ability, both types of children need similar intensive early reading support in order to prevent reading failure.
What is “Phonics”?

It is a kind of **knowledge**

Which letters are used to represent which phonemes

It is a kind of **skill**

Pronounce this word...

blit fratchet
Words that are part of, or related to, the “phonics” family

**Alphabetic Principal** - when we say children have acquired the “alphabetic principal” we mean they have acquired understanding and skill in phonics.

**Phonemic decoding** - the process of identifying unfamiliar words in text by using letter-sound relationships and blending.

**Decoding** - this word is often used to refer to the entire process of identifying words in text. Preferred use is to describe the complete process of identifying unfamiliar words.
Why is it important for children to acquire good phonemic decoding skills (phonics) early in reading development?

Because learning to read involves everyday encounters with words the child has never before seen in print.

Phonemic analysis provides the most important single clue to the identity of unknown words in print.
The most efficient way to make an “accurate first attempt” at the identity of a new word is:

First, do phonemic analysis and try an approximate pronunciation

Then, close in on the exact right word by finding one containing the right sounds, that also makes sense in the sentence.

(chapter 10, Preventing Reading Difficulties in Young Children (2000))
The boy ________the dog in the woods.

The boy ch ___d the dog in the woods
The connection to reading fluency:

To be a fluent reader, a child must be able to recognize most of the words in a passage “by sight”
These are interesting and challenging times for anyone whose professional responsibilities are related in any way to literacy outcomes among school children. For, in spite of all our new knowledge about reading and reading instruction, there is a widespread concern that public education is not as effective as it should be in teaching all children to read.
The report of the National Research Council pointed out that these concerns about literacy derive not from declining levels of literacy in our schools but rather from recognition that the demands for high levels of literacy are rapidly accelerating in our society.
The connection to reading fluency:

To be a fluent reader, a child must be able to recognize most of the words in a passage “by sight”

Children must correctly identify words 3-8 times before they become “sight words”

Children must make accurate first attempts when they encounter new words, or the growth of their “sight word vocabulary” will be delayed—they will not become fluent readers
Words likely to be encountered for the first time in first grade:

- animal
- faster
- happy
- never
- time
- sleep
- rabbit
<table>
<thead>
<tr>
<th>Words likely to be encountered for the first time in second grade</th>
<th>amaze</th>
<th>beach</th>
<th>comfortable</th>
<th>example</th>
<th>interesting</th>
<th>grease</th>
<th>stiff</th>
<th>sweep</th>
</tr>
</thead>
</table>

In the middle of the 3rd grade reading comprehension test, it was the ______ for a ______ to wear his full set of ______ whenever he ______ in ______ - even in times of ______! When a ______ believed he was ______ friends, he would ______ his ______. This ______ of ______ showed that the ______ felt ______ and safe.
Passage from 3rd grade reading comprehension test

During the middle ages, it was the custom for a knight to wear his full set of armor whenever he appeared in public - even in times of peace! When a knight believed he was among friends, he would remove his helmet. This symbol of friendship showed that the knight felt welcome and safe.
Becoming a fluent reader—from the bottom up

1. Students who acquire proficient phonemic decoding skills in first grade become accurate and independent readers by the middle or end of first grade.

2. Students who read accurately, and read a lot, acquire larger and larger vocabularies of words they can read “by sight.”

3. Fluent readers in third grade are those who can read almost all of the words in third grade text “by sight.”
One of the most important discoveries.....

“One of the great mysteries to challenge researchers is how people learn to read and comprehend text rapidly and with ease. A large part of the explanation lies in how they learn to read individual words. Skilled readers are able to look at thousands of words and immediately recognize their meanings without any effort.”

The Surprise Party

My dad had his fortieth birthday last month, so my mom planned a big surprise party for him. She said I could assist with the party but that I had to keep the party a secret. She said I couldn’t tell my dad because that would spoil the surprise.

I helped mom organize the guest list and write the invitations. I was responsible for making sure everyone was included. I also addressed all the envelopes and put stamps and return addresses on them.....
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From a recent multi-disciplinary scientific review of the research:

“From all these different perspectives, two inescapable conclusions emerge. The first is that mastering the alphabetic principle is essential to becoming proficient in the skill of reading....”

and the second is that instructional techniques (namely phonics) that teach this principle directly are more effective than those that do not.”

Recent Functional Neuroimaging findings on Adults
What have we discovered about the effects of remedial and preventive instruction on brain functioning?
Magnetic Source Imaging

• Detects small biomagnetic brain signals
• Provides real-time information about which brain areas are active and when during task performance
Neural Response to Intervention

Does the pattern of brain activation change in response to intervention?

8 children with severe dyslexia (7 to 17)

8 week intense phonologically-based intervention (2 hours a day = up to 80 hours of instruction)

Very large improvements in reading ability

Simos et al., *Neurology*, 2002
Decreased activity in right hemisphere

Increased activity in left hemisphere
Decreased activity in right hemisphere

Increased activity in left hemisphere
Students were identified as at risk for reading difficulties in kindergarten.

Received one year of intervention in first grade.
Kindergarten

S#1
Weak activation

S#31
Strong activation

Left Hemisphere  Right Hemisphere

At Risk
Not At Risk
Three potential stumbling blocks to becoming a good reader (NRC Report, 1998)

1. Difficulty learning to read words accurately and fluently

2. Insufficient vocabulary, general knowledge, and reasoning skills to support comprehension of written language

3. Absence or loss of initial motivation to read, or failure to develop a mature appreciation of the rewards of reading.
Language

Meaningful Differences
in the Everyday Experience of Young American Children

Betty Hart & Todd R. Risley

Forward by Lois Bloom
Hart and Risley (1995) conducted a longitudinal study of children and families from three groups:

- Professional families
- Working-class families
- Families on welfare
Hart & Risley compared the mean number of interactions initiated per hour in each of the three groups.
Hart & Risley also compared the mean number of minutes of interaction per hour in the three groups.
Cumulative Language Experiences

Cumulative Words Per Hour

- Welfare
- Working
- Professional
Cumulative Language Experiences

Cumulative Words Spoken to Child
(in millions)

Age of child
(in months)

Professional

Working

Welfare
The Effects of Weaknesses in Oral Language on Reading Growth
(Hirsch, 1996)

Reading Age

Level

Chronological Age

High Oral Language in Kindergarten

Low Oral Language in Kindergarten

5.2 years difference
Percentile scores on Peabody of 29,000 students in RF schools

Median Percentile

Bottom 20%

Percentile on test of Oral Vocab.

Kinder. 1st 2nd 3rd

32 32 37 34

12 8 9 12
Bringing Words to Life
Isabel Beck
M. McKeown
L. Kucan
Guilford Press
Big ideas from “Bringing Words to Life”

First-grade children from higher SES groups know about twice as many words as lower SES children

Poor children, who enter school with vocabulary deficiencies have a particularly difficult time learning words from “context”

Research has discovered much more powerful ways of teaching vocabulary than are typically used in classrooms – generalization to reading comprehension

A “robust” approach to vocabulary instruction involves directly explaining the meanings of words along with thought-provoking, playful, interactive follow-up.
Four Critical Elements for More Robust Vocabulary Instruction

Select the right words to teach – Tier 2 words
- absurd
- fortunate
- ridiculous

Develop child-friendly definitions for these words

Engage children in interesting, challenging, playful activities in which they learn to access the meanings of words in multiple contexts

Find a way to devote more time during the day to vocabulary instruction
A final concluding thought....

There is no question but that “leaving no child behind in reading” is going to be a significant challenge...

It will involve professional development for teachers, school reorganization, careful assessments, and a relentless focus on the individual needs of every child...

But, it's not the most difficult thing we could be faced with...
Consider this task for example...
Questions/
Discussion