

Reading Fluency: How does it develop and how can we improve it in children with reading disabilities?

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How does phonemic awareness
contribute to the acquisition of
reading fluency?

Phonemic awareness has its initial impact on the growth of reading skill by helping children improve the accuracy of their “first guesses” at the identity of unknown words in text.

1. It helps children understand the alphabetic principle

Children must understand that the words in their oral language are composed of small segments of sound in order to comprehend the way that language is represented by print.

Without at least emergent levels of phonemic awareness, the rationale for learning individual letter sounds, and “sounding out” words is not understandable.

In order to begin to use the alphabetic principle in reading, children must have knowledge and skill in three areas:

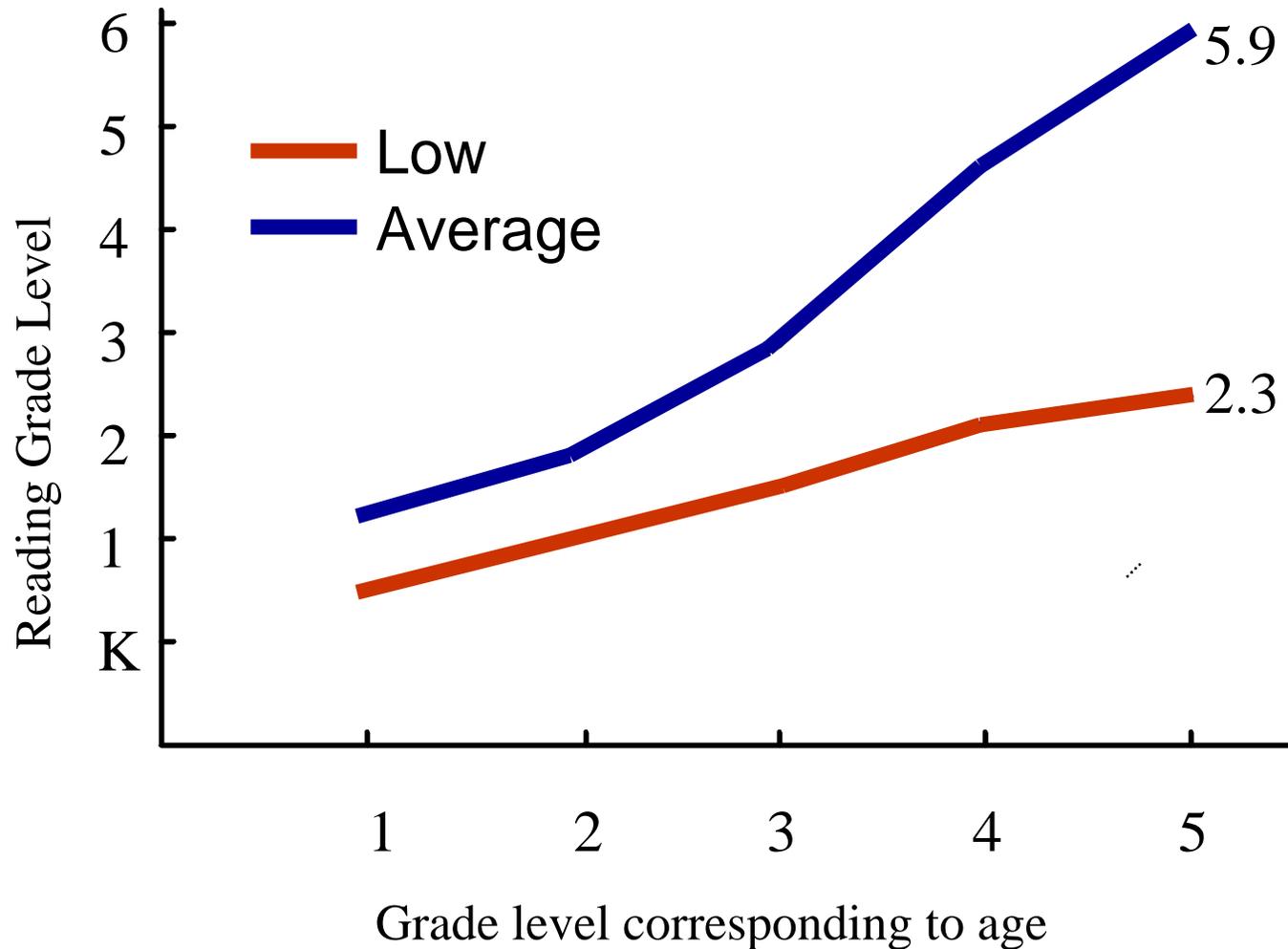
1. Letter-sound knowledge
2. Basic phonological awareness
3. ability to use context to help identify words once they are partially decoded phonetically.

2. It makes it possible to generate possibilities for words in context that are only partially “sounded out.”

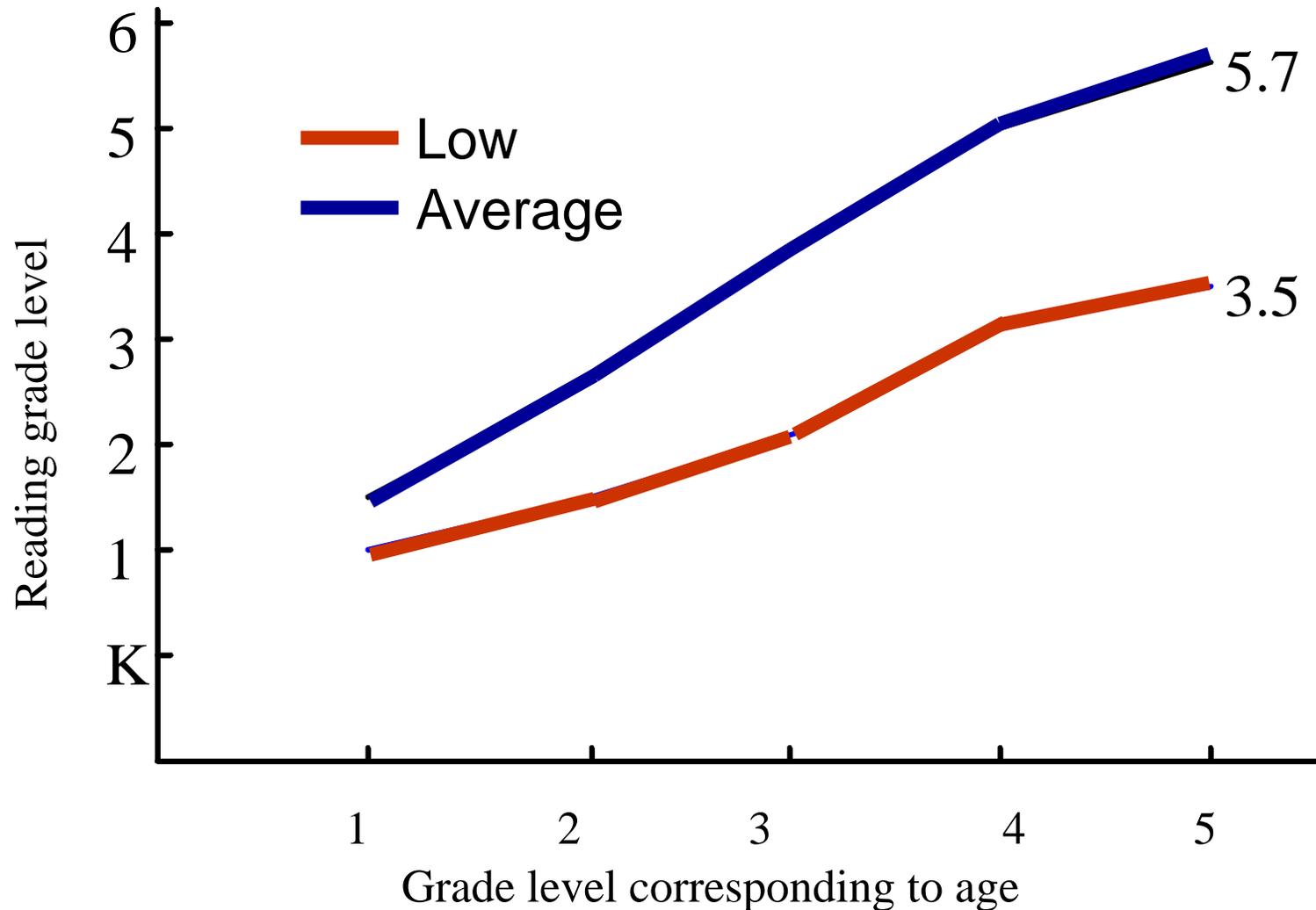
The boy _____ the dog in the woods.

The boy ch ____ the dog in the woods

Growth in “phonics” ability of children who begin first grade in the bottom 20% in Phoneme Awareness and Letter Knowledge (Wagner, Torgesen, Rashotte, et al., 1997)

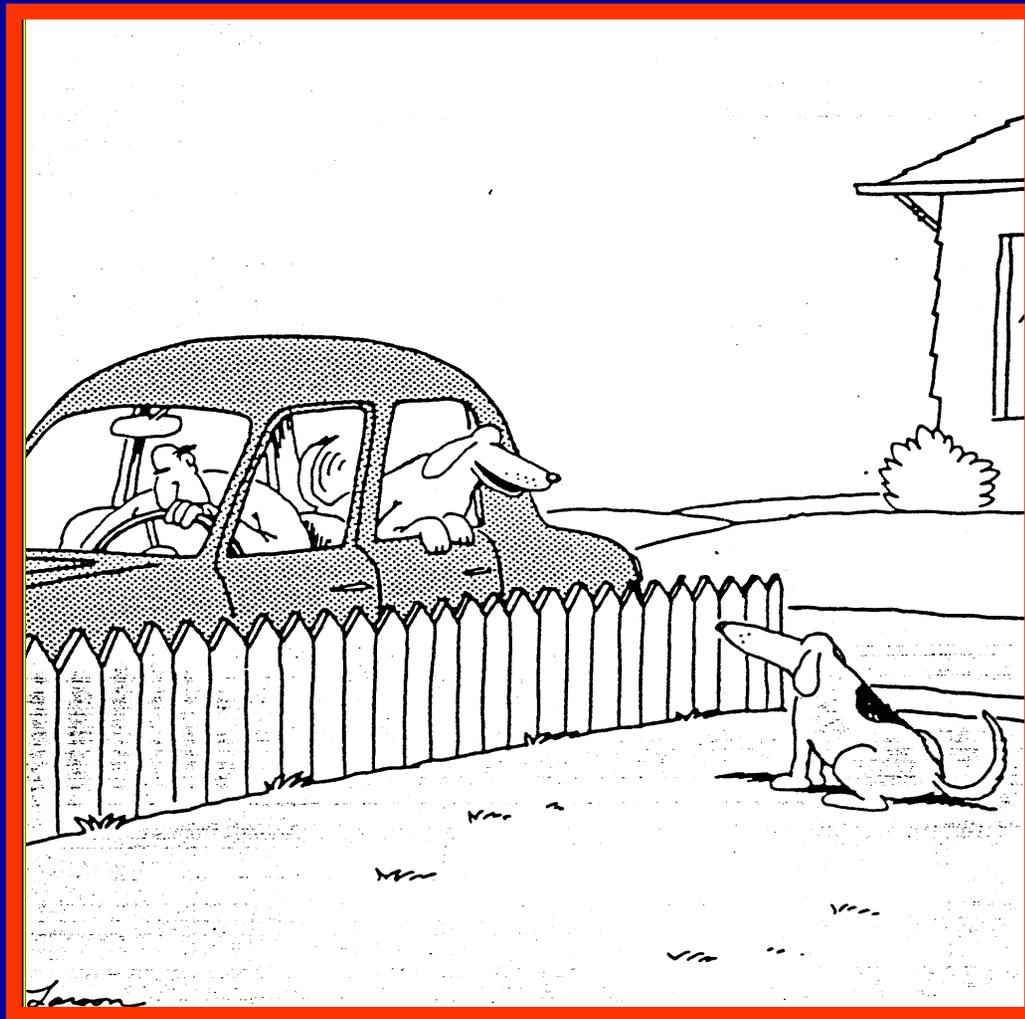


Growth in word reading ability of children who begin first grade in the bottom 20% in Phoneme Awareness and Letter Knowledge (Wagner, Torgesen, Rashotte, et al., 1997)



Some phonological humor....

Deficits in phonemic awareness create problems for many children, but they can also be devastating for dogs



"Ha, ha, Biff. Guess What? After we go to the drugstore and the post office, I'm going to the vet's to get tutored."

To summarize....

Early development of phonemic awareness is important to reading development because it helps students acquire phonemic decoding skills, which improves reading accuracy

The most widely accepted definition of fluency

“Fluency is the ability to read text quickly, accurately, and with proper expression”

National Reading Panel

Since we know that prosody is at least partially an index of comprehension...

Fluency is the ability to read text quickly, accurately, and with good comprehension

However, because it is difficult to measure both prosody and comprehension with a brief test on a large scale,

and because reading rate is strongly correlated with comprehension....

Most schools set their end-of-year targets, or benchmarks for reading fluency in terms of oral reading rate - the number of words per minute that can be read correctly on a grade level passage

Factors that might potentially influence oral reading rate

1. Proportion of words in text that are recognized as “sight words.”
2. Speed with which sight words are processed - affected by practice or individual differences in basic processing speed.
3. Speed of processes used to identify novel or unknown words -- phonetic decoding, analogy, context.
4. Speed with which word meanings are identified.
5. Speed at which overall meaning is constructed
6. Contextual affects on speed of word recognition-the “comprehension effect”
7. Individual choices about the trade-off between speed and accuracy

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These are iNTirEStinG and cHallinGinG times for anyone whose pRoFEshuNle responsibilities are rEelaTed in any way to liTiRucY outcomes among school children. For, in spite of all our new NaWLEGe about reading and reading iNstRukshun, there is a wide-spread concern that public EdgUkAshuN is not as eFfEktlve as it shood be in tEechHiNg 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.

What is a “sight word”?

“Sight words are words that readers have read accurately on earlier occasions. They read the words by remembering how they read them previously. The term sight indicates that sight of the word activates that word in memory, including information about its spelling, pronunciation, typical role in sentences, and meaning” (Ehri, 1998)

“ Sight of the word activates its pronunciation and meaning in memory immediately without any sounding out or blending required. Sight words are read as whole units with no pauses between sounds” (Ehri, 2002))

“Sight words include any word that readers have practised reading sufficiently often to be read from memory” (Ehri, 2002))

According to our current understanding, a significant part of understanding how children become fluent readers by 3rd or 4th grade involves understanding how they learn to recognize many thousands of words at a single glance.

something decide money then said

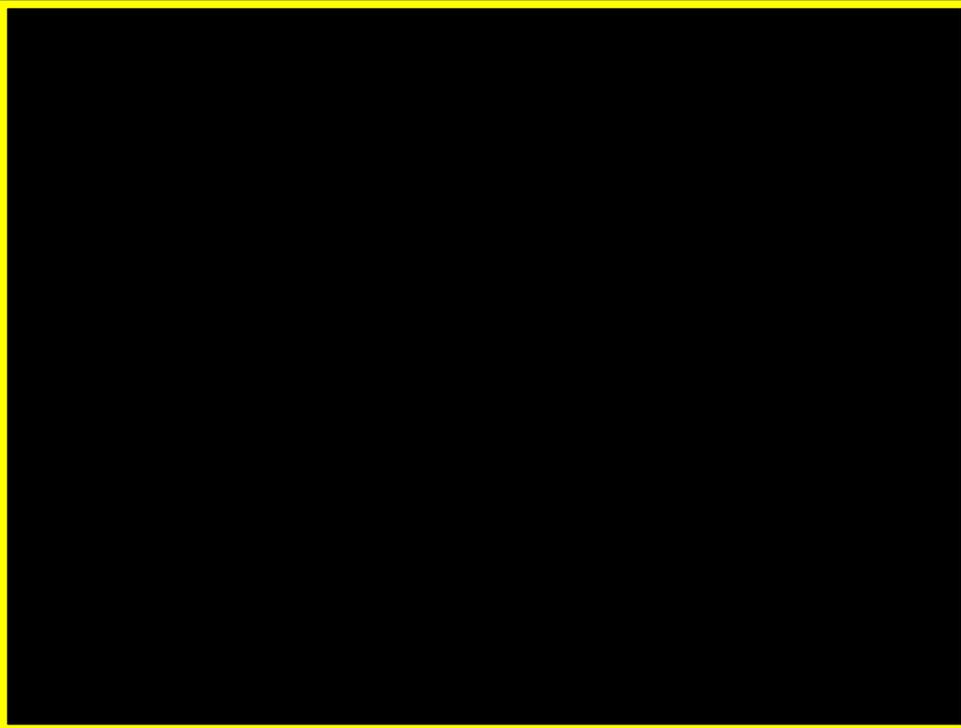


December, 3rd Grade
Correct word/minute=60
19th percentile

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.....



December, 3rd Grade
Correct word/minute=128
78th percentile

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.....

The most complete current theory of how children form sight word representations has been developed by Linnea Ehri (Ehri, 1998, 2002)

The theory begins with the statement that “the process at the heart of sight word learning is a connection-forming process. Connections are formed that link individual written words to their pronunciations and meanings in memory

The distinctive contribution of the theory is that it describes what kinds of connections are most likely used to remember sight words.

What are some potential connections that might serve?

Associations between the visual features of words and their meanings.

Shape -- on ate tent

But what about -- stick, sting, sling, string, sink, stink, stick

Sight word reading must involve remembering the letters in the words; these are the distinctive features that make one word different from another.

What are some potential connections that might serve?

However, if these letter sequences were linked arbitrarily to meaning, it would be a very difficult memorization task.

recognize something excitement

“A mnemonically powerful system is needed to explain learning as rapid as occurs for sight words.”

Further, if letters were connected arbitrarily to meaning, we would expect many more synonymous substitutions in reading.

Reading student for pupil

Instead--puppet for pupil

mad for angry

angel for angry

recover for found

fund for found

Instead of arbitrary connections between visual features and meaning, Ehri's theory proposes:

“..that pronunciations of words are the anchors for written words in memory. Readers learn sight words by forming connections between letters seen in spellings of words and sounds detected in their pronunciations already present in memory.”

“When readers learn sight words, they look at the spelling, pronounce the word, and analyse how the graphemes match up to phonemes in that word. Reading the word a few times secures its connections in memory.”

For a reader with well developed phonemic awareness, the phonological structure of a word, which is already known, serves as a mnemonic for remembering the letters in its spelling.

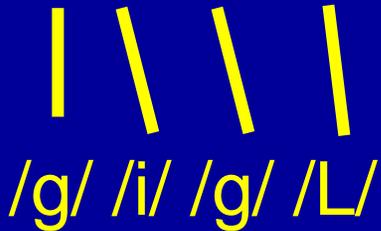
S T O P



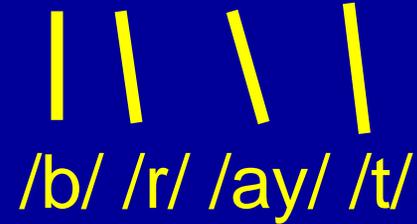
B I R D



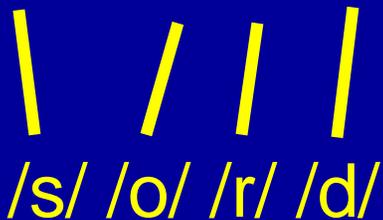
G I G G L E



B R I G H T



S W* O R D



I S* L A N D



“...readers learn to process written words as phonemic maps that lay out elements of the pronunciation visually. Beginners become skilled at computing these mapping relations spontaneously when they read new words. This is the critical event for sight word learning. Grapho-phonemic connections provide a powerful mnemonic system that bonds written words to their pronunciations in memory along with meanings. Once the alphabetic mapping system is known, readers can build a vocabulary of sight words easily. “

Relating the growth of phonemic decoding skills to the quality of orthographic representations required for recognizing words at a single glance

Phases in development of word reading influence the quality of sight word representations

Pre-alphabetic phase -- children do not use letter-sound connections to read words. They remember selected visual features.

Look dog spiderman

Partial alphabetic phase -- children form connections between some of the letters and sounds in words

Jail -- JL

house -- HS

clap CP

Two kinds of weaknesses in word reading

1. Inability to completely segment sounds in words
2. Incomplete knowledge of sound-letter relations-- particularly vowels

Alphabetic phase -- children form connections between all of the letters and sounds in words. Representations are more complete, and reading is more accurate

As children's increasingly developed phonemic skills lead to more detailed analysis of the internal structure of words in print, they begin to acquire increasingly explicit and more fully specified orthographic representations. *However, if their phonetic skills do not develop, their orthographic representations are likely to remain incompletely specified, and they will be inaccurate readers and poor spellers.*

Which is the real word?

smoak smoke

circus cercus

wagon wagun

first ferst

traid trade

Consolidated alphabetic phase -- children form connections between frequent letter patterns (est, ing, at) and groups of sounds.

ch est
/ / \
/ch/ /est/

in ter est ing
/ / \< \
/in/ /ter/ /est/ /ing/

Summary of the connection between reading fluency and phonemic awareness

1. A major factor that determines reading fluency is the proportion of words in a passage that can be recognized as sight words.
2. Phonemic awareness contributes to the development of sight words in two ways:
 - A. It helps children to make more accurate “first guesses” when they encounter a word for the first time.
 - B. It helps them use the phonemic structure of words as a mnemonic for remembering the letters in a word’s spelling. Thus, it is directly helpful in forming fully developed sight word representations in memory.

Implications for instruction

1. Phonemic awareness should be stimulated early in development as one key to accurate reading of words when they are first encountered in print
2. The growth of phonemic awareness should be monitored to insure that it attains the full phonemic level
3. Letter representations of all 44 phonemes should be taught
4. Young children should be encouraged and supported to do lots of reading-- there should be lots of opportunities for guided oral reading (reading with feedback).
5. Text that is specifically written to provide extra practice opportunities for high-utility “core vocabulary” words may be particularly efficient for building fluency through early acquisition of high frequency words in sight vocabularies



Examine outcomes from six clinical or experimental studies of remedial interventions with children from 10-12 years of age experiencing reading difficulties

Three samples of severely disabled children with beginning word level skills around the 2nd percentile

Two samples of moderately disabled children with beginning word level skills around the 10th percentile

One sample of mildly impaired children with beginning word level skills around the 30th percentile.

Instructional Effectiveness Measured by Outcomes in Four Areas

Phonemic Decoding Accuracy -- skill at using sound-letter relationships to decode novel words

Text reading accuracy -- Accuracy with which individual words are identified in text

Text reading fluency -- speed of oral reading of connected text

Reading Comprehension -- accuracy with which meaning is constructed during reading

Outcomes measured in standard scores. An improvement in standard score means that a child is improving his/her reading skills compared to average readers. On all the measures used here, 100 is average.

A study of intensive, highly skilled intervention with 60 children who had severe reading disabilities

Children were between 8 and 10 years of age

Had been receiving special education services for an average of 16 months

Nominated as worst readers: at least 1.5 S.D's below grade level

Average Word Attack=69, Word Identification=69, Verbal IQ=93

Randomly assigned to two instructional conditions that both taught “phonics” explicitly, but used different procedures with different emphasis

Children in both conditions received 67.5 hours of one-on-one instruction, 2 hours a day for 8 weeks

Children were followed for two years after the intervention was completed

Time x Activity Analyses for an approach with very strong emphasis on phonemic awareness and phonemic decoding(LIPS)

Phonemic Awareness and
Phonemic Decoding

85%

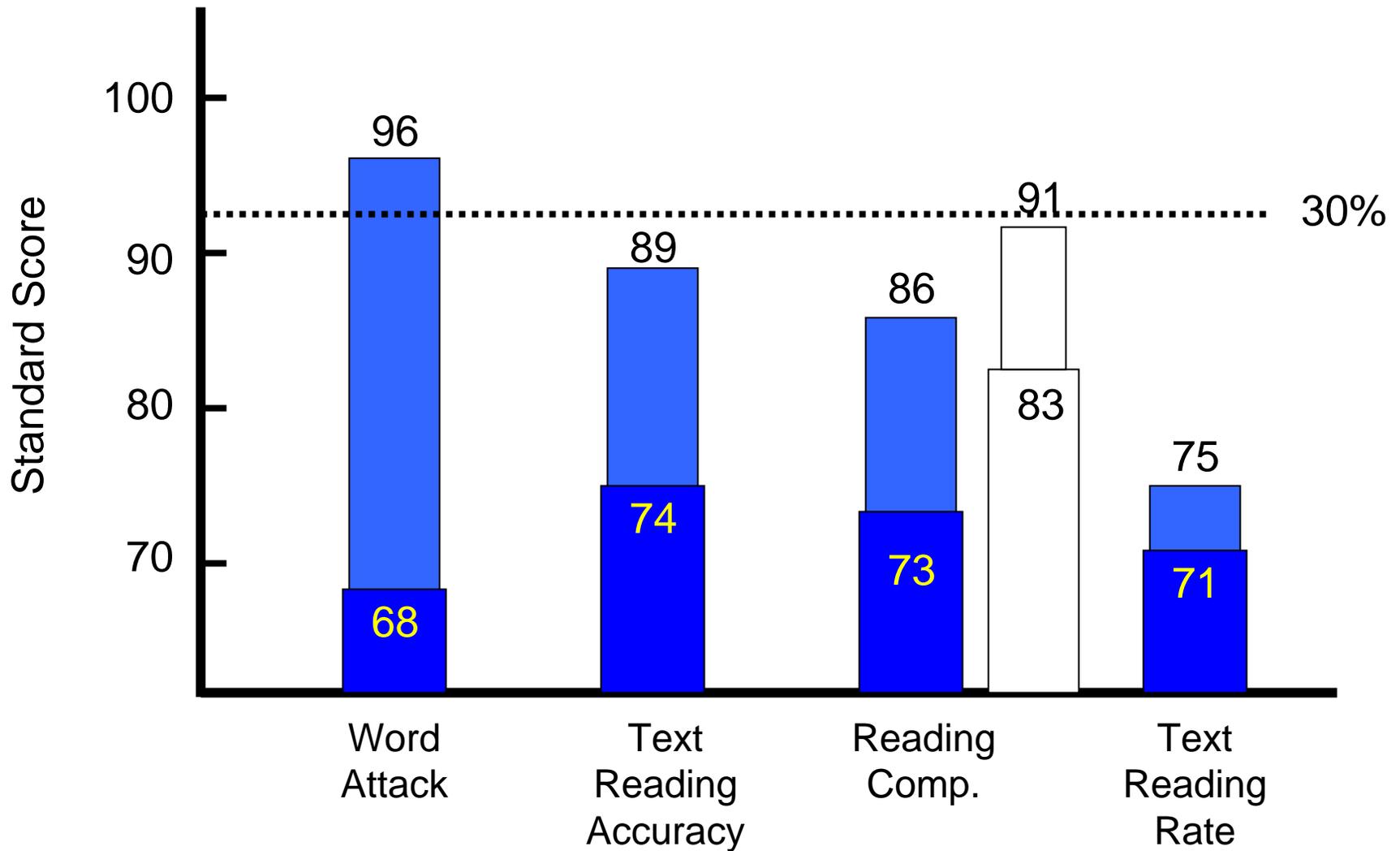
Sight Word Instruction

10%

Reading or writing
connected text

5%

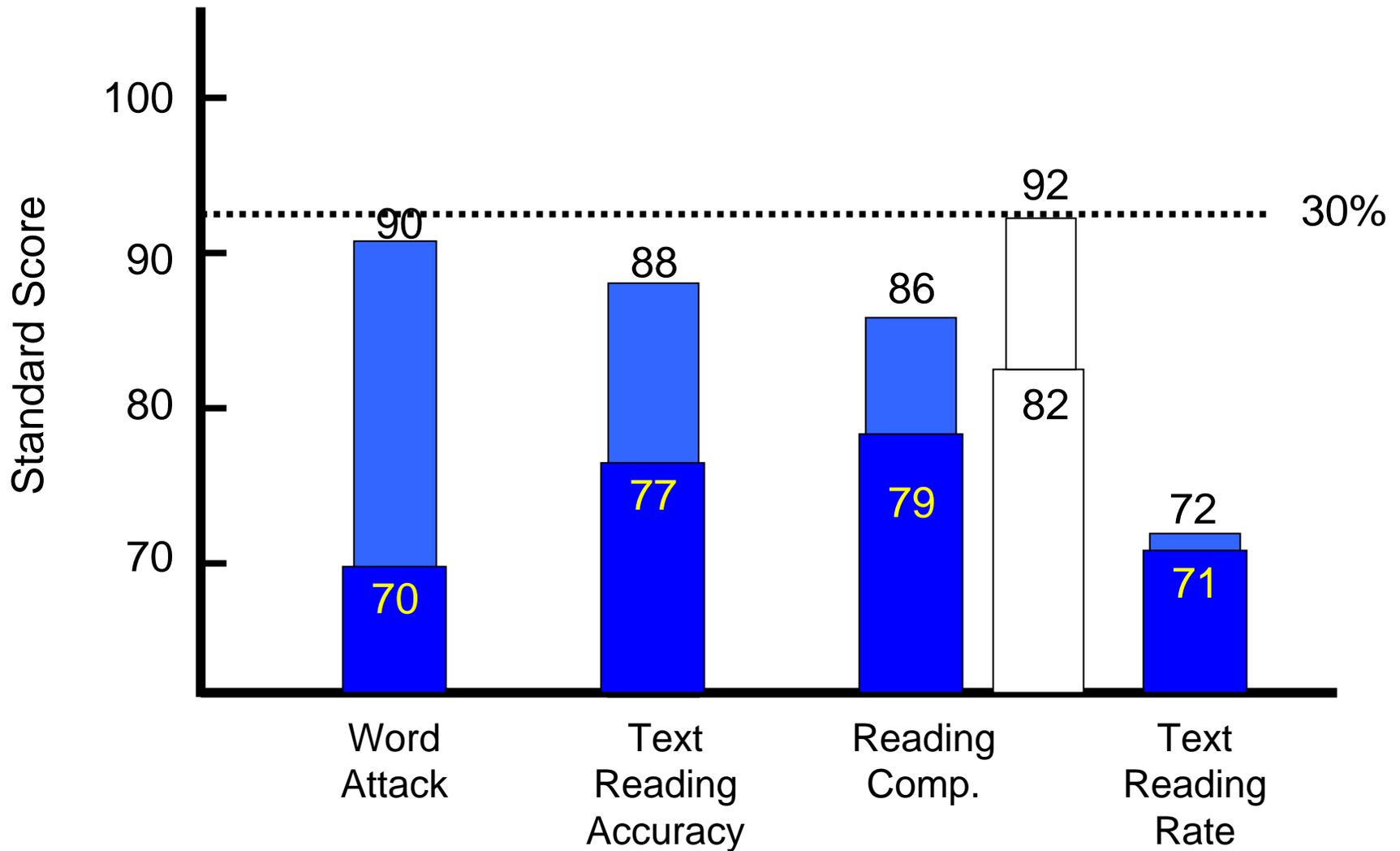
Outcomes from 67.5 Hours of Intensive Intervention-LIPS



Time x Activity Analyses for an approach that emphasized guided reading of text with online correction and feedback (EP)

	<u>LIPS</u>	<u>EP</u>
Phonemic Awareness and Phonemic Decoding	85%	20%
Sight Word Instruction	10%	30%
Reading or writing connected text	5%	50%

Outcomes from 67.5 Hours of Intensive Intervention-EP



Oral Reading Fluency was much improved on passages for which level of difficulty remained constant

Absolute change in rate from pretest to posttest.

Most difficult
passage

Pretest -- 38 WPM, 10 errors

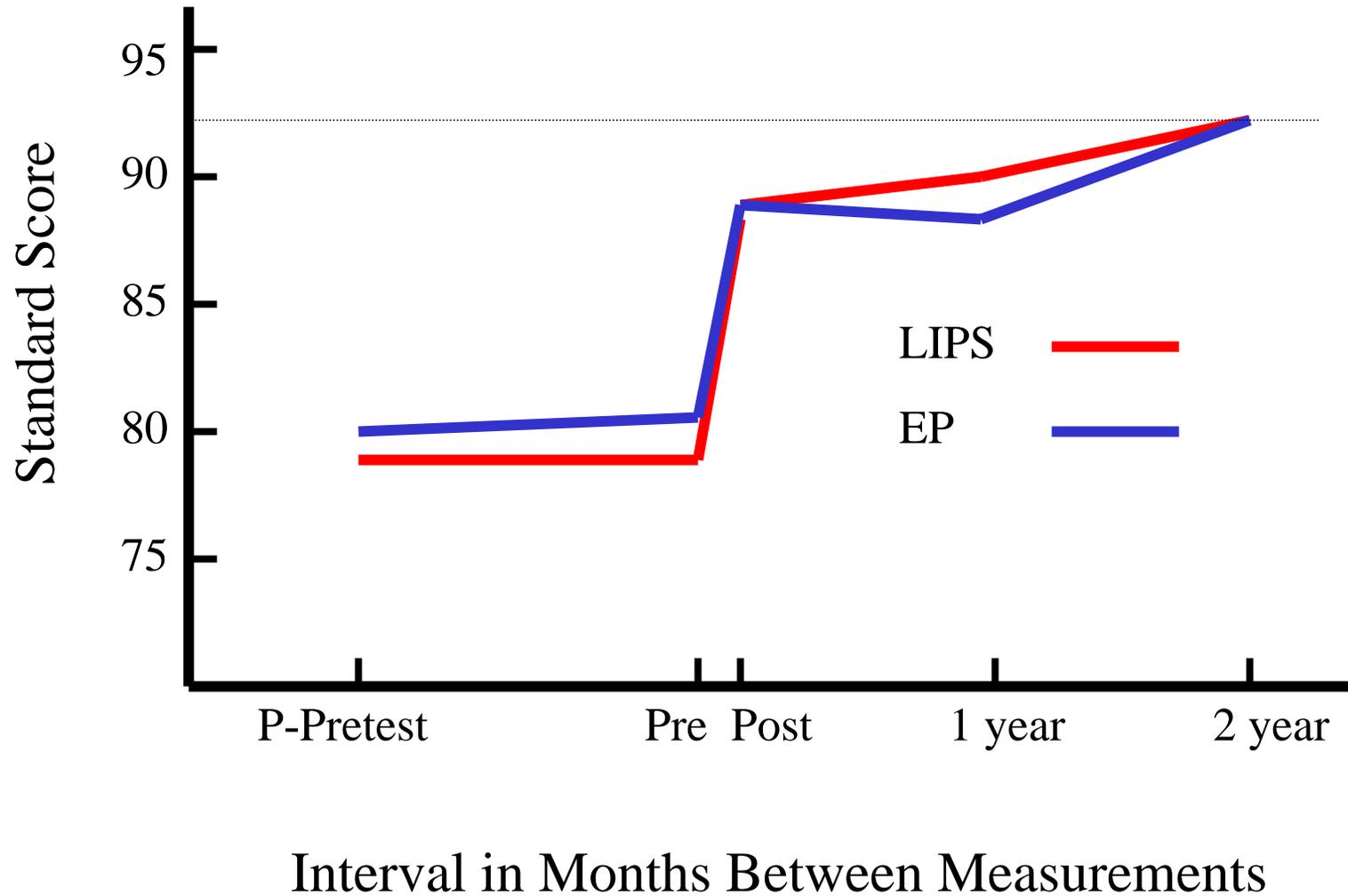
Posttest -- 101 WPM, 2 errors

Next most difficult
passage

Pretest -- 42 WPM, 6 errors

Posttest -- 104 WPM, 1 error

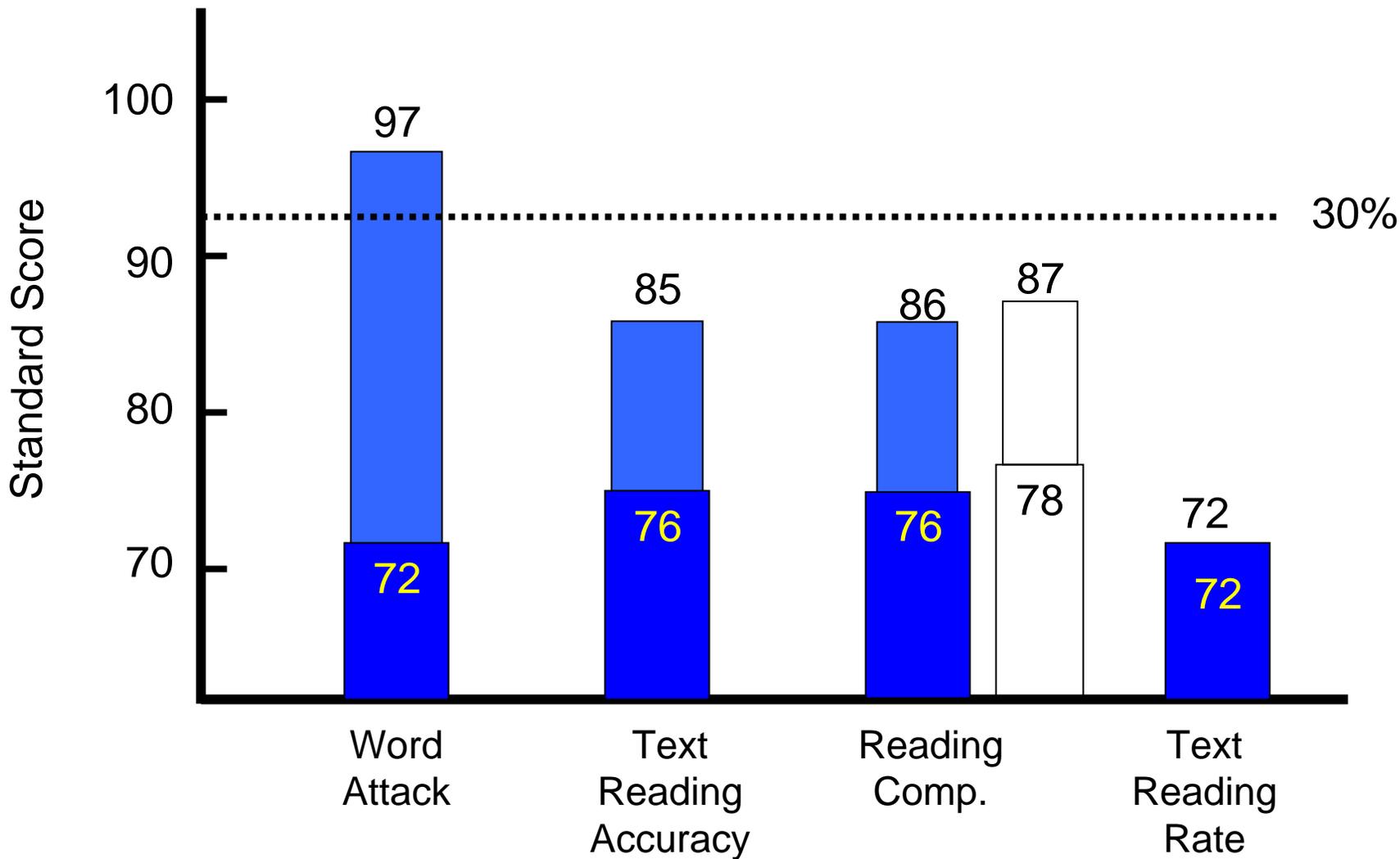
Growth in Total Reading Skill Before, During, and Following Intensive Intervention



Major differences between Accuracy and Accuracy + Fluency Groups

	<u>Accuracy</u>	<u>Accuracy + Fluency</u>
First 33 Hrs. 1:1	LIPS	LIPS
Next 50 Hrs. 1:1	LIPS	70% LIPS, 30% Fluency
Next 50 Hrs. Sm. Grp.	Extended LIPS Comprehension V V Accuracy Oriented Text practice	Comprehension--V V Repeated reading practice with text and word drills

Outcomes from 133 Hours of Intensive LIPS + Fluency+ Comprehension Intervention



A Brief Description of the Spell/Read P.A.T. program

Distribution of activities in a typical 70 minute session:

40 minutes -- Phonemic awareness/phonics

20 minutes -- shared reading

7 minutes -- writing about what was read

3 minutes -- wrap up

Systematic instruction in phonic elements beginning with mastery of 44 phonemes at single syllable level through multi-syllable strategies. Fluency oriented practice from beginning of instruction. Discussion and writing to enhance comprehension.

A Clinical Sample of 48 Students aged 8-16

Middle and upper-middle class students

Mean Age 11 years

79% White, 67% Male

Received 45-80 hours (mean=60) hours of instruction

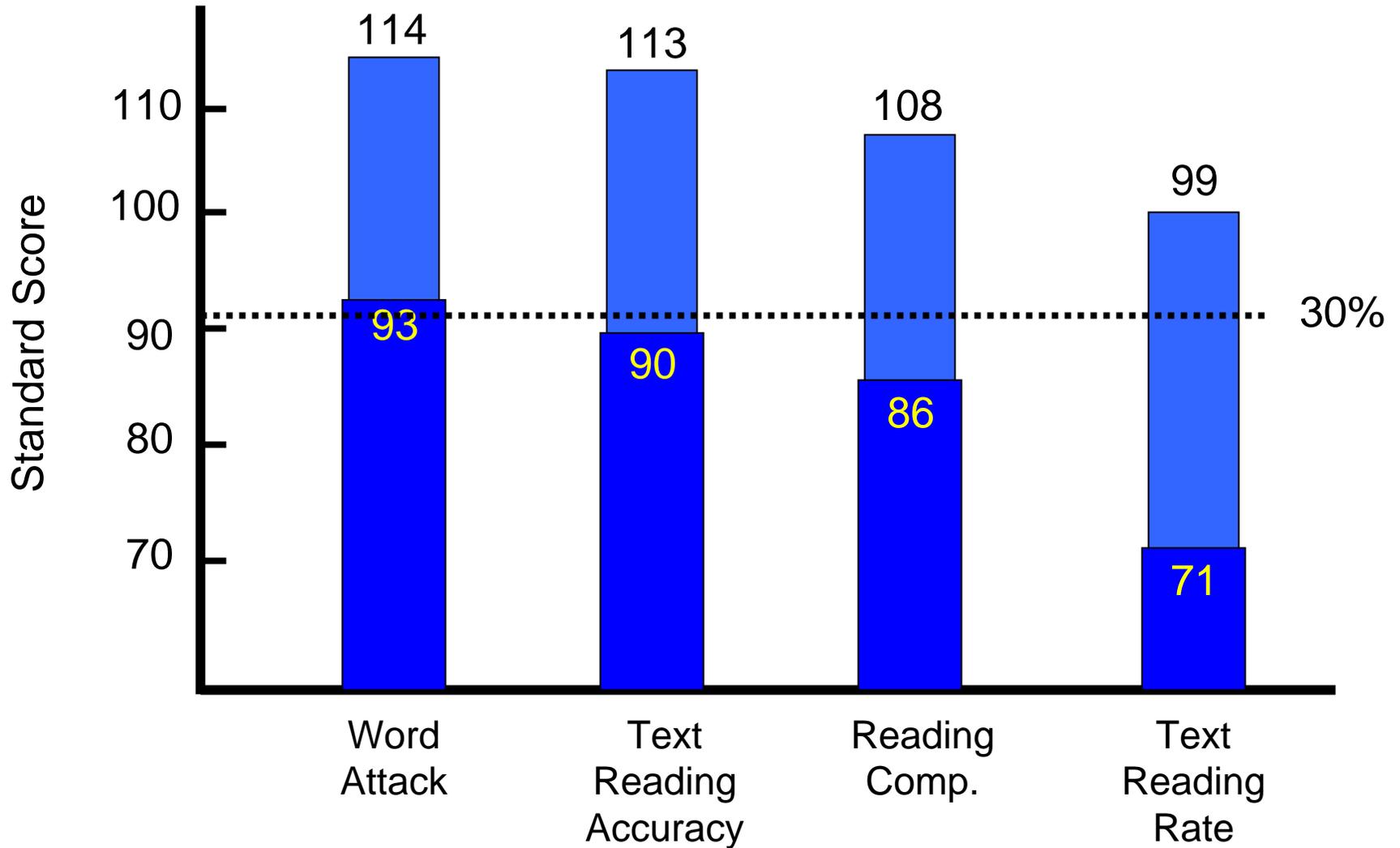
Intervention provided in groups of 2-4

Remedial Method: Spell Read P.A.T.

Mean beginning Word Identification Score = 92

Children with word level skills around the 30th percentile

Outcomes from 60 Hours of Small Group Intervention with upper middle class students--Spell Read



A Middle School Sample of 14 Students aged 11-14

Working class students

Mean Age 12 years

39% White, 64% Male

Received 37-58 hours (mean=51.4) hours of instruction

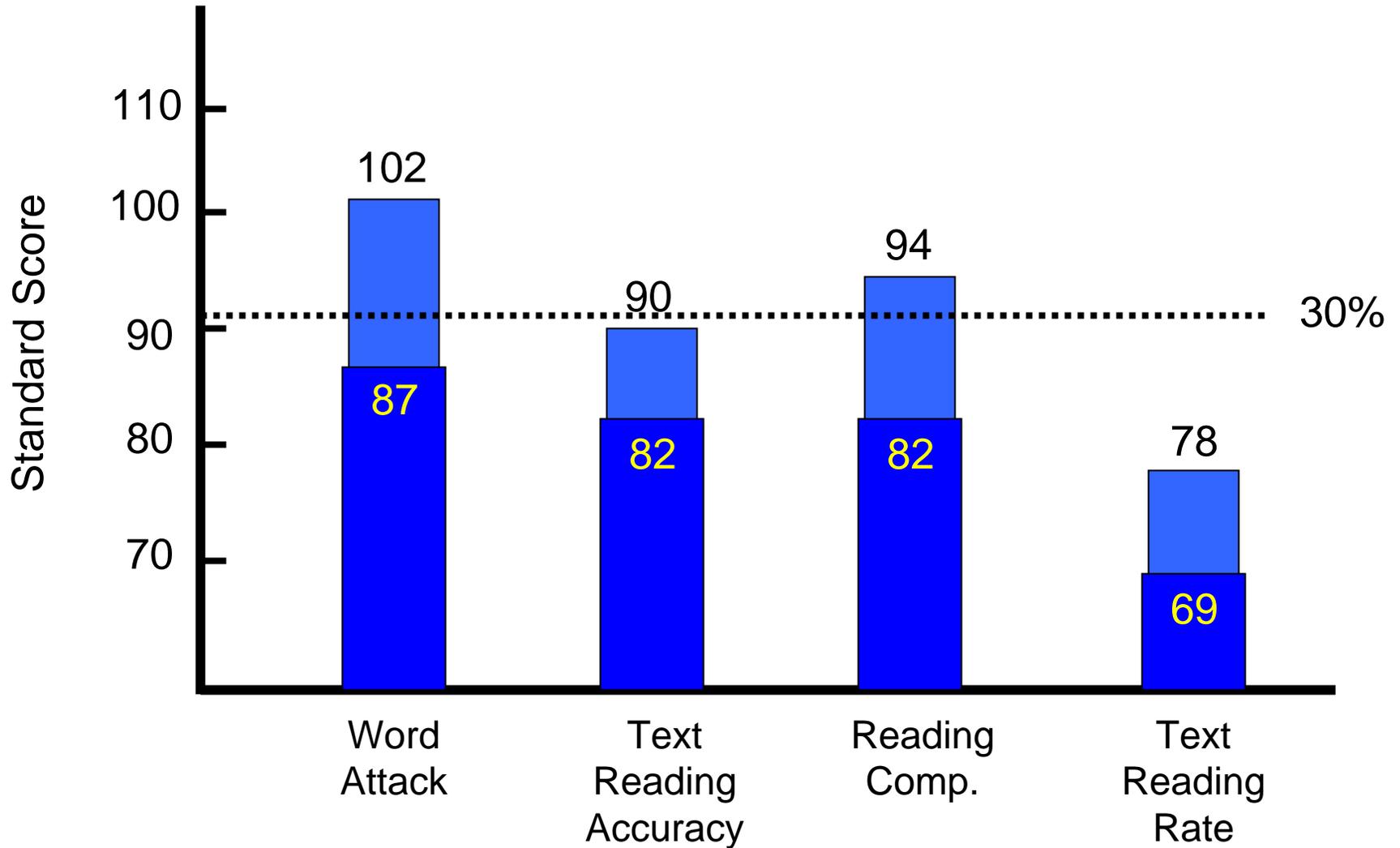
Intervention provided in groups of 2-4

Remedial Method: Spell Read P.A.T.

Mean Word Identification Score = 80

Children with word level skills around the 10 percentile

Outcomes from 50 Hours of Small Group Intervention with working class students--Spell Read



A School-based, treatment control study of 40 students

60% Free and reduced lunch

Mean Age 12 years (range 11-14)

45% White, 45% Black, 10% other

53% in special education

Received 94-108 hours (mean=100) hours of instruction

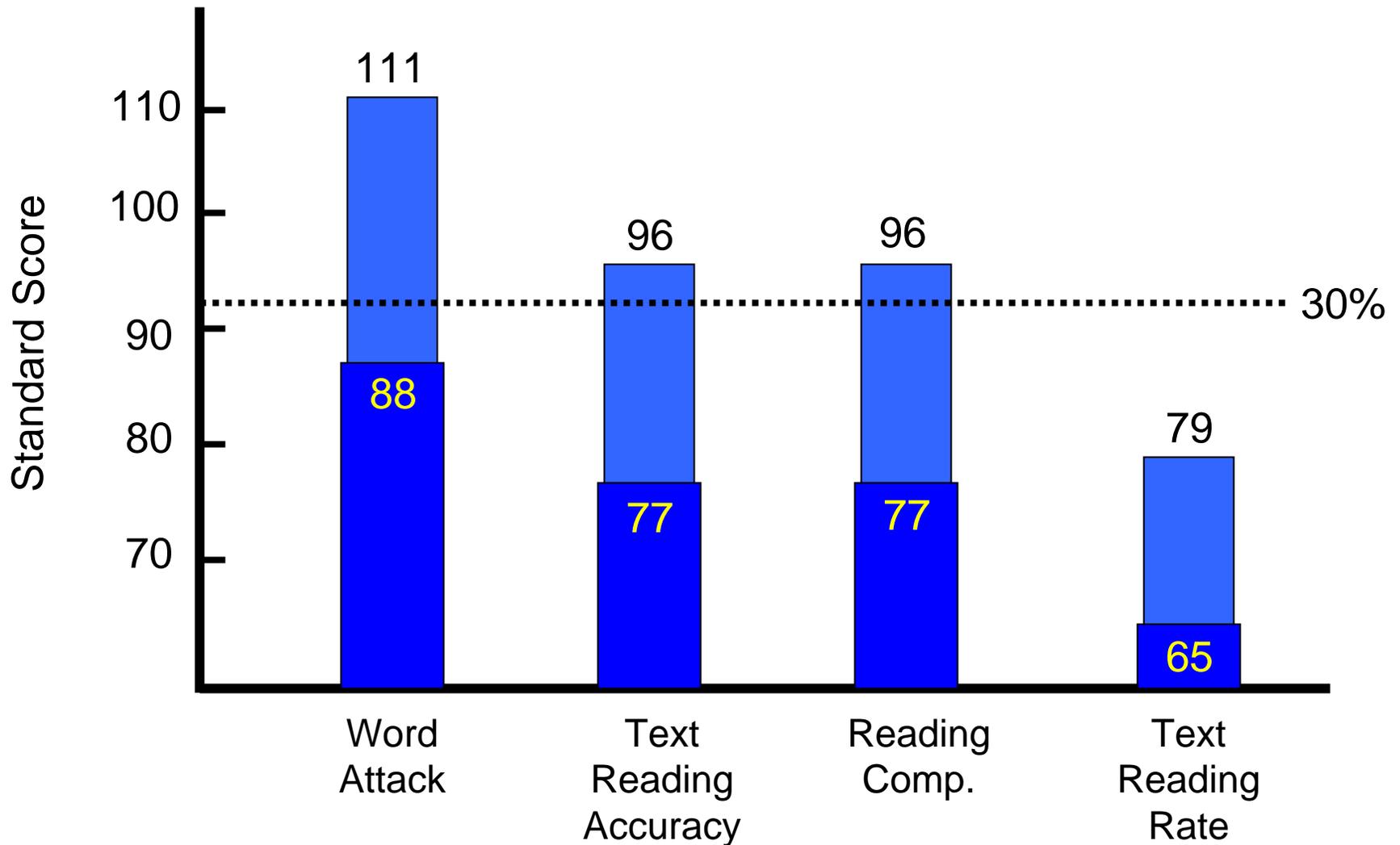
Intervention provided in groups of 4-5

Remedial Methods: Spell Read P.A.T., Soar to Success

Mean Word Identification Score = 83

Children begin with word level skills around 10th percentile

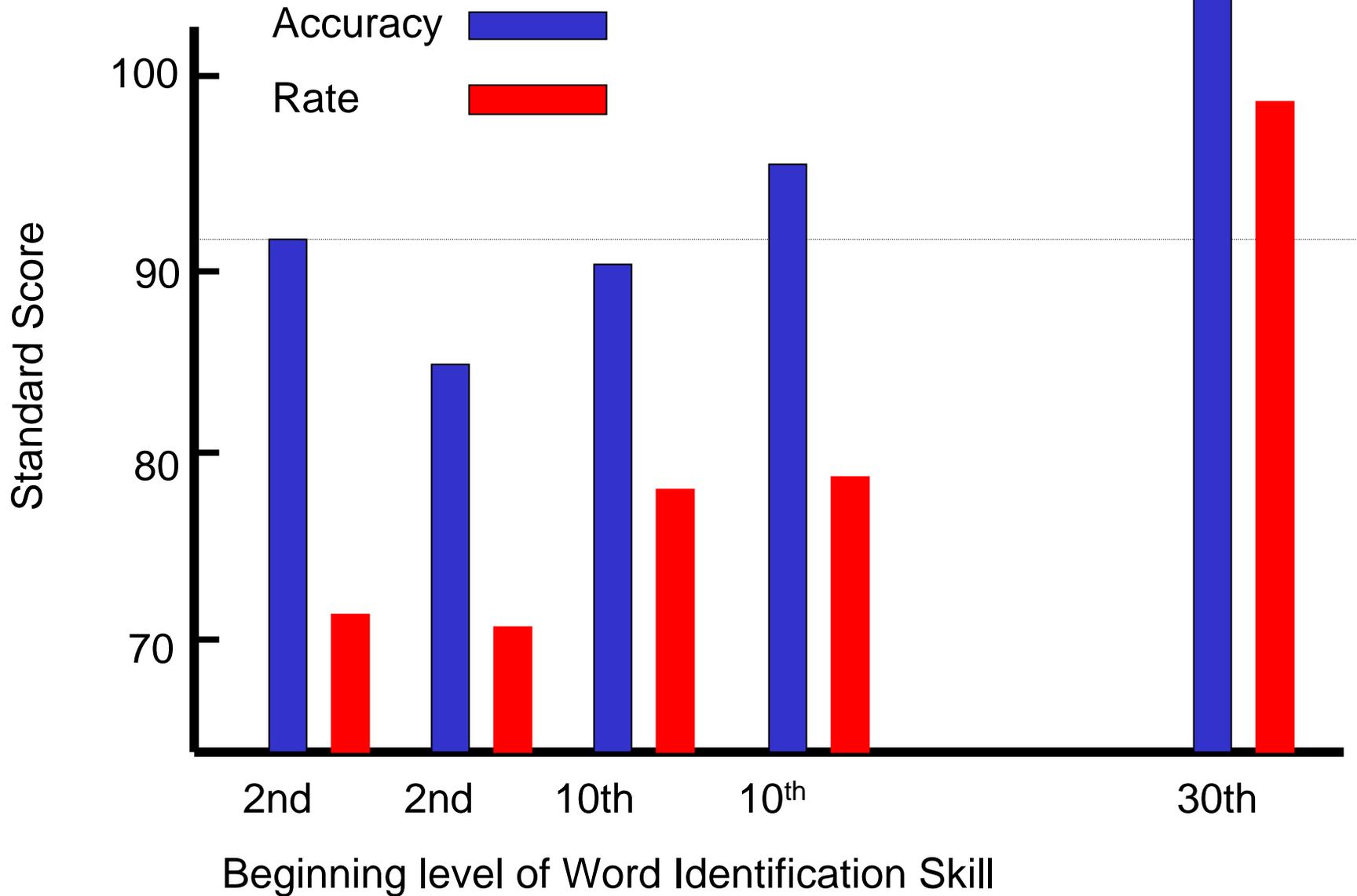
Outcomes from 100 Hours of Small Group Intervention--Spell Read



Summary and Conclusions:

1. For many older children with word level reading skills around the 30th percentile, a relatively brief (60hrs) dose of appropriate small group instruction can bring their skills in phonemic decoding, text reading accuracy and fluency, and comprehension solidly into the average range.
2. For many older children with word level reading skills around the 10th percentile, a more substantial dose (100hrs) of appropriate small group instruction can bring their skills in phonemic decoding, text reading accuracy, and reading comprehension solidly into the average range. Although the gap in reading fluency can be closed somewhat, reading fluency is likely to remain substantially impaired.
3. For older children with word level reading skills around the 2nd percentile, intensive interventions can have a strong effect on phonemic decoding, text reading accuracy, and reading comprehension, but they are likely to leave the fluency gap essentially unaffected.

Disparity in outcomes for rate vs. accuracy in five remediation studies



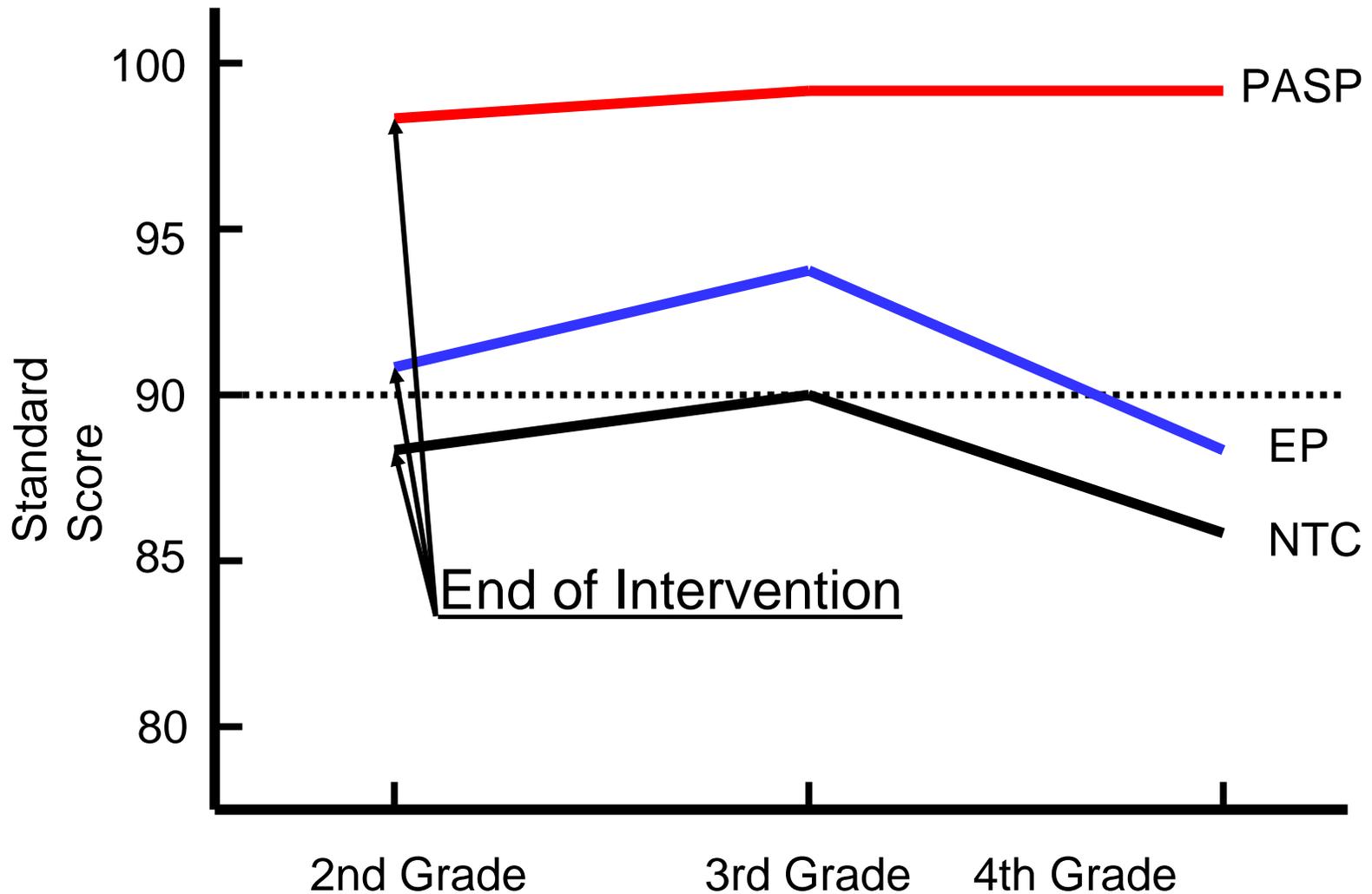
What happens to accuracy and fluency of reading scores when children receive powerful preventive instruction?

Children were identified in kindergarten and received 2 1/2 years of preventive instructional support.

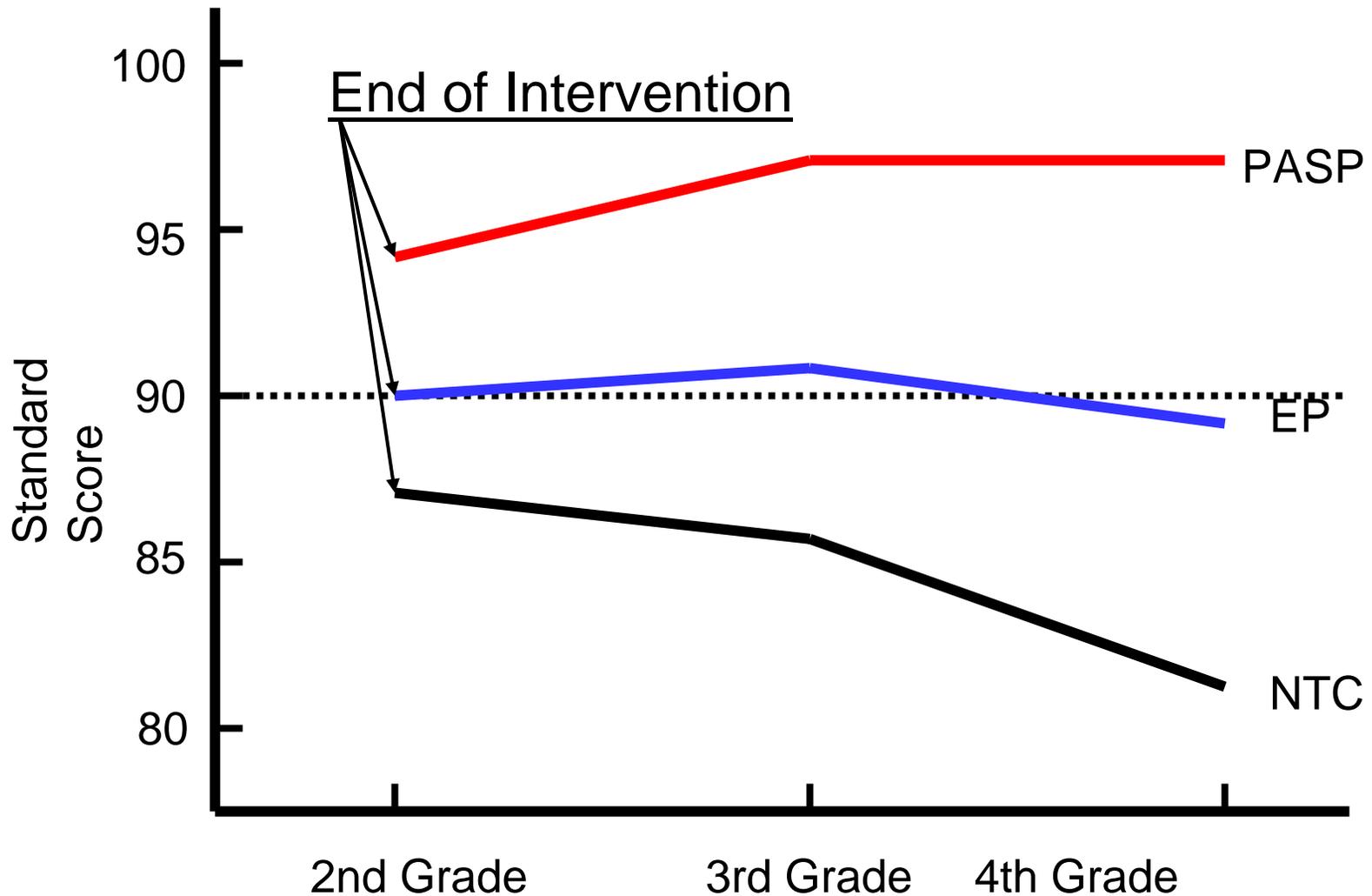
Curriculum featured multi-sensory, explicit instruction in phonemic awareness and phonics

Children were taught 1:1 in 20 minute sessions four times a week: half the sessions were taught by well trained teachers, and half were taught by aides.

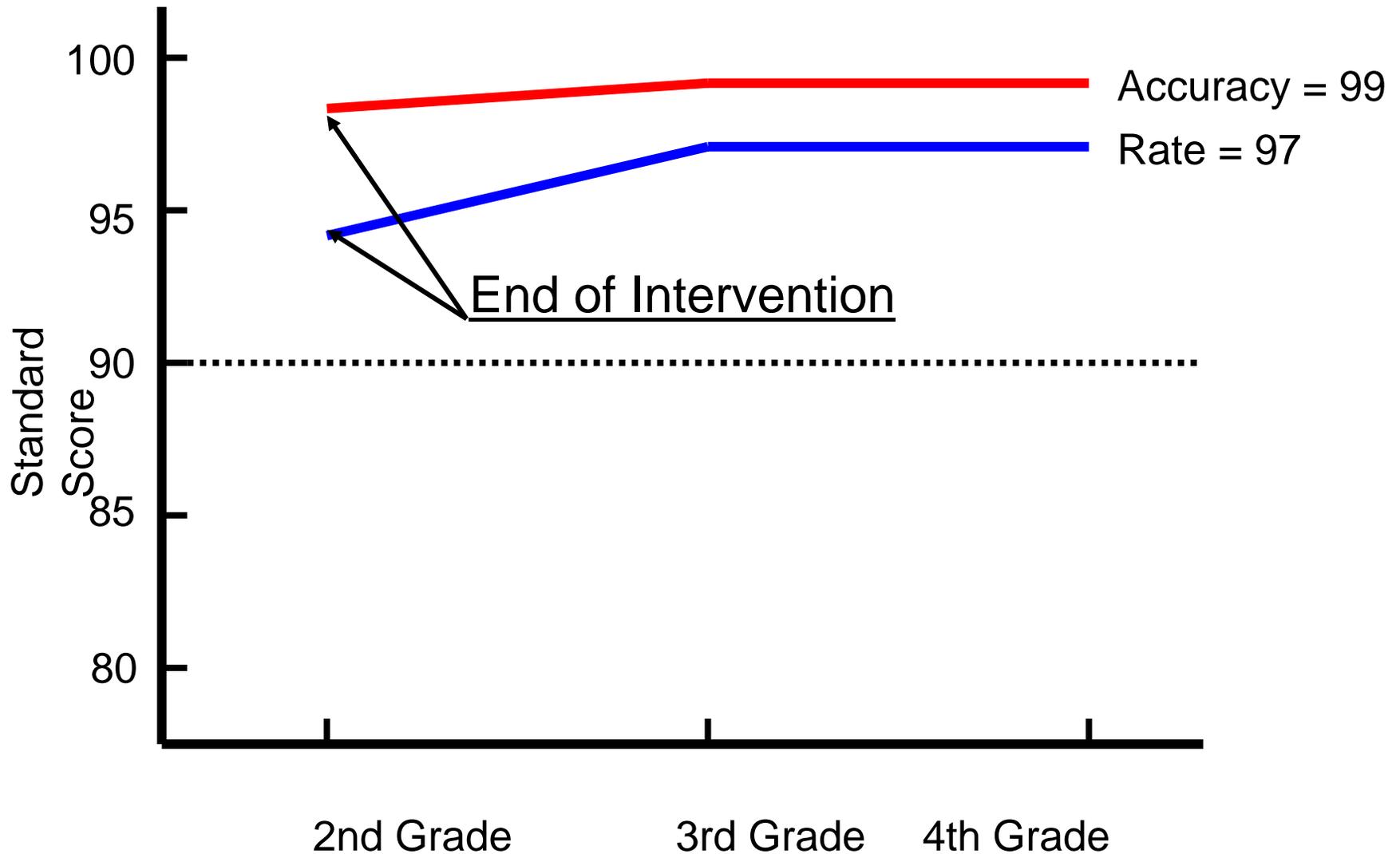
Follow-up growth in text reading accuracy



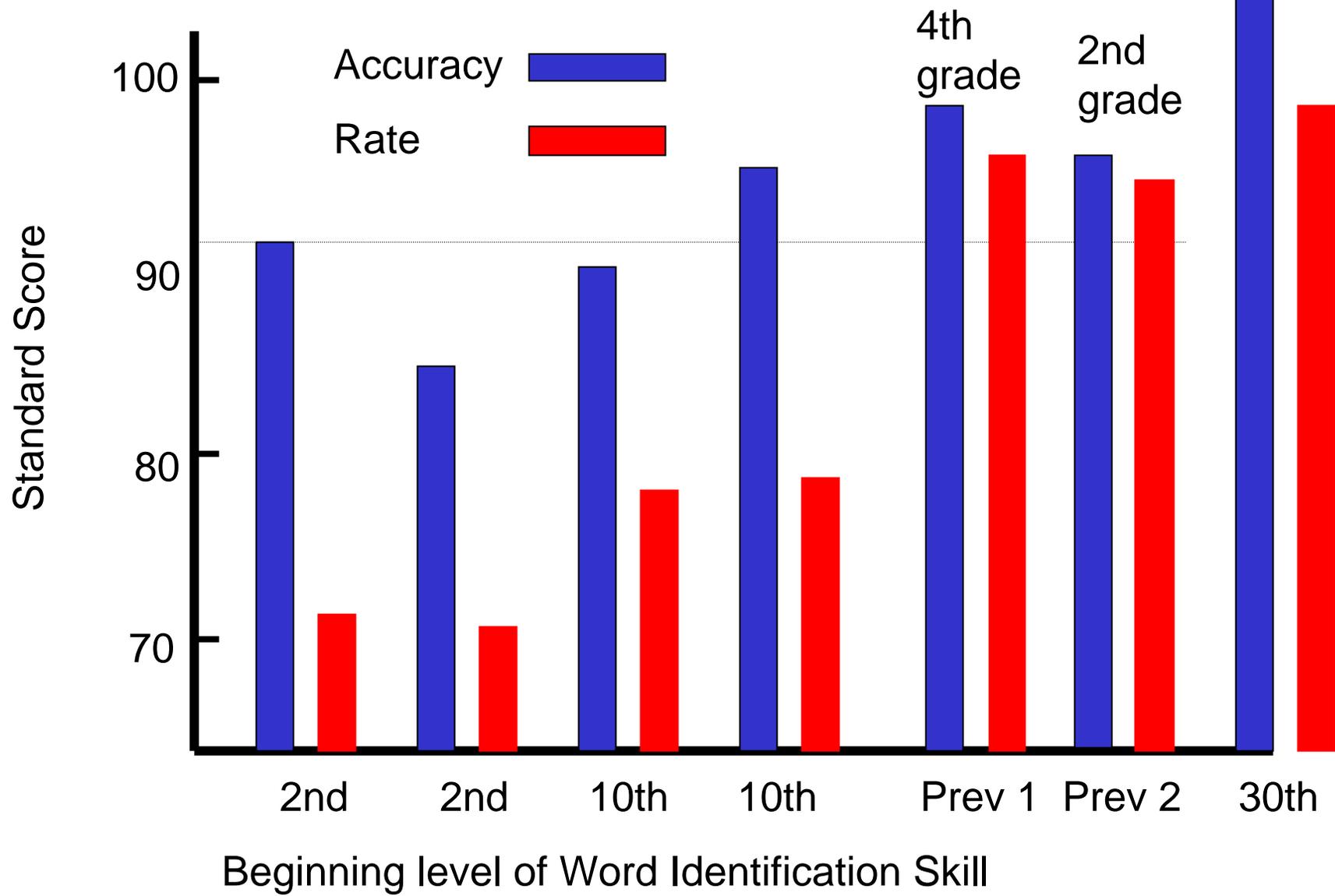
Follow-up growth in text reading fluency



Comparison of Rate vs. Fluency for strongest group (PASP)



Disparity in outcomes for rate vs. accuracy in remediation and prevention studies



Our Current Hypothesis:

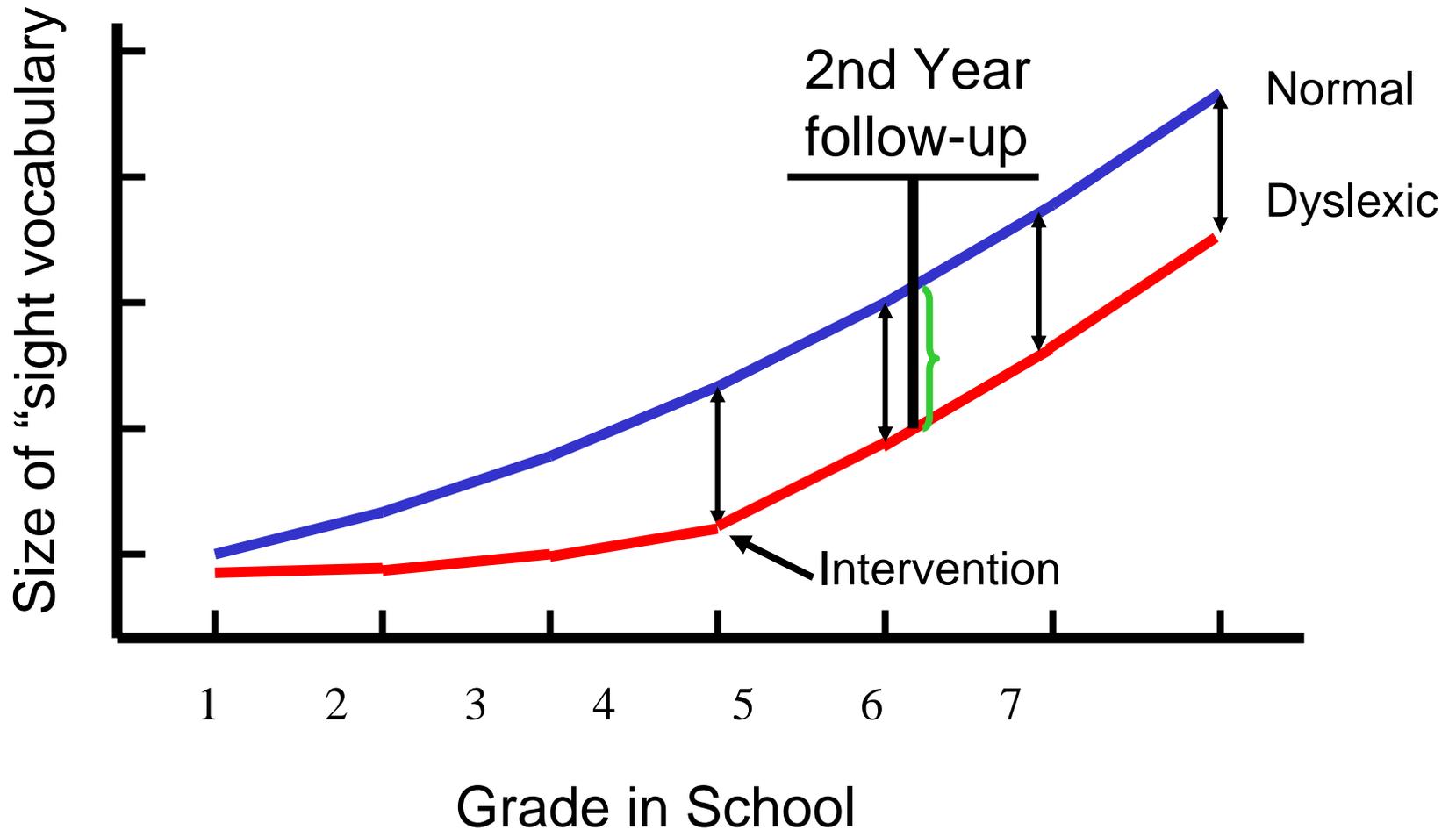
After problems with reading accuracy have been substantially remediated through intensive instruction, children remain dysfluent readers relative to age peers primarily because there are too many words in grade level passages that they still cannot recognize as sight words

These are iNTirEStinG and cHallinGinG times for anyone whose pRoFEshuNle responsibilities are rEelaTed in any way to liTiRucY outcomes among school children. For, in spite of all our new NaWLEGe about reading and reading iNstRukshun, there is a wide-spread concern that public EdgUkAshuN is not as eFfEktlve as it shoold be in tEechHiNg all children to read.

If children are allowed to fall behind in the development of word reading skills in first, second, and third grade, they miss out on the many thousands of accurate word reading repetitions necessary to sustain normal growth in size of their sight word vocabulary.

Very low beginning word identification scores may signify a level of deficiency in sight word development that cannot noticeably be overcome during intensive interventions. Further, normal levels of reading practice following intervention cannot significantly “close the gap” with average children who are continuing to acquire sight words at a rapid pace in late elementary, middle, and high school.

Projected growth in “sight vocabulary” of normal readers and disabled children before and after remediation



The major factor limiting reading fluency in older children with reading disabilities is a relative deficiency in the number of words they can read “by sight”.

which suggests.....

Once children become able to read text accurately, the major challenge in working with older disabled readers is how to engineer and focus reading instruction and practice so that development of “sight word vocabulary” is accelerated at a rate sufficient to “close the gap” in reading fluency.

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Elfrieda H. Hiebert, Ph.D.

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Policy Implications arising from the combined outcomes of remedial and preventive studies

1. We must work preventively to eliminate the enormous reading practice deficits that result from prolonged reading failure, and that are a primary cause of difficulties in attaining fluent text reading skills.
2. We must find a way to provide interventions for older children with reading disabilities that are appropriately focused and sufficiently intensive. This type of intervention can produce dramatic improvements in older children's text reading accuracy and reading comprehension in a relatively short period of time.
3. We still need to develop appropriately engineered practice activities to help close the gap in reading fluency once accurate reading skills are established.

Florida Center for Reading Research

www.fcrr.org

Thank
You