



Knowledge and Equity: How Cognitive Science Can Combat Unfairness

NATALIE WEXLER

NATIONAL ESEA CONFERENCE

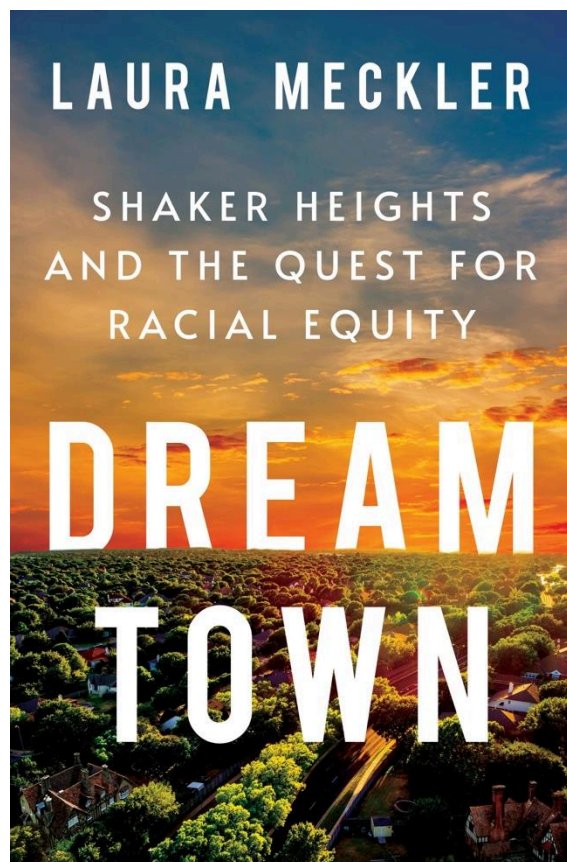
FEBRUARY 10, 2026

IN
EQUALITY

This presentation will cover ...

- Why typical remedies for education inequity don't go far enough
- Why the root cause of education inequity is unequal levels of parental education
- How schools can address inequity through curriculum and instruction grounded in scientific evidence

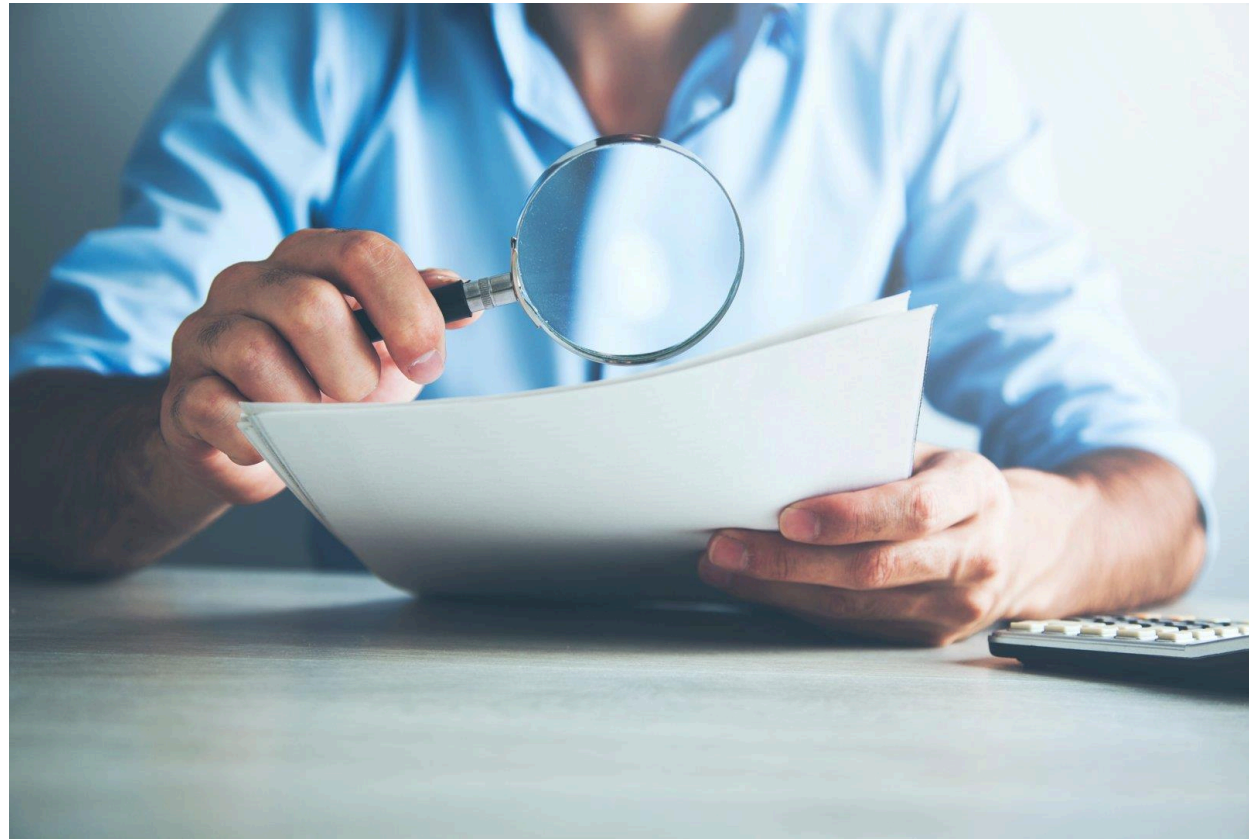




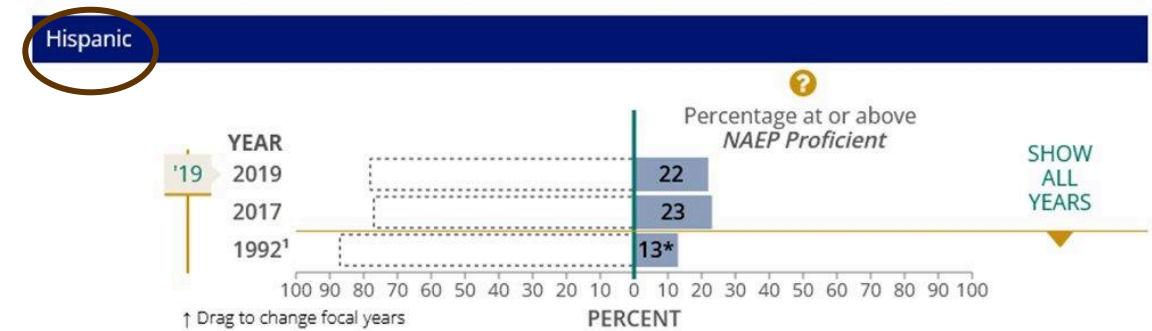
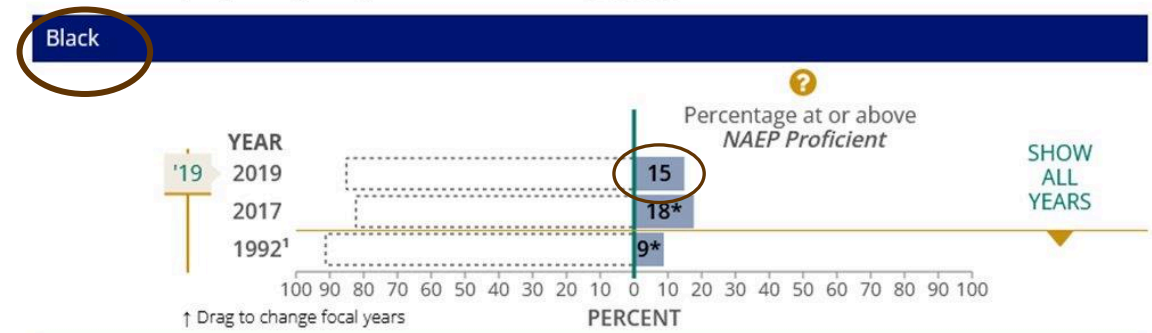
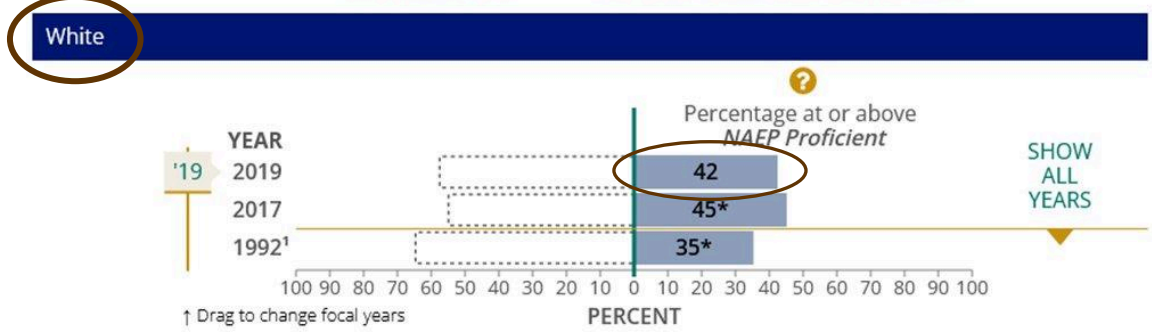
- 1970: voluntary two-way busing
- Late 1980s: new school boundaries
- 1990s: Black students still 90% of bottom 20%
- 2020: Blame placed on systemic racism; tracking abandoned

WHAT and HOW were schools teaching?

The lens we use to look at a problem determines how we try to solve it.



BASELINE: *NAEP PROFICIENT* [set at NAEP Basic](#) [Show NAEP achievement-level details](#)

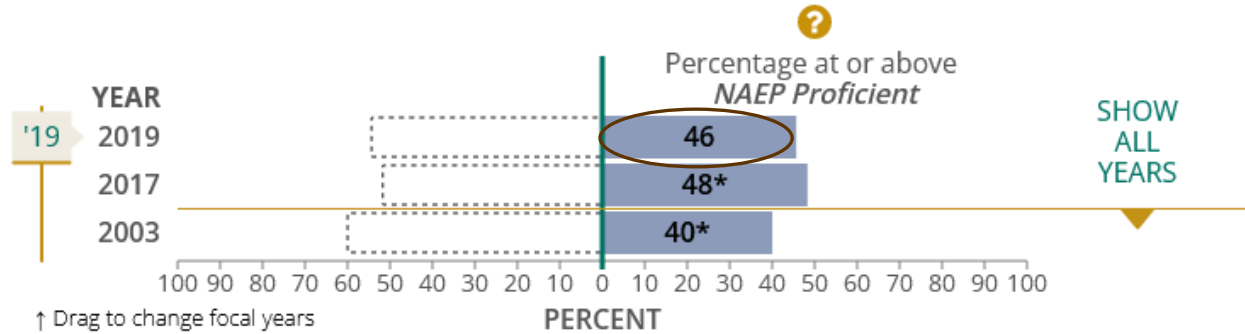


U.S. test scores are reported primarily in terms of race and ethnicity.

Data: 2019 NAEP Reading Assessment
8th grade Reading

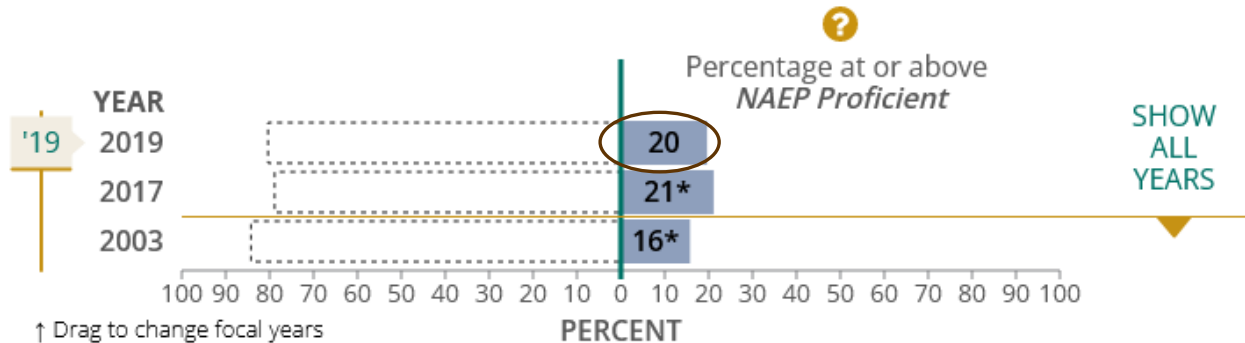
B-W difference:
27 % points

Not eligible for National School Lunch Program (NSLP)



Sometimes they're reported in terms of income level.

Eligible for National School Lunch Program (NSLP)

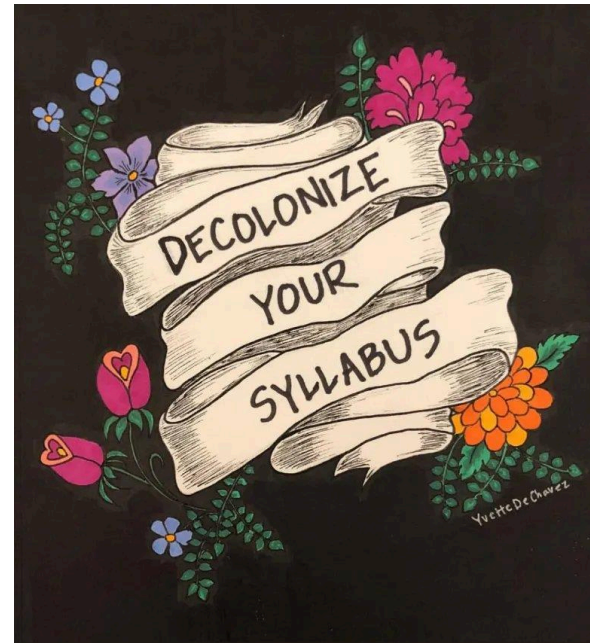


Difference:
26 % points

A widespread assumption:
The root cause of gaps in test
scores is poverty and—
especially—racism.



The racial lens has led to corresponding proposed solutions.



Is this *enough* to achieve equity?

Lots of white students also score low on tests.

Student group	Number of students
Number of students performing below NAEP Basic Low by race/ethnicity	
All students	0.42 million (33 percent of all students performing below NAEP Basic)
White	121,000 (26 percent of White students in below NAEP Basic) 1 out of 14 White students in fourth grade
Black	115,000 (40 percent of Black students in below NAEP Basic) 1 out of 5 Black students in fourth grade
Hispanic	165,000 (37 percent of Hispanic students in below NAEP Basic) 1 out of 6 Hispanic students in fourth grade

Data: NAEP 2019 4th grade reading assessment

STANDARDS & ACCOUNTABILITY

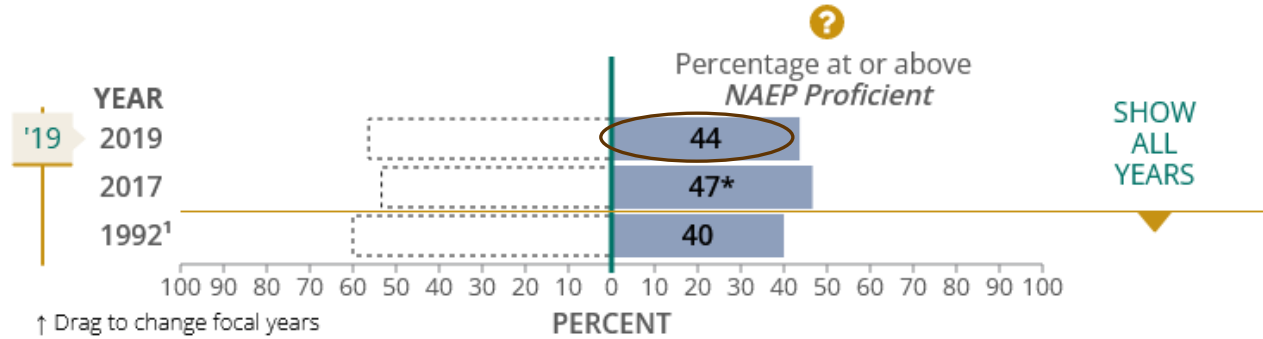
Explaining Achievement Gaps: The Role of Socioeconomic Factors

Eric Hengyu Hu, Ph.D. and Paul L. Morgan, Ph.D.

Thomas B. Fordham Institute 2024

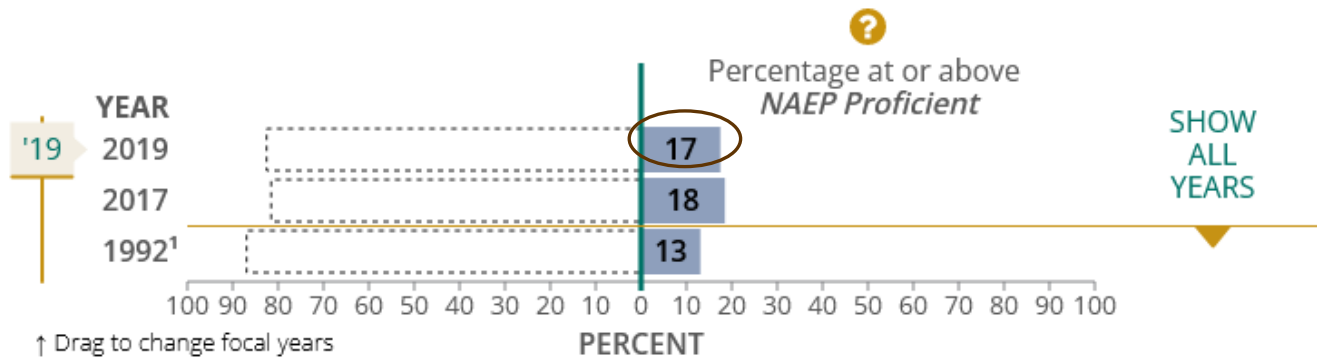
- SES explains a significant amount of the racial gap.
- 1st grade reading: explains 64% of Black-white gap and 77% of Hispanic-white gap.
- Two most significant factors: income and **level of parental education.**

Graduated from college



Scores are *rarely* reported in terms of *level of parental education*.

Did not finish high school



Difference:
27 % points

A closer look at level of parental education

Brookings Institution report on kindergarten readiness, 2012

Figure 1: Likelihood of Being Ready for School at Age Five, by Poverty Status at Birth

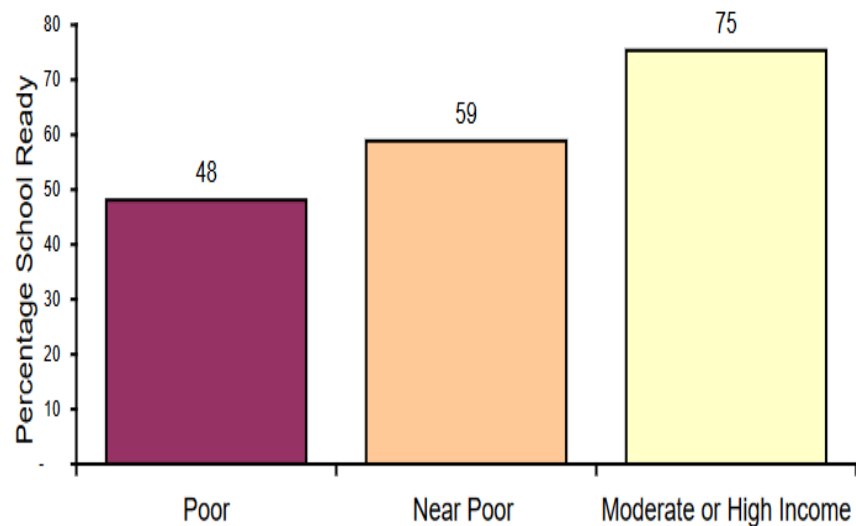
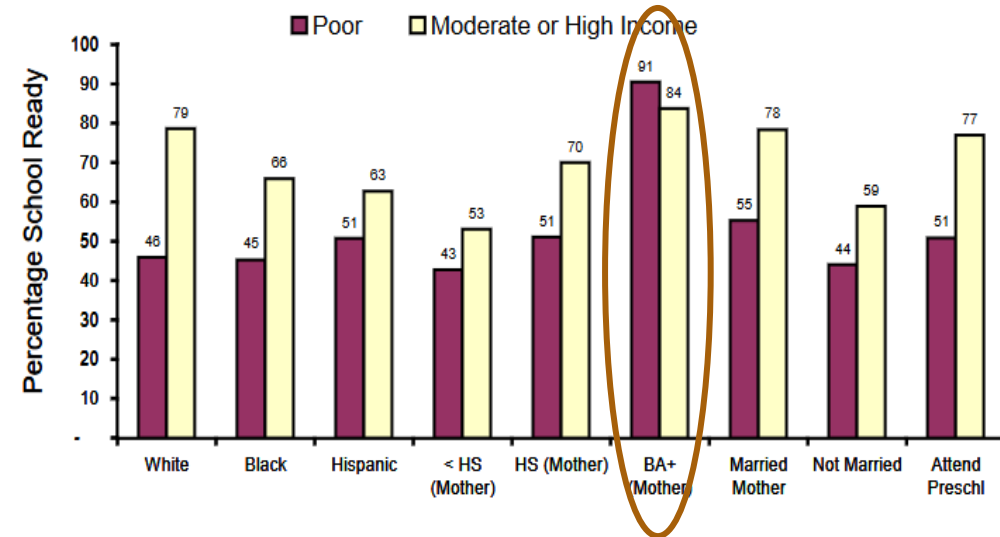
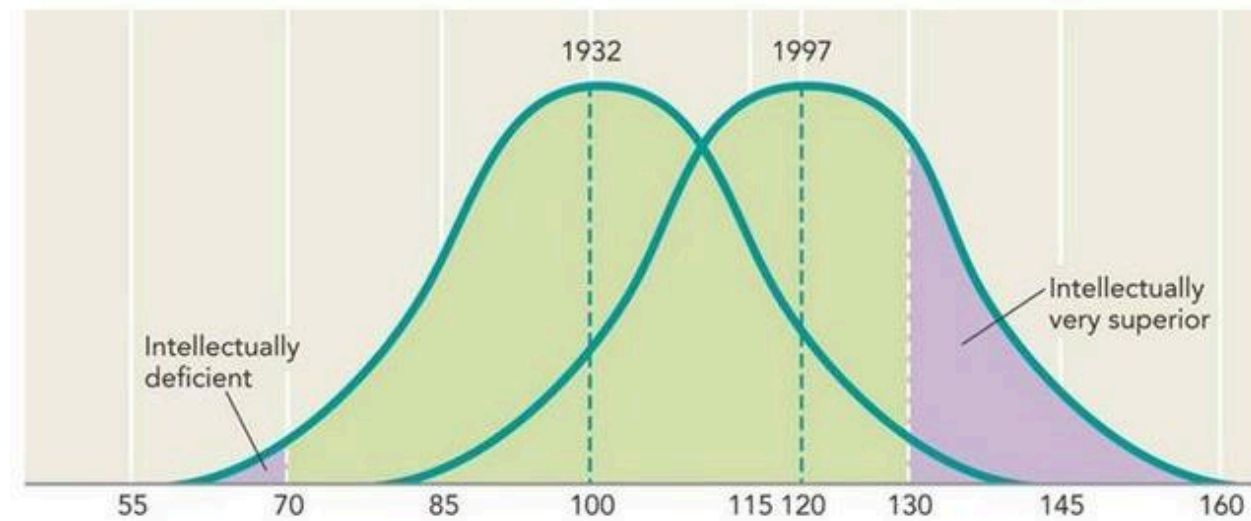


Figure 3: Likelihood of Being Ready for School at Age Five, by Poverty Status at Birth and Selected Child and Family Characteristics



Education can boost IQ.

The Flynn Effect



Source: <https://notes.devonzuegel.com/post/157638196303/flynn-effect>

Poverty and IQ

- Heritability for high-SES children: ~70%
- Heritability for low-SES children: ~20%
- “Many children in poverty do not get to develop their full genetic potential.”
- “There is plenty of room for interventions to have large effects on IQ.”

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Schooling Makes You Smarter

What Teachers Need to Know about IQ

By Richard E. Nisbett

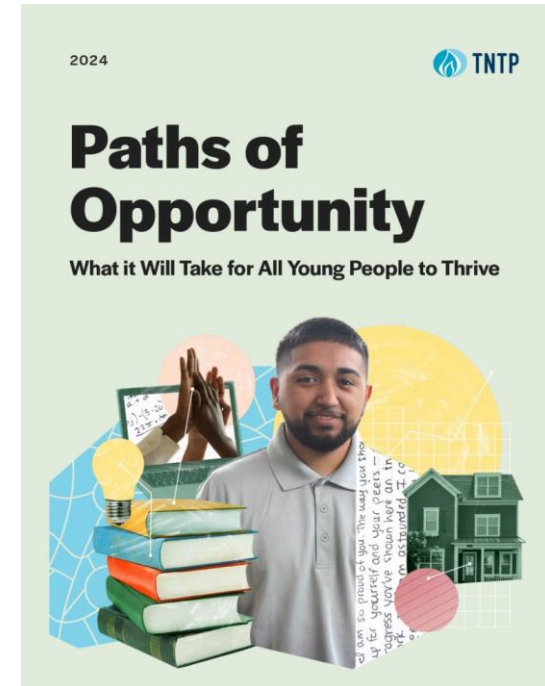
<https://www.aft.org/ae/spring2013/nisbett>

What happens if poor kids do well in school?

Adolescents living in poverty who are strong academically:

- 3x as likely to earn a living wage by age 30
- 2x as likely to report high levels of well-being by age 30

How can we change more lives by enabling more students to succeed?



Teaching for more equitable outcomes: The missing ingredient

Why equity initiatives can fail and what teachers can do about it.



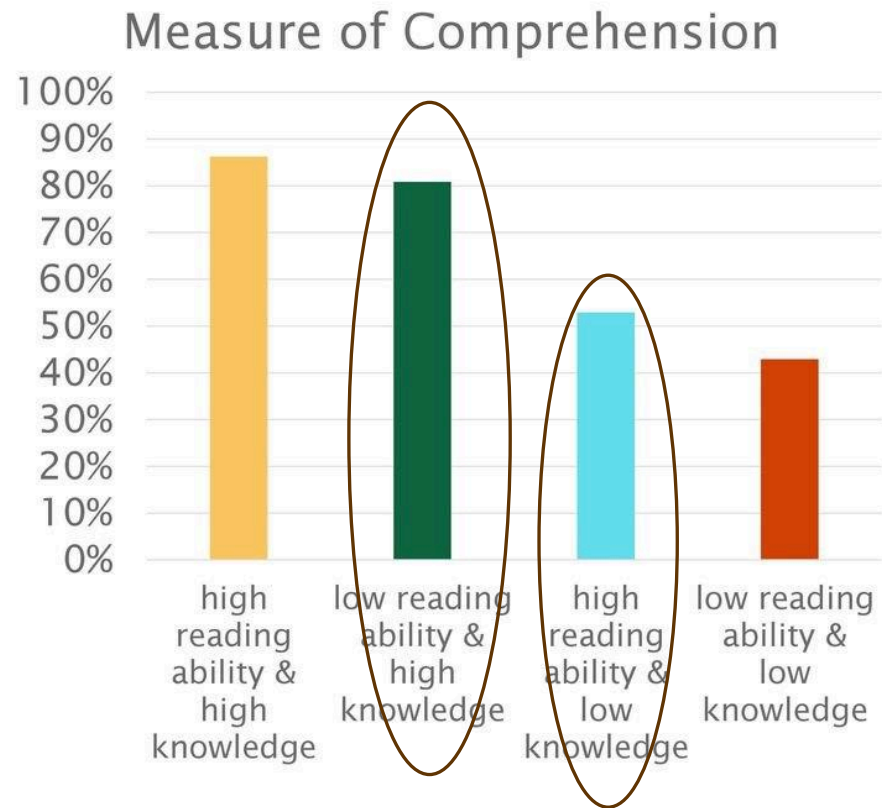
NIDHI SACHDEVA AND JIM HEWITT

APR 27, 2025

New teachers are “told to focus on things like inclusion, belonging, cultural relevance, student choice, and emotional safety—all of which are important.

But they are not enough as is. Real equity also depends on something else: **knowledge.**”

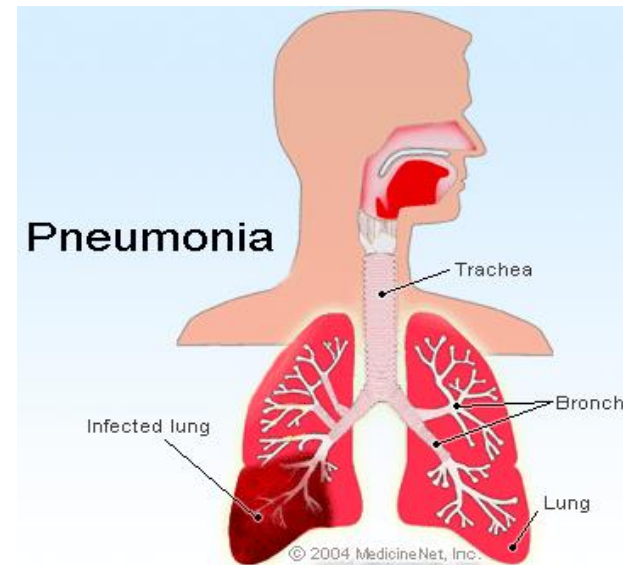
Science tells us background knowledge plays a key role in reading comprehension.



The Baseball Study
Recht & Leslie (1988)

We draw on background knowledge to understand *everything* we learn—and read.

To boost reading comprehension, students need to acquire as much academic knowledge and vocabulary as possible.



Passage from Third Grade PARCC Test

In one of the most remote places in the world, the Canadian Arctic, a people have survived over a thousand years. They are the Inuit. For the Inuit, the Arctic is a place teeming with life. Depending on how far north they live, the Inuit find everything from caribou herds and polar bears to beluga whales.

In one of the most [REDACTED] places in the world,
the [REDACTED], a people have [REDACTED] over
a [REDACTED] years. They are the [REDACTED]. For the
[REDACTED], the [REDACTED] is a place [REDACTED] with life.
Depending on how far north they live, the [REDACTED]
find everything from [REDACTED] [REDACTED] and [REDACTED]
[REDACTED] to [REDACTED].

The Wug Study



A moa builds a nest because it is a bird.
The moa looked in his nest
and found his hat.



A moa builds a hive because it is a wug
The moa looked in his hive
and found his hat.

(Neuman, Kaefer & Pinkham 2014)


Typical reading comprehension instruction *reinforces* inequities.

COMPREHENSION strategies vs. skills

- Using Schema
- Predicting
- Inferring
- Questioning
- Determining Importance
- Visualizing
- Synthesizing

- Main Idea & Details
- Author's Purpose
- Determining Theme
- Cause & Effect
- Summarize/Retell
- Sequence of Events
- Compare & Contrast
- Story Structure
- Classify & Categorize
- Fact & Opinion
- Drawing Conclusions
- Point of View
- Identifying Genre
- Describing Plot
- Making Predictions
- Figurative Language

READ TO COMPREHEND



First Grade PARADE

Fountas and Pinnell

Progress Monitoring by Instructional Text Reading Level

GRADE	MONTHS OF THE SCHOOL YEAR									
	1	2	3	4	5	6	7	8	9	10
K	-	-	-	A	A/B	B	B	C	C	C
1	C/D	D	E	E/F	F	G	G/H	H	I	I
2	I/J	J	J	J/K	K	K/L	L	L	M	M
3	M/N	N	N	N	O	O	O	P	P	P
4	P/Q	Q	Q	Q	R	R	R	S	S	S
5	S/T	T	T	T	U	U	U	V	V	V
6	V/W	W	W	W	X	X	X	X	Y	Y
7	Y	Y	Y	Y	Y/Z	Z	Z	Z	Z	Z
8	Z	Z	Z	Z	Z	Z	Z	Z	Z	Z
9-12	Z	Z	Z	Z+	Z+	Z+	Z+	Z+	Z+	Z+

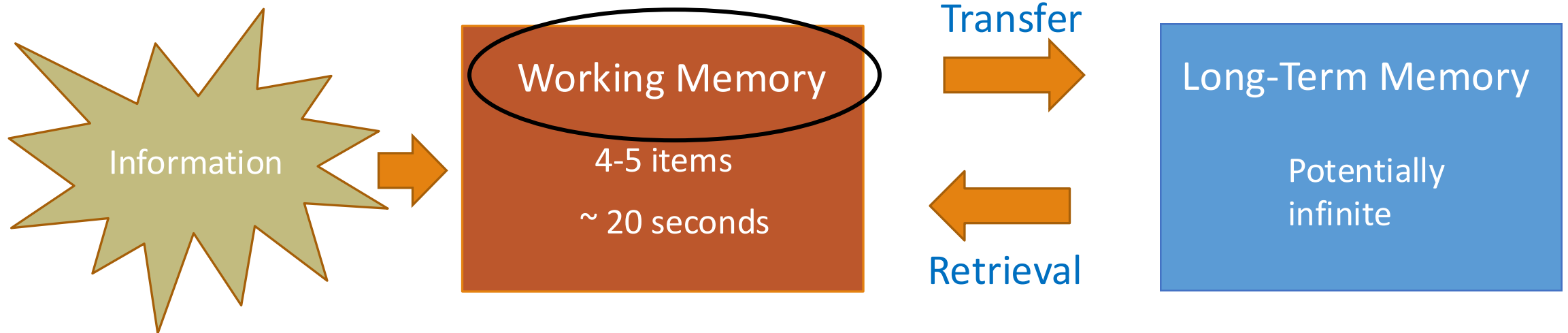
How will students learn what they need
to understand complex text?

“Leveled texts lead
to leveled lives.”



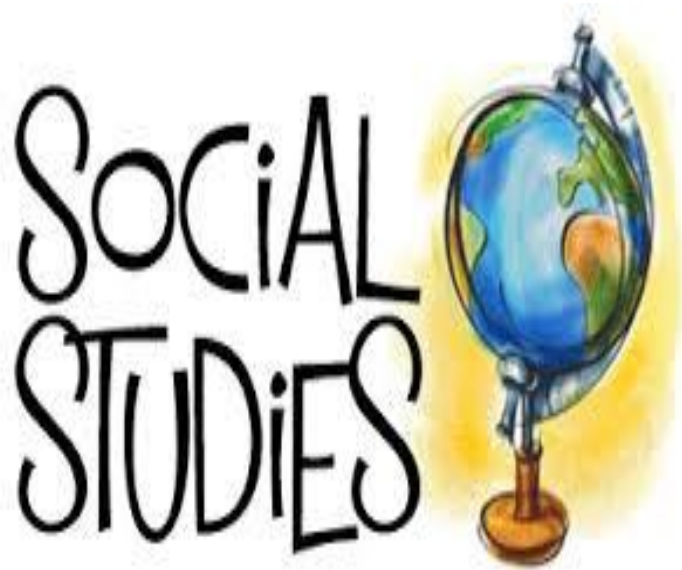
Dr. Alfred Tatum

Why do kids with more academic knowledge do better in school?



The more knowledge you have, the easier it is to learn.

Knowledge-building curricula can give all children access to academic knowledge.

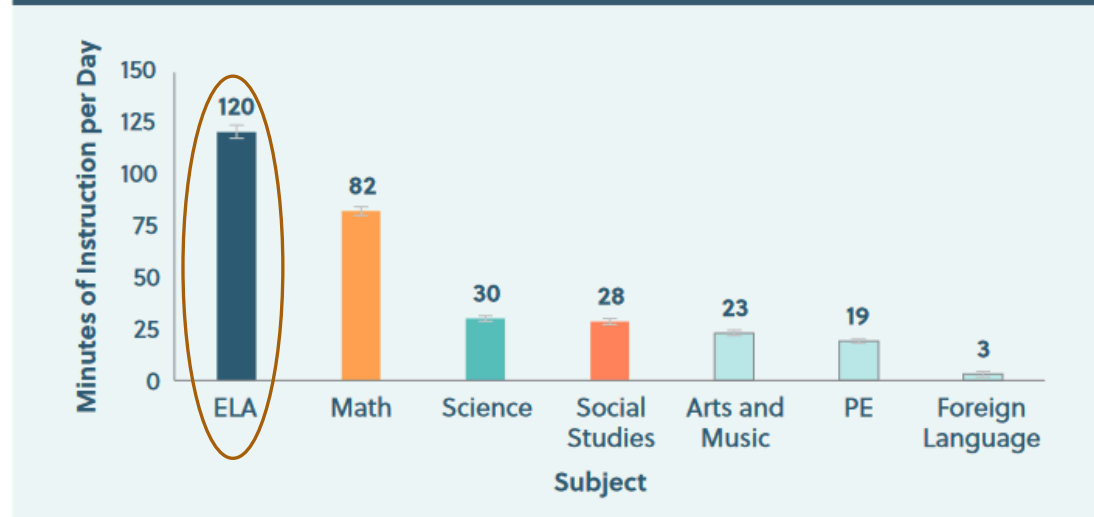


The Elementary Curriculum

How much time do elementary students spend each day on ...

- ELA?
- Math?
- Science?
- Social Studies?
- Arts?

Figure 2. Students spend an average of two hours per day on ELA instruction.



Note: The figure contains pooled averages of grades 1 through 5. The mean total instructional time is 302 minutes per day. Analytic sample includes 6,829 students. "Arts and music" includes art, music, dance, and theater. Error bars represent 95 percent confidence intervals.

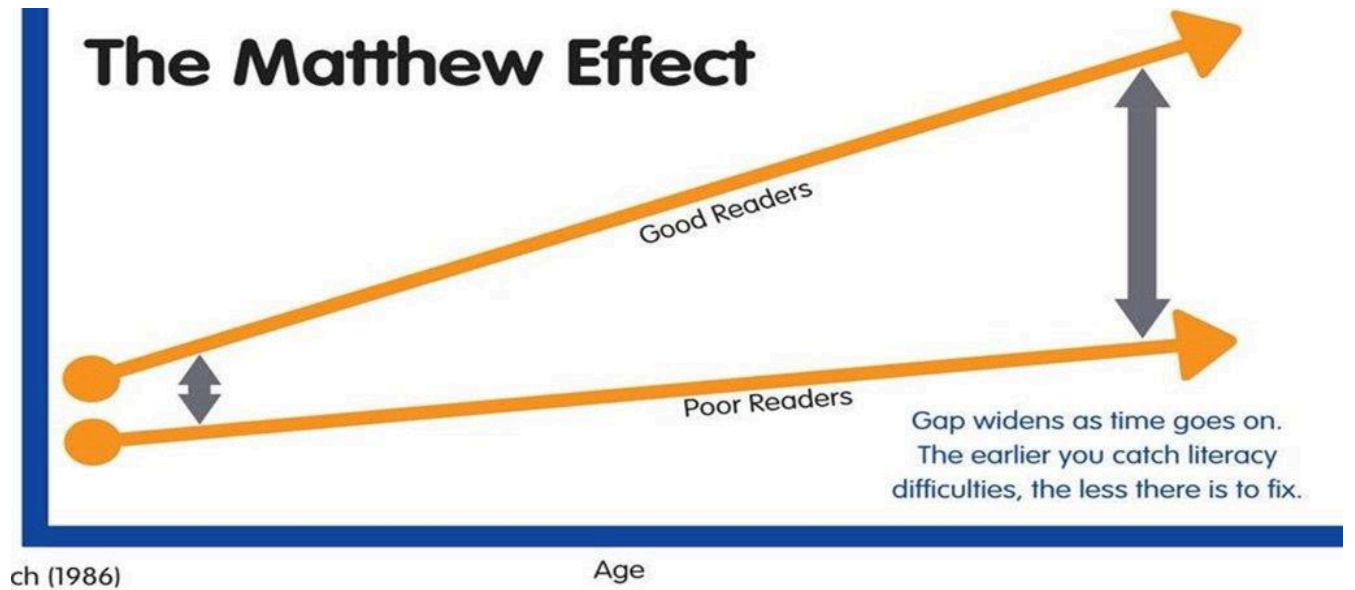
Source: Adam Tyner and Sarah Kabourek. Social Studies Instruction and Reading Comprehension: Evidence from the Early Childhood Longitudinal Study. Washington D.C.: Thomas B. Fordham Institute (September 2020). (Based on data for students who started K in 2010-11.)

Going Deeper into the Data

- Extra half-hour a day of social studies: higher reading test scores in 5th grade
- Extra half-hour a day of ELA/reading: no increase in reading test scores
- Students from the lowest SES: biggest boost from more social studies
- Students from highest SES: no significant boost from more social studies



Why it's important to start early



Evidence that knowledge-building curricula can narrow gaps—eventually.

Children who start with more knowledge may benefit most—in the *short term*. (Cabell, Kim, et al., 2025)

Longer-term effects: struggling readers benefit the most. (May et al., 2023)



What this looks like in the classroom

- Abby & Sarah
- “They were even more invested than other students ... because they had not been exposed to any of this before.”
- “That cloud looks like an anvil!”
- Started grade 3 at a K reading level; by EOY, were at grade 2.
- Gains continued in grade 4.



Season 1, Reading
Comprehension
Revisited



Deloris Fowler
Grade 3 teacher

How we teach also matters for equity.

- “Study after study has shown that teaching with **explicit instruction** helps all students succeed, but it **helps disadvantaged students the most.** ...
- “One large study involving 56,000 students found that explicit teaching narrowed achievement gaps, especially for students from less-educated families.”

(Sachdeva & Hewitt, <https://scienceoflearning.substack.com/p/teaching-for-more-equitable-outcomes>)



What is “explicit teaching”?

- Fully guided instruction for new topics
- Review
- Checking for understanding
- Elaboration
- Lots of guided practice

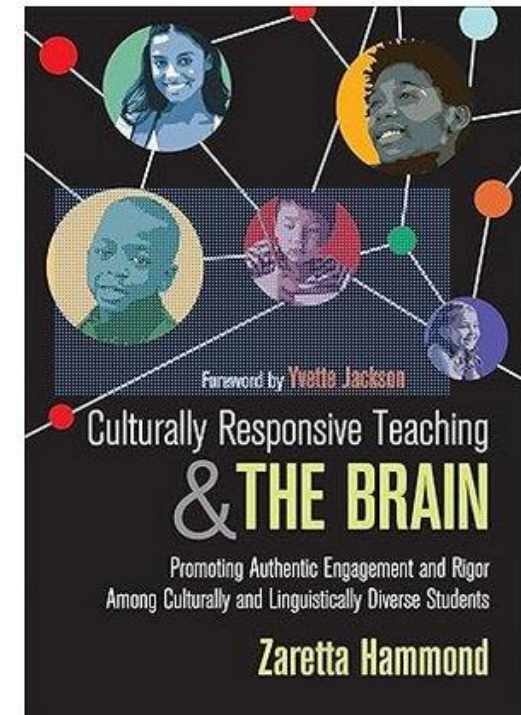


What about Culturally Responsive Teaching?

CRT “is a pedagogical approach firmly rooted in learning theory and cognitive science.”

- Use oral language/storytelling to convey information.
- Break down complex information into chunks.
- Connect prior knowledge to new knowledge.

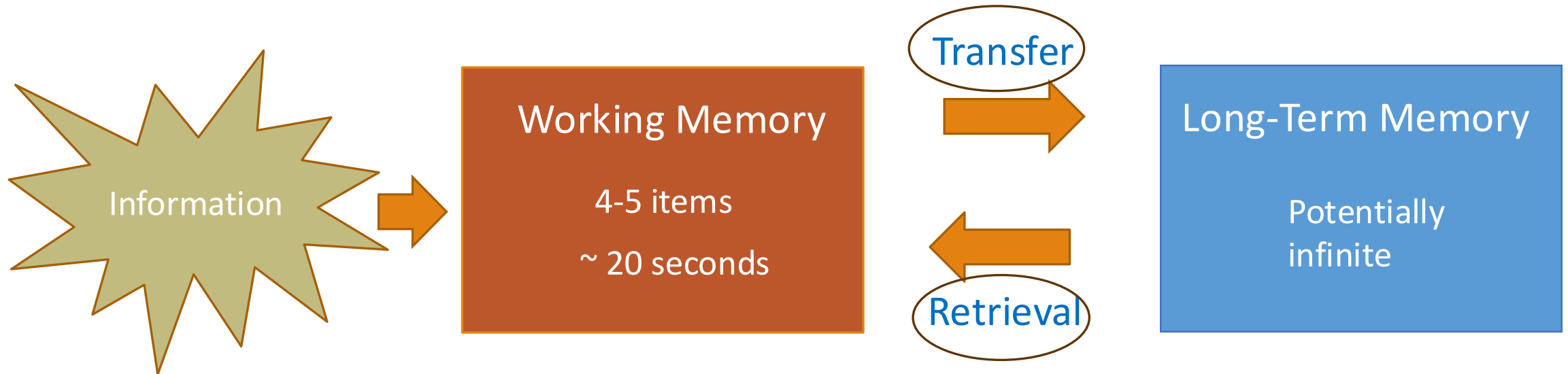
These principles apply to teaching ALL students—especially those from less educated families.



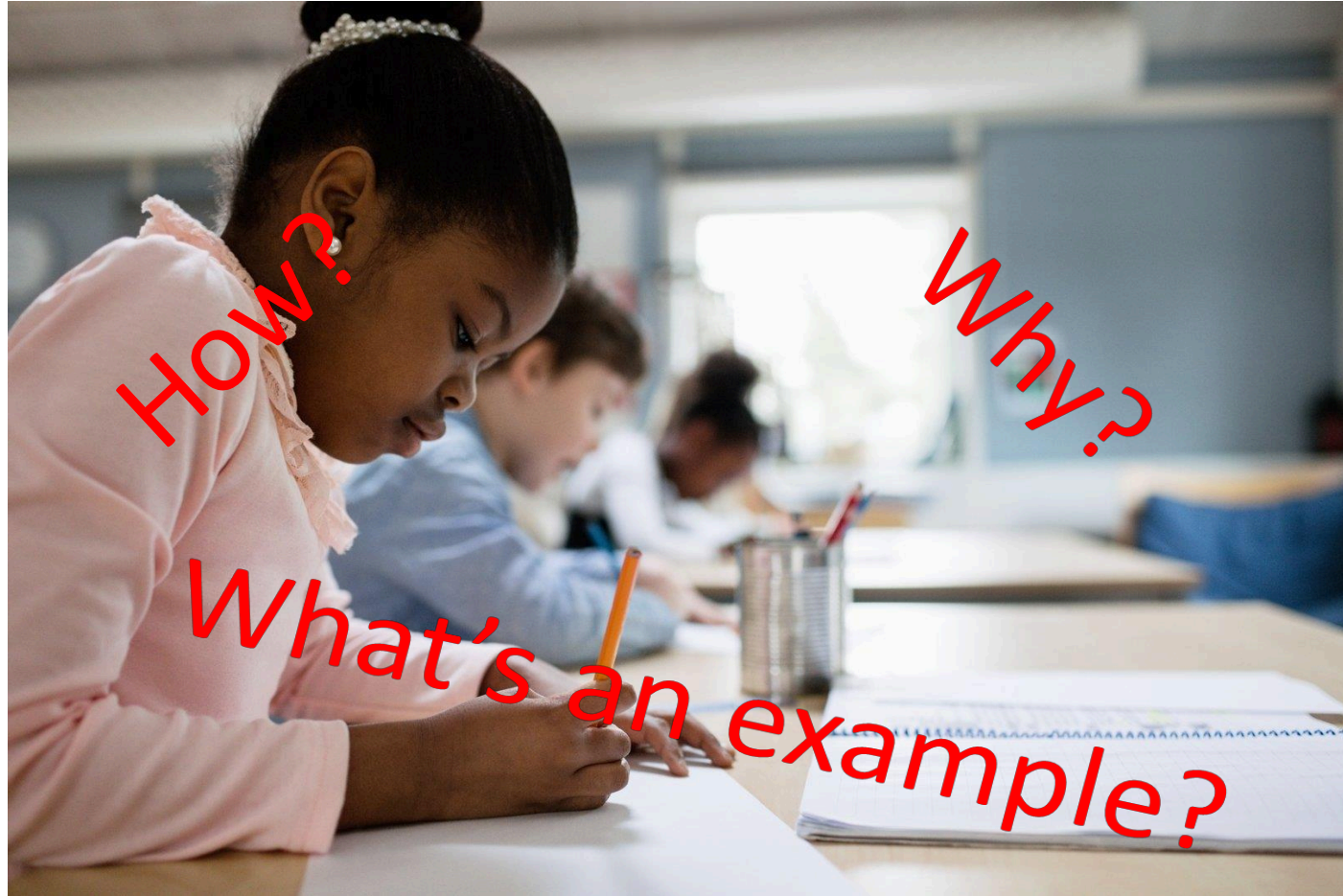
Writing instruction can address inequities.

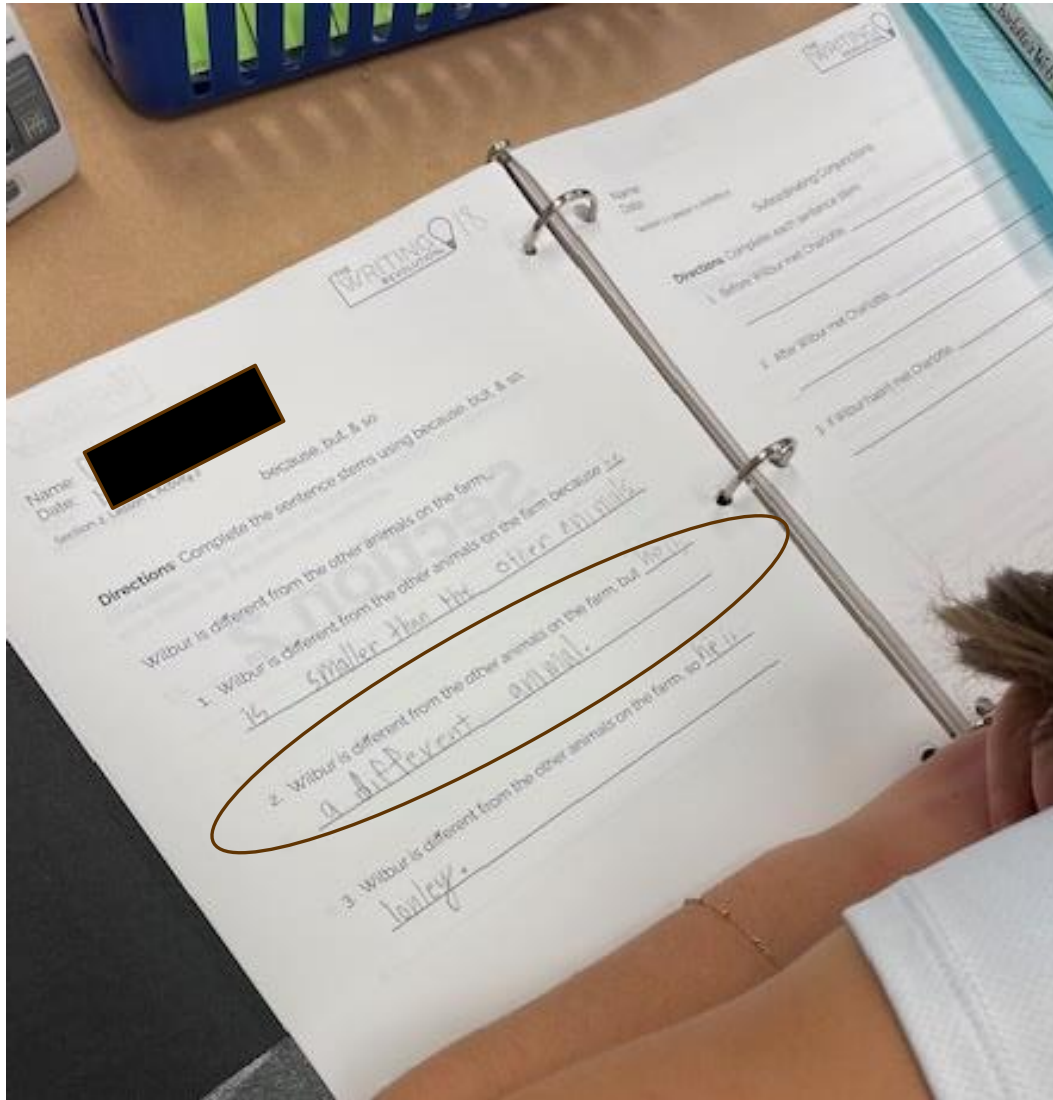


Transfer and Retrieval



Writing provides opportunities for elaboration.





Checks for understanding.

T: Is that a change of direction? So, we want something opposite ... Those ideas are almost the same.

Comprehension/analytical abilities

To write well, we need to:

- Find the main idea and key details
- Summarize
- Compare and contrast
- Cite evidence
- Etc.



Complex syntax

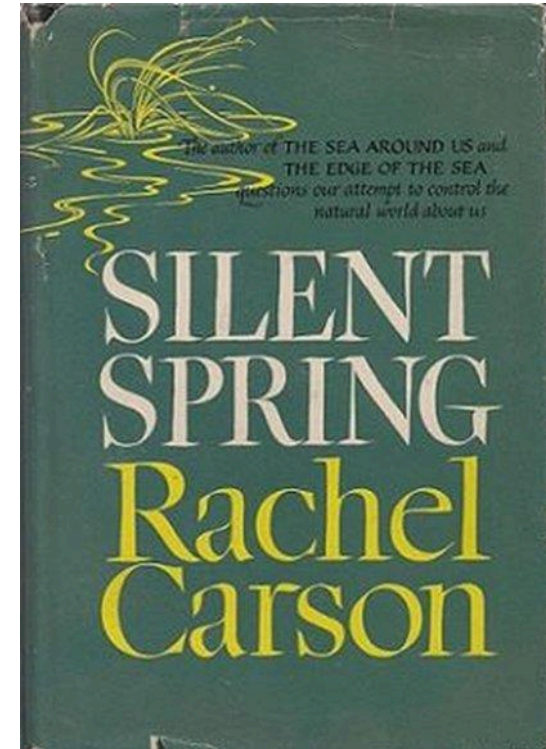
“Rachel Carson, a scientist, writer, and ecologist, grew up in the rural river town of Springdale, Pennsylvania.”

Student: “They grew up together in Pennsylvania.”

The solution:

- Teach students what an appositive is (a phrase describing a noun), using familiar content.
- After students have learned about Rachel Carson, give them this sentence to complete:

Rachel Carson, _____, grew up in Springdale, Pennsylvania.



Caution: writing can also *impede* learning.

 Restricted access | Research article | First published online March 19, 2020

The Effects of Writing on Learning in Science, Social Studies, and Mathematics: A Meta-Analysis

[Steve Graham](#), [Sharlene A. Kiuvara](#), and [Meade MacKay](#) [View all authors and affiliations](#)

On AVERAGE, the effect of writing on learning was positive.

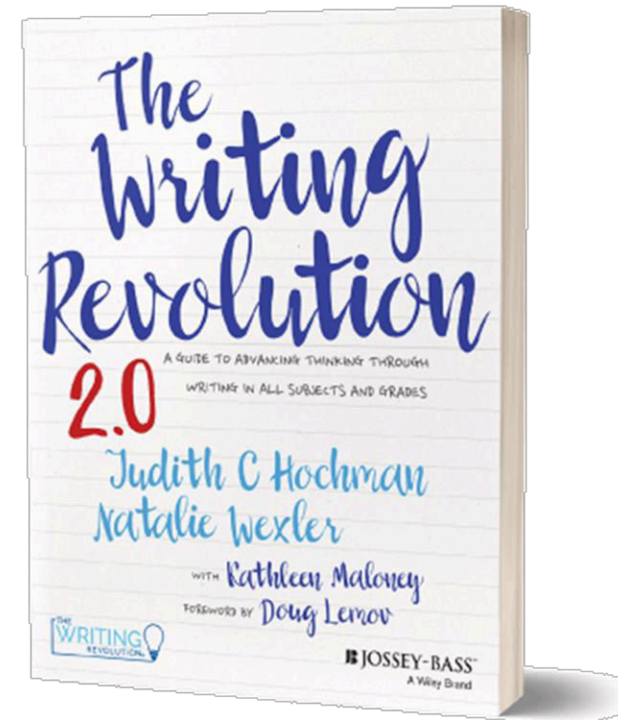
But: 18% of the studies **found a NEGATIVE effect.**

Why?



What can we do to ensure writing instruction promotes equity?

1. Embed writing activities in curriculum content.
2. Teach grammar & complex syntax via students' own writing.
3. **Modulate cognitive load.**

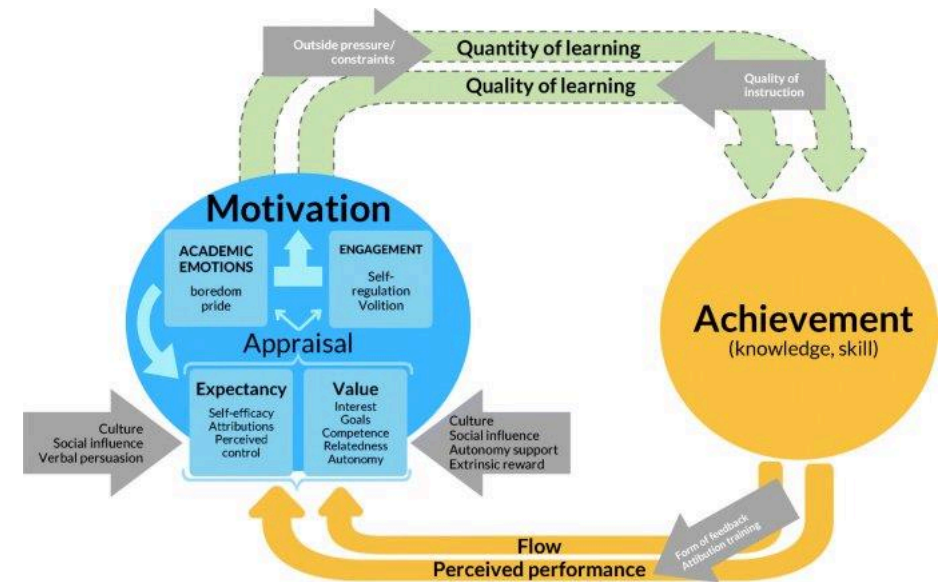


What about motivation?

Theory: CRT boosts motivation, which then boosts achievement.

Evidence: achievement LEADS to motivation. (Garon-Carrier et al., 2015)

“Clear teaching” decreases cognitive load and increases motivation. (Serki & Bolan 2023)



Source: Vu et al., Ed Psych Rev 2022

The “deficit model” argument

Research Article

Tiered vocabulary and raciolinguistic discourses of deficit: from academic scholarship to education policy

Ian Cushing 

Pages 969-987 | Received 26 Jul 2023, Accepted 06 Jan 2024, Published online: 25 Jan 2024



As Flores ([2020](#)) argues, these deficit framings co-articulate with raciolinguistic ideologies to represent racialised bilinguals as lacking academic language. Yet in reality, the heterogenous language practices of racialised bilinguals simply transcend the rigidity of the academic/non-academic borders which themselves are based on idealised versions of white, print-centric, monolingual understandings of language. Put simply, the distinctions which underpin the tiered vocabulary framework do not reflect actual language use, yet are still used to frame racialised, working-class, and bilingual children as lacking capabilities in the kind of language necessary for success in school.

Whose knowledge?

We don't all have to agree.

The key: internally coherent curriculum.

DYNASTY



But let's not unintentionally put students at a disadvantage.



Sonja Santelises, CEO of Baltimore City Schools

Having both kinds of knowledge “reinforces the idea that you belong in the room.”



Will this be too hard for kids?

BETWEEN THE LINES: CHAPTER FIVE

Why Kentucky's reading crisis can't be solved by phonics alone

As some Kentucky school districts go all in on phonics, they are quick to realize there's much more to making kids proficient readers.

Mandy McLaren Louisville Courier Journal

Published 5:02 AM EDT Oct. 19, 2022 | Updated 5:06 PM EDT Oct. 19, 2022

"I think for so long we thought that (our students) couldn't understand these things, so we didn't teach these things to them," [a third-grade teacher] said.

But three years into the new reading approach, [she] and her colleagues say they have proof to the contrary.

"They like being challenged," said a second-grade teacher.
"It's their favorite part of the day."

Content-rich curriculum + explicit writing instruction

K-2 (primarily oral):

- “It improves their oral communication tenfold.”
- “It doesn’t matter whether they come from poverty. They can do it.”

Upper elementary/middle school:

- “It’s just a game-changer.”
- “Before, it was just a bunch of words. Now they enjoy reading.”
- Improvements in test scores, increased confidence



Monroe, LA

Students with learning disabilities

“Before, my SPED students would just rewrite the prompt.

Once we started at the sentence level, they could go back and expand their answers.

It blew my mind.”

Rochelle Williams, director of special education, Monroe



Teachers don't need to be experts in cognitive science to do this.

“At the start, the focus was on writing instruction.

But something kind of unexpected, kind of amazing began to happen.

We realized that teaching students to write clearly was actually teaching them to *think* clearly.”



Justin Overacker
High School English Teacher

**Knowledge Matters Podcast Season 3:
Literacy and the Science of Learning**



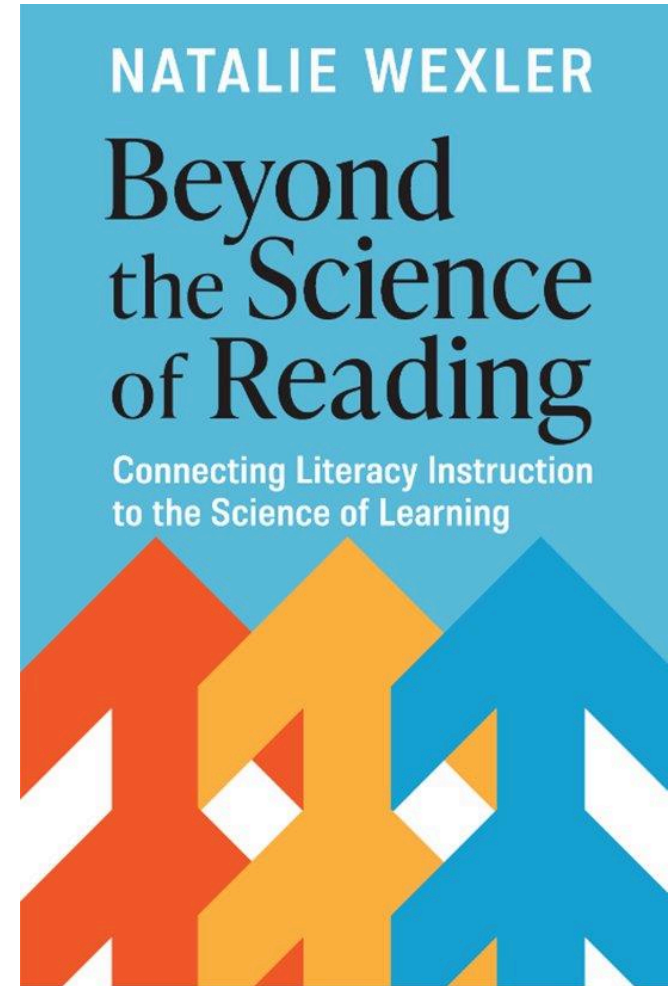
Dylan Wiliam



Doug Lemov

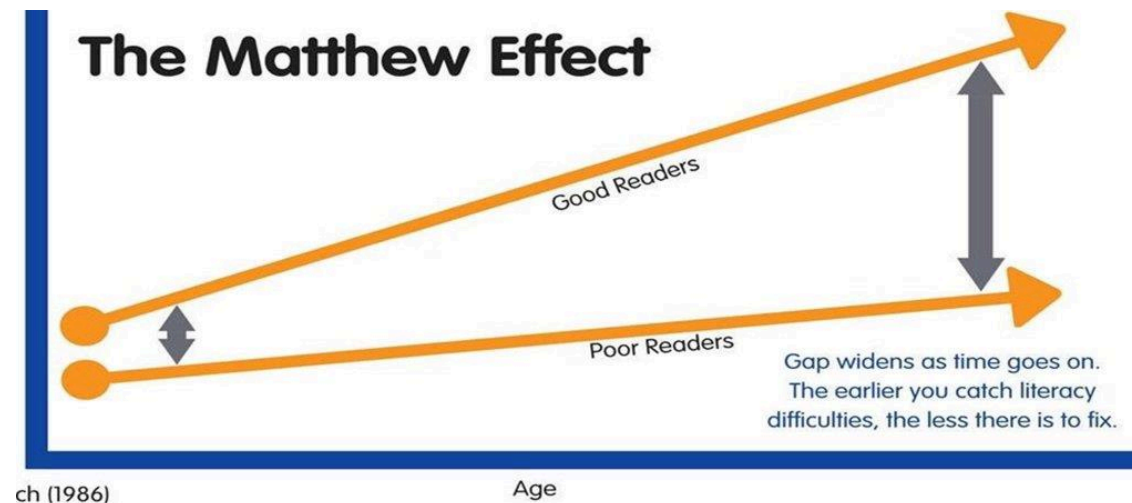


Natalie Wexler



Education alone can't ensure equity, but ...

It can do a lot to level the playing field.
It shouldn't *exacerbate* inequities.



Beginning of the year writing sample

Topic: Explain why we study the past.

We study the past because
it's good to learn about things that happen
years ago. In history we learn all about
the past. We learn about wars that
happened years ago, how many people died, generals,
what countries were in them. The past
is full of people



Danny, 9th grader

Later that year ...

Topic: Conquest of the Americas
 Thesis Statement: While some view the conquest of the Americas as a positive event, without question it had a negative impact.

Main Idea	Details
¶1. Introduction	G.S. history/controversy Sp. St. debate = Sp. conquest Th. St. Pros. VS. (neg.)
positive ↓ ¶2. T.S.	domestic animals = horses, sheep + cattle + pigs intro alphabet + new ideas = law + sci. conquest → cult. diffusion (ex crops) (Doc A) econ. new business + trade (Doc B)
negative ↓ ¶3. T.S.	Columbus → genocide + cruelty + slavery diseases killed millions C. America / 25 → 2 million (Doc C) forced / convert to Christianity → torture + murder
¶4. Conclusion	Rephrase Th. St. conquest = brutal New Sp. St. disease + abuse New G.S. debated for years



Throughout history, there have been many controversies. One such debate is over the Spanish conquest of the Americas. While some view the conquest of the Americas as a positive event, without question it had a negative impact.

Some claim that the Americas benefitted from the Spanish conquest. First, the Spanish introduced domesticated animals such as horses, sheep, cattle and pigs, to the Native Americans. In addition, the Spanish introduced the alphabet and new ideas in law and science. The conquest of the Americas led to the spread of



Thank you!

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