Reading Comprehension is Not a Single Ability

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LARRC: Language and Reading Research Consortium

Institute of Education Sciences (Grant# R305F100002)

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- Laura Justice (PI)
- Shelley Gray (Co-PI)
- Hugh Catts (Co-PI)
- Tiffany Hogan (Co-PI)
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- Ron Nelson
- Diane Nielsen
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- Jim Bovaird
- Richard Lomax
- Shayne Piasta
- Ann O’Connell
- Mindy Bridges
- Jill Pentimonti
Reading Crisis

- NAEP 2015 data show that 64% of 4th graders and 66% of 8th graders are reading below proficiency level on national assessment.
- PISA data appear to show that American children are losing ground to those from other countries.
## PISA Results

<table>
<thead>
<tr>
<th>2009</th>
<th>2012</th>
<th>2012</th>
</tr>
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<tbody>
<tr>
<td>Shanghai-China</td>
<td>Shanghai-China</td>
<td>Estonia</td>
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<td>Korea</td>
<td>Hong Kong</td>
<td>Liechtenstein</td>
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<td>Finland</td>
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<td>Netherlands</td>
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<td>Canada</td>
<td>Finland</td>
<td>Belgium</td>
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<tr>
<td>New Zealand</td>
<td>Canada</td>
<td>Macro-China</td>
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<td>Japan</td>
<td>Taiwan</td>
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<td>Australia</td>
<td>Ireland</td>
<td>Germany</td>
</tr>
<tr>
<td>United States</td>
<td>Poland</td>
<td>United States</td>
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Reading Comprehension

Vocabulary
Syntax
Discourse

Inference Making
Comprehension
Monitoring

Sight Word
Decoding
Phono Awareness

Working Memory
Intervention

Proximal gains

Improvement in reading comprehension
Sara first let loose a team of gophers. The plan backfired when a dog chased them away. She then threw a party but the guests failed to bring their motorcycles. Furthermore, her stereo system was not loud enough. Obscene phone calls gave her some hope until the number was changed. It was the installation of the blinking neon lights across the street that finally did the trick. She framed the ad from the classified section and now has it hanging on her wall.

1. Where did Sara put the gophers?
2. Why did Sara want the guests to bring their motorcycles?
3. What did the ad say?
Knowledge Gap

• Schools have dramatically reduced time spent teaching subject matters like science and social studies in lieu of generic reading comprehension instruction
• Teach strategies like “finding the main idea” or “comprehension monitoring.”
• Students do read subject matter material within RC lessons – but it is one subject one day and another the next – no time to build knowledge
• Skills may help but knowledge is the building block of more knowledge
Common Core

- **CCSS.ELA-Literacy.RI.4.2**
  Determine the main idea of the text and how it is supported by details; summarize the text

- **CCSS.ELA-Literacy.RI.5.2**
  Determine two or more main ideas of the text and explain how they are supported by key details; summarized the text

- **CCSS.ELA-Literacy.RI.6.2**
  Determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments.
"I'm searching for my keys."
Knowledge Matters
http://www.knowledgematterscampaign.org

• We don’t have a reading crisis, we have a knowledge crisis – knowledge is literacy
NAEP Reading Topics

4th Grade
Blue crabs
Brazilian beetles
Antarctica penguins
Ellis Island
Woman astronaut
Telescopes and space
Cultural stereotypes (N)
Fishing with granddaddy (N)

8th Grade
Oregon trail
Great white shark
Anasazi Indians
19th Amendment
Robots
Cane Toads
Bus schedules
Chinese Emperor (N)

“Reading tests are knowledge tests in disguise” (Willingham, 2015)
Wattenburg (2016)

Third Grade

- **basic place geography** (the names and general locations of continents, commonly discussed countries, states, and regions; basic relationships among these entities; north, south, east, west);
- **basic physical geography** (names and basic characteristics of forest and tundra);
- **basic astronomy** (planets, stars, space, orbits);
- **seasons and their basic characteristics**;
- **a wide variety of animals**, their basic characteristics and habitats, how they adapt to their environments;
- **basic units (and abbreviations)** of measurement, specifically pounds, kilograms, and miles.
Knowledge Matters

http://www.knowledgematterscampaign.org

- We don’t have a reading crisis, we have a knowledge crisis – knowledge is literacy
- Daniel Willingham - Teaching content is teaching reading
  
  https://www.youtube.com/watch?v=RiP-ijdxqEc

- Why Knowledge Matters (Hirsch, 2016)
- Reading comprehension is not a skill but a condition you create (Robert Pondiscio)
David Pearson


RAND Reading Study Group (2002)

Reading for Understanding
Toward an R&D Program in Reading Comprehension

RAND Reading Study Group
Catherine Snow, Chair
Commissioned by the Office of Education Research and Improvement (OERI)

Science & Technology Policy Institute
RAND Education™
Complexities of Reading

• Reading ability/disability is a more fluid concept than typically thought

• Given different combinations of text and activity, the best reader can be expected to perform quite poorly and the poorest reader quite well

• Reading ability is not solely “beneath the skin and between the ears” (Mehan, 1993)

• Because of the interactive nature of the process, we are unable to reduce RC performance down to a single score

• It’s not a single thing
Examined how 4 commonly used standardized reading comprehension tests compared with each other (QRI, GORT-3, WJPC-3, PIAT)

Bivariate correlations ranged from .45-.68 (median = .54)

Lower correlations at higher grades

Overlap in diagnosis was only 40%
Variability across measures of RC

• Measurement error
• Different formats of assessment
• Different content
Method of Assessment


Method of Assessment


- 79 fourth-grade students
- Read 3 narrative and 3 expository passages
- Answered open-ended or multiple choice questions or retell
- Counterbalanced across passages
- Bivariate correlations ranges from .37-.48
- Interaction of assessment method and ability
Variability across measures of RC

- Measurement error
- Different forms of assessment
- Different content
LARRC

- Approximately 700 3rd grade children
- Presented with 8 passages adapted from QRI
- Read 4, Listened to 4
- 2 narrative and 2 expository
- Answered 5-8 questions
# Bivariate Correlations between Passages (Percent Correct)

<table>
<thead>
<tr>
<th>Reading Comprehension Passages</th>
<th>RC.1</th>
<th>RC.2</th>
<th>RC.3</th>
<th>RC.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC.1 The Trip to the Zoo</td>
<td></td>
<td>.434</td>
<td>.456</td>
<td>.406</td>
</tr>
<tr>
<td>RC.2 Bomb Beetle</td>
<td></td>
<td>.497</td>
<td>.474</td>
<td></td>
</tr>
<tr>
<td>RC.3 The Horned Frog</td>
<td></td>
<td></td>
<td>.465</td>
<td></td>
</tr>
<tr>
<td>RC.4 A New Friend from Europe</td>
<td></td>
<td></td>
<td></td>
<td>.465</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Listening Comprehension Passages</th>
<th>LC.1</th>
<th>LC.2</th>
<th>LC.3</th>
<th>LC.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>LC.1 The Friend</td>
<td></td>
<td>.498</td>
<td>.467</td>
<td>.370</td>
</tr>
<tr>
<td>LC.2 Puffin</td>
<td></td>
<td></td>
<td>.411</td>
<td>.365</td>
</tr>
<tr>
<td>LC.3 Windshield Wiper</td>
<td></td>
<td></td>
<td></td>
<td>.418</td>
</tr>
<tr>
<td>LC.4 A Special Birthday for Rosa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Passages 1-4: Reading Comprehension
Passages 5-8: Listening Comprehension
N=12 with mean passage percent correct close to -1 SD (55.2%)

Passages 1-4: Reading Comprehension
Passages 5-8: Listening Comprehension
Latent factor

Reading Comprehension

Measure 1

Measure 2

Measure 3
Predicting Reading Comprehension Over Time: Third through Fifth Grade Children (Lonigan, 2015)
Predicting Reading Comprehension Over Time: Third through Fifth Grade Children (Lonigan, 2015)

Gates T1 ($R^2 = .56$)

WJ-PC T1 ($R^2 = .60$)

TSREC T1 ($R^2 = .56$)

Gates T2 ($R^2 = .59$)

WJ-PC T2 ($R^2 = .66$)

TSREC T2 ($R^2 = .59$)

Gates T3 ($R^2 = .57$)

WJ-PC T3 ($R^2 = .61$)

TSREC T3 ($R^2 = .57$)
Implications for instruction

• Reading comprehension is not a skill but a condition you create (Robert Pondiscio)

• Best way to improve comprehension is to systematically teach content knowledge (Hirsch, 2016; Willingham, 2006)
Word Reading

- Often assumed in the past that comprehension problems were due to poor word reading
- Systematic phonics instruction has shown to not only improve word reading but also comprehension (NRP, 2000)
Strategy Instruction

- Comprehension monitoring
- Prediction
- Find the main idea
- Summarizing
- Paraphrasing
- Generating questions
- Inferencing
- Visualize
- Graphic organizer


Reading Strategies

• Promotes cognitive engagement
• Reading requires thinking

• “Thinking guided by print” (Perfetti, 1985)

• “Thinking with a book in your hand”
System 1
- automatic
- intuitive
- attention limited
- “seat of the pants”

System 2
- deliberate
- logical
- rational
- resource demanding
Why Don’t Students Like School?
Because the Mind Is Not Designed for Thinking
Reading Comprehension

• Requires controlled and managed cognition
• Self-regulation – adjust, alter, or maintain thinking
• Strategic use of attentional resources & working memory
  - natural abilities
Executive functioning

• Executive functioning deficits, attentional problems can reek havoc on comprehension
  - distracted by details
  - fail to focus on the most central ideas
  - miss markers for inference making
  - problems monitoring coherence of text
Reading Comprehension

• Requires controlled and managed cognition
• Self-regulation – adjust, alter, or maintain thinking
• Strategic use of attentional resources & working memory
  - natural abilities
  - standard of coherence
Standard of Coherence
van den Broek et al. (2011)

• One’s explicit or implicit criteria for how coherent one’s understanding should be
• Goal of reading – gist or deep comprehension
• Motivation or interest in topic
• Presence of distractors or secondary tasks
• Fatigue
Reading Comprehension

• Requires controlled cognition
• Strategic use of attentional resources & working memory
  - natural abilities
  - standard of coherence
  - experience and instruction strategic processing
Reading Strategies

- easily taught
- not automatically transferable

HOW WE LEARN ASK THE COGNITIVE SCIENTIST

The Usefulness of Brief Instruction in Reading Comprehension Strategies

How does the mind work—and especially how does it learn? Teachers' instructional decisions are based on a mix of theories learned in teacher education, trial and error, craft knowledge, and gut instincts. Such gut knowledge often serves us well, but is there anything transferable to rely on?

Cognitive science is an interdisciplinary field of research from psychology, neuroscience, linguistics, philosophy, computer science, and anthropology who seek to understand the mind. In this regular American Educator column, we consider findings from this field that are strong and clear enough to merit classroom applications.

By Daniel T. Willingham

Question: In a recent column, you said that background knowledge is essential for reading comprehension. What about reading comprehension strategies? Isn't it important to teach children comprehension strategies to help them get everything out of what they read?

The effectiveness of teaching reading comprehension strategies has been the subject of over 500 studies in the last 25 years. The simple conclusion from this work is that strategy instruction improves comprehension. Much more difficult to answer are the interesting questions that follow: How much do strategies help? How do they work? Do all students benefit? How much time should be spent on them? The answers are not yet clear, but combining what cognitive scientists know about reading with patterns of data from experiments conducted in classrooms allows us to draw some tentative conclusions. It appears that reading strategies do not build reading skill, but rather are a bag of tricks that can indirectly improve comprehension. These tricks are easy to learn and require little practice, but students must be able to decode fluently before these strategies can be effective.
IKEA Desk

• Think about the desks you have put together in the past
• Find the “main” piece to work with and start assembling
• As you work, stop and ask yourself if it looks correct
Expertise

• Combination of knowledge and skills in a discipline
Willingham (2016)

• Critical thinking (as well as scientific thinking and other domain-based thinking) is not a skill. There is not a set of critical thinking skills that can be acquired and deployed regardless of context.
• There are metacognitive strategies that, once learned, make critical thinking more likely.
• The ability to think critically—to actually do what the metacognitive strategies call for—depends on domain knowledge and practice.
Strategy instruction

• Should be most effective when skill instruction is tied to specific text and task
Strategy instruction may have greater value when tied to the particular text-task situation.

Especially the case when it comes to assessment/performance.

Comprehension is more than knowledge acquisition/literature appreciation.

Students must do something with the knowledge.
Argumentation

• Read two articles with contrasting viewpoints and write a reflective essay
  - Identify claim, argument, & counterargument; evaluate evidence; take a stance; check biases
  - teach specific to discipline

Language Intervention
Language Basis

Academic Language

- Discipline-general language knowledge and skills that cut across content areas and allow students to communicate about and gain discipline-specific knowledge
- Vocabulary, syntax and discourse structures found across content areas in print
- Core academic language skills (CALS; Uccelli et al., 2014, *Applied Psycholinguistics*; Uccelli & Phillips Galloway, 2016, *Journal of Adolescent & Adult Literacy*) – Grades 4-8
Figure 1
Core Academic Language Skills Construct

Organizing analytic texts
Unpacking dense information
Connecting ideas logically
Understanding metalinguistic vocabulary
Tracking participants and themes
Interpreting writers’ viewpoints
Recognizing Academic Register

CORE ACADEMIC-LANGUAGE SKILLS

Academic Vocabulary

• Tier 2 words (analyze, enormous, evidently)
  - context of storybooks or text
  - teach synonyms and antonyms
  - provide opportunity to forget and relearn

• Morphosyntax (include, inclusion, inclusive)
  - unpacking complex words
  - learn how morphemes work

*Bringing Word to Life: Robust Vocabulary Instruction*
(Beck, McKeown, & Kucan, 2013)

*Unlocking Literacy: 2nd Ed.* (Henry, 2010)
Complex Syntax

• Unpacking of noun phrases
  - prepositional phrases
  - relative clauses

• Subordination
  – because, although, unless, even though, if, whenever, provided that, though, since, while, whereas
Complex Syntax

• Unpacking of noun phrases
  - prepositional phrases
  - relative clauses

• Subordination
  – because, although, unless, even though, if, whenever, provided that, though, since, while, whereas
Cohesion

- Cohesive devices tie one portion of the text to another
  - conjunctives (e.g., alternatively, however, nonetheless)
  - enumeration (first, next, then)
  - anaphoric pronouns
  - text structure
Text as an language lesson

• Pick an appropriate book or text
• Teach the language in the book
• Avoid piecemeal presentation of content
Galileo Galilei was born way back in the year 1564 in the town of Pisa, Italy. When he was 20 years old, he was studying in Pisa. His father wanted him to be a doctor, but Galileo was bored with school except for math. Because math was the one subject where he was doing well, the court mathematician offered to tutor him privately so he could become a qualified mathematician. Galileo’s father was disappointed, but he agreed.

Because he needed to earn money, Galileo began experimenting with different things, trying to come up with some sort of invention that he could sell for money. He had a little bit of success with his invention that was kind of like a compass that could be used to measure plots of land. He had already experimented with pendulums, thermometers, and magnets.

When he heard that a Dutch inventor had invented something called a spyglass, but was keeping it a secret, Galileo decided to work on one of his own. Within 24 hours, he had invented a telescope that could magnify things to make them appear ten times larger than real life. One night, he pointed his telescope toward the sky, and made his first of many space observations: the moon was not smooth, like everyone thought. The moon was covered in bumps and craters. As technology has improved, first Galileo, and then many others, have made improvements on the telescope, the wonderful device that allows us to see from a distance.

Name:

Answer the following questions based on the reading passage. Don't forget to go back to the passage whenever necessary to find or confirm your answers.

1) Galileo’s father was disappointed when he became a mathematician. What did he want him to be instead?

2) Why did Galileo become an inventor?

3) Where did Galileo get the idea for his telescope?

4) What did Galileo discover about the moon?

5) Do you think Galileo’s inventions made a difference in the world? How?
LARRC

- 766 children PreK – 3rd Grade
- 25 week language intervention
- Four 30 minute sessions a week
- Vocabulary, text structure, inferencing, comprehension monitoring
- Some proximal gains
- No effect on standardized RC/LC tests
Language Intervention


Should we measure reading comprehension?
Assessment

• No compelling reason to give a traditional standardized reading comprehension test
  - not single thing
  - not reliable
  - no consistency in diagnosis

• Measure component skills
  - word reading
  - academic language
  - domain knowledge
EOY Assessments

• Accountability
• Unfair assessments
• Change to subject matter tests
Text-Task Scenarios

• Pearson and colleagues argue that we specifically measure children abilities on specific comprehension text-tasks situations
• Assess whether a child can evaluate an argumentative text on a familiar topic written with grade level complexity – summarize vs. take a stance and support claim
• Appreciation of a narrative
• Contrast perspectives
Alternative approaches

- Global Integrated Scenario-Based Assessment (GISA: O’Reily & Sabatini, 2016; Sabatini et al., 2016)
  - based on a multidimensional model of reading
  - students given a clear plausible purpose for reading
  - contextualized within a scenario
  - discipline specific (i.e., questions appropriate to the discipline)
  - background knowledge measured and/or taught
  - digitally delivered (text, websites, e-mails, images)
  - give examples of appropriate answers (e.g., written summary example)
  - digital “peers” that allow for collaboration (e.g., ask questions of reader)
Thank you

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