Good Readers are Good Thinkers!
Teaching Executive Skills to Support Reading Comprehension

Kelly B. Cartwright, Ph.D.
Professor of Psychology, Neuroscience, & Teacher Preparation

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Working at an intersection…

Today, we are here!

Psychology
(How do students think and learn?)

Neuroscience
(How do brain activities relate to learning?)

Education
(How can we teach for effective learning?)

reading is thinking

but, even with all those skills in place, reading comprehension STILL looks like this for some of our students…

meaningless reading*

-- Dolch (1960)

*meaningless reading = specific reading comprehension difficulties; “poor comprehenders” or “word callers”
Let’s think about these students…

(Which ones fit the “poor comprehender” profile?)

<table>
<thead>
<tr>
<th>Name</th>
<th>Reading Rate (WCPM)</th>
<th>Word Decoding (Grade Level)</th>
<th>Comprehension (Grade Level)</th>
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<tr>
<td>Benson, Charles</td>
<td>52</td>
<td>2.1</td>
<td>1.3</td>
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<td>Carter, Andrew</td>
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<td>3.5</td>
<td>2.0</td>
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<td>Franklin, Megan</td>
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<td>Jones, Sarah</td>
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<td>2.4</td>
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<td>Lopez, Selma</td>
<td>73</td>
<td>3.1</td>
<td>3.0</td>
</tr>
<tr>
<td>Martin, David</td>
<td>91</td>
<td>4.3</td>
<td>4.0</td>
</tr>
</tbody>
</table>

50th percentile for 3rd grade students in September = 83 WCPM (Hasbrouck & Tindal, 2017)

How Many?

- Applegate, Applegate, & Modla (2009)
  Teacher-identified fluent readers; 34% were struggling comprehenders

- Torppa & Colleagues (2007)
  Finnish 1st & 2nd graders at risk for reading difficulties; 22% were poor comprehenders

- Catts, Hogan, & Fey (2003)
  183 poor comprehenders; 28.8% were good decoders

- Riddle Buly & Valencia (2002)
  108 children, failed state reading assessment; 33% poor comprehenders

- Shankweiler & colleagues (1999)
  Across 3 studies of struggling readers; 28% poor comprehenders

**Poor comprehenders comprise almost a third of struggling readers!**

Plan for the Day

What are executive skills?

Why are they important?

How do executive skills develop?

How can we teach them to support reading comprehension?

What are executive skills?

executive skills

critical set of mental skills that enable the management of reading processes toward the end goal of reading comprehension
Coming to terms…

- executive skills
- executive functions
- executive functioning skills
- executive control
- executive control processes

What are executive skills?

mental skills we use to manage our thoughts, feelings, & behaviors to achieve goals

self-regulation

like an air traffic controller!

Umbrella term…

that includes many skills involved in regulating thinking, feeling, and behavior

3 Core (or Basic) Executive Skills*

working memory

- 2 parts: storage & processing
  - e.g., remembering directions while carrying them out, holding text meaning in mind while updating it as you read through a text

*underlie more complex executive skills like planning, organization, & monitoring

3 Core (or Basic) Executive Skills*

cognitive flexibility (mental flexibility)

- switching between ideas or activities; revising goals/plans; shifting
  - e.g., transitioning from math to circle time, juggling sounds & meaning

*underlie more complex executive skills like planning, organization, & monitoring

3 Core (or Basic) Executive Skills*

inhibition (self control or inhibitory control)

- resisting impulses, controlling behavior
  - e.g., waiting turn, using words instead of grabbing, ignoring irrelevant word meanings or details, ignoring distractors in the environment while reading

*underlie more complex executive skills like planning, organization, & monitoring
Executive Skill Self Assessment

Why are executive skills important?
Tied to long term academic and life outcomes

The Marshmallow Study

The Marshmallow Study (Mischel et al. 1972)

- One marshmallow now, or wait and get two
- Ability to delay gratification was related to:
  - higher SAT scores
  - better social, cognitive, and emotional coping in adolescence
  - educational achievement
  - adult self-worth
  - better ability to cope with stress as adults
  - less crack cocaine use (in vulnerable populations)
  - less aggression, bullying

(Mischel et al., 2011)

Preschool executive skills predict...

Growth in emergent literacy, vocabulary, and math across Pre-K (McClelland et al., 2007)

Kindergarten literacy and math skills (Bar & Razz, 2007)

3rd grade reading comprehension (Guajardo & Cartwright, 2014)

Math & reading achievement at age 21 (McClelland et al., 2013)

College completion by age 25 (McClelland et al., 2013)

LIFESPAN ACADEMIC SUCCESS!
Specific executive skills underlie successful reading comprehension...

**planning & organization** (Cutting, Molak, Cole, Levine, & Mahone, 2019; Locascio, Mahone, Escolar, & Cutting, 2019)

**working memory** (Boscolo, et al., 2013; Cain, 2006; Coventry, Connolly, De Beer, & Romani, 2005; De Beer, Williams, Connolly, & Connolly, 1996; Oakley, Hart, & Ganea, 2006)

**cognitive flexibility** (Cartwright et al., 2016; Cartwright et al., 2017)

**inhibition** (Boscolo, Connolly, & Pelagios, 2010; Cain, 2006; Locascio, et al., 2010)

**social understanding** (Brown, Orom-Cardy, & Johnson, 2013; Cartwright et al., 2017; Dagostino & Cartwright, 2014)

How do executive skills develop?

Development of Executive Skills

- Begins in infancy, big improvements in preschool age, continues through adolescence and adulthood (Cartwright, 2015)
- Self-regulatory language that children use to talk themselves through tasks - indicates reflection (Alarcón-Rubio, et al., 2014; Bodrova, et al., 2011; Cragg & Nation, 2010; Kray & Ferdinand, 2013; Marcovitch, et al., 2008)
- Warm, open, stimulating caregiving style: animated, positive interaction style; sensitivity to students’ interests & ideas; asking open-ended & inferential questions; using complex syntax & vocab (Blair, Raver, Berry, & Family Life Project Investigators, 2014; Fay-Stammbach, Hawes, & Meredith, 2014; Rhoades, Greenberg, Lanza, & Blair, 2011)

How can we teach executive skills to support reading comprehension?
Teaching executive skills...

• Requires that we TALK about THINKING in ways that may be unfamiliar to us

• Goes beyond comprehension strategies & typical think-alouds

• Is also familiar because it brings together many things that we already do!

Teacher Talk Examples:
“Good readers are good thinkers…”

• Good planners: Know why they are reading and make a plan to get there

• Organized thinkers: Know how words, stories, books are put together and use what they know to help them remember what they read

• Are flexible thinkers: Can think (and do) lots of things at the same time

• Have good memories: Keep some things in mind while doing other things

• Are good at inhibiting things that are not important to understanding

• Are good “mind readers”: Can think about characters’ thoughts and feelings

Introducing 6 executive skills...

For each of the 6 skills:

• introduction & definition

• examples (assessments, games)

• how you might explain the skill

• applications to reading instruction

1. Planning (Chapter 2)

People with goals succeed because they know where they’re going

(good comprehenders understand because they know why they are reading)

-- attributed to Earl Nightingale, brainyquote.com

Planning ( & Organization)

[ability to implement multi-step tasks, in proper order, to reach a goal]

• Tower of London task: arrange balls or disks on pegs to match a goal (count number of moves, errors, speed)

• Games that require planning: Jenga, Chess, Checkers

• Games that require organization: 20 questions, Apples to Apples

Planning and Reading Comprehension

• Draws on many things we know good readers do

• Involves goal-setting and teaching students steps they can take to reach their reading goal for a particular text

My Plan to Understand

Good readers are good planners: Know why they are reading and make a plan to get there
My Plan to Understand

First, set a goal: _____________________________________  *discuss w/students

THEN ask yourself these questions

- Preview: Looking through the book, what do I see to help me get there?
- Focus: Should I pay more attention to some parts and slow down for others?
- Connect: What do I already know about this topic that will help me reach the goal?
- Question: What goal-related question(s) can I ask myself?
- Predict: What do I guess will be in this book?
- What other steps can I take to reach my goal?
- What will I know when I’m done?

Questions to guide goal-setting discussions (first step in plan)...

- Why are you reading this text?
- What kind of a text is it, a story or an informational text (fiction or non-fiction)?
- What do you need to know when you are done?
- Do you need to remember details of a story, or are you reading to learn information about a new topic?
- Are you reading to answer questions?
- Are you reading to find a particular kind of information?
- Are you reading for fun?

2. Organization (Chapter 3)

Organization is what you do before you do something, so that when you do it, it’s not all mixed up. (Authors use different kinds of organization to help us understand text; good readers use that organization to help themselves understand text.)

- Attributed to A. A. Milne (https://www.goodreads.com/quotes)

Organization and Reading Comprehension

- Recognition of organization already in texts
  - syntax (word order)
  - text structure (narrative or various informational structures)

- Ability to USE a text’s organization to remember what’s in it

- Ability to apply one’s own knowledge of organization to words and texts (requires explicit knowledge of organization as a tool)

Organization and Reading Comprehension

- How many sentences can you make with these words?

Organization

(Ability to recognize order, impose order, or create systems to manage information or objects)

- book fun a good reading is

  Reading a good book is fun.
  A good book reading is fun.
  A fun reading book is good.
  A good reading book is good.
  A fun book reading is fun.
  A fun book reading is good.

Teaching Conceptual Organization

Concept Maps (organizing information in our heads)

[Diagram showing concept maps]
How is your knowledge of reading comprehension organized?

Turn and Talk
- What did you write?
- What factors contribute to successful reading comprehension?

Teaching Language Organization: Scrambled Sentences
Syntax: the way language is organized to make meaning
Example:
quickly backyard dog the she in brushed the

You can begin each day with a sentence anagram (scrambled sentence) on the board to provide practice! Discuss and have them explain reasons for their choices.

Teaching Language Organization: Word Grouping Activity (Weaver, 1979)
quickly backyard dog the she in brushed the
First: Which word is the action word?
Next: Group the rest of the words by answering these questions
- Who did it? (The answer to this question usually goes before the action word.)
- How did they do it? (The answer to this question usually goes right before the action word)
- To whom or what did they do it? (The answer to this usually goes after the action word)
- Where did they do it? (The answer to this usually goes at the end of the sentence)

Teaching Language Organization: Organization: Causal Connections (van den Broek, 1987; Walker, Gopnik, & Ganea, 2014; Wolman, van den Broek, & Lorch, 1997)
In narratives, events are connected because of cause/effect
Think about The Little Engine that Could:
How are events causally connected?

Poor comprehenders struggle with understanding cause and effect in stories:
their retellings are like a string of unrelated events.
Organization: Scrambled Stories

Tell me what’s happening in this story…

First: Next Then Finally

Teaching Organization: Causal Connections in Narratives

Story sequencing (putting pictures in correct order) with verbal explanation for WHY they are connected

Google “story sequence images” & also use wordless picture books

Keep track of students’ use of connecting words!

Students’ use of connecting words tells you much about their understanding of causal connections

(Cain, 2003; Trabasso et al., 1981)

Teaching Organization: Causal Connections in Narratives

Teach and Assess Connecting Words:

Independence Between Ideas:
and, additionally, now, as well, also, in addition…

Dependence (Connection) Between Ideas:
if, but, because, so, so that, in order to, however, in contrast, or else, instead of…

Time Sequence:
later, first, next, since, and then, when, before, finally…

(Cain, 2003; Trabasso et al., 1981)

Try Story Cubes with your students

Do students’ stories include:
• Causal connections?
• Connecting words?

Let’s make a story…

https://www.storycubes.com
Teach Expository Text Organization

Teach the text structures explicitly!
- collection, description, explanation
- definition-example
- problem-solution
- compare-contrast
- temporal sequence
- causation (process or cycle)

(Reutzel, Read, and Fawson, 2009; Williams, 2003, 2005; Williams et al., 2014)

3. Cognitive Flexibility (Chapter 4)

The test of a first-rate intelligence is the ability to hold two opposed ideas in mind at the same time, and still retain the ability to function.

(and the test of a good reader is whether he can juggle multiple aspects of text, actively switching between them while reading?)

— F. Scott Fitzgerald (1964, p. 69)

Cognitive Flexibility

What two ways are these cards sorted?
- Multiple Classification tasks sort sets of cards along 2 (or more) dimensions at once, indicates the flexibility with which folks can consider these dimensions at the same time
- Games: Set®, Spot it!, Uno

You try the cognitive flexibility assessment!

- You need:
  - A set of word cards (there are 12 per set)
  - Your 2x2 matrix
- Sort by sound and meaning into the 2x2 matrix
- Check it:
  - Do meanings match horizontally (or vertically)?
  - Do beginning sounds match horizontally (or vertically)?
  - Matching by diagonals does not count as correct

Teaching Cognitive Flexibility

(first, single sorts then, sort completions)

(criterion of 4 in a row correct)
You try Teaching Cognitive Flexibility!

• You need: one set of word cards and a 2x2 matrix

• Shoulder partner: one is “teacher” and one is “student”

• Steps:
  1. Student completes a single sort (into 2 piles) on one dimension (meaning or sound)
  2. Teacher reshuffles; student completes 2nd single sort (into 2 piles) on other dimension
  3. Fill-in-the-Blank: Teacher places 3 cards into the 2x2 matrix, sorted by sound and meaning; hand student remaining 9 cards and ask them to “Find a card that goes here”
  4. Reshuffle 12 cards, place 3 new cards in 2x2 matrix and continue this process until student gets 4 Fill-in-the-Blanks in a row correct

Teaching Cognitive Flexibility: Multi-feature Questions - sound & meaning

I am thinking of a yellow food that starts with /b/.

I am thinking of a beach container that rhymes with rail.

Tell me a /d/ word that names a kind of flower.

Can you think of a /p/ word that you can eat?

Your turn!

• Think of five sound-meaning questions to ask your students

• When could you incorporate this activity during the school day?

• Share with your shoulder partner

Working Memory

[storage & processing: ability to hold information in mind while completing a task]

Let’s try a sentence completion task…

• light, wheels, bananas

Another assessment: the letters backward task

• “I’m going to say some letters, and you repeat them backwards.”
  • Q K becomes Q K
  • Z P N becomes N P Z
  • F T S B becomes B S T F

Games: “Johnny has a ______ in his pocket” & “The name game”

• Pocket Game: Students take turns, add an item each time; alphabetical order; say entire list PLUS their new item on their turn

• Name Ice breaker: Each student says their name and something they like; subsequent students must remember each student, their liked item, AND come up with their own response, adding it to the list

4. Working Memory (Chapter 5)

I am an omnivorous reader with a strangely retentive memory for trifles.

Isn’t that what we want for all of our readers – to retain what they read?!)

— Sherlock Holmes (Doyle, 1986, p. 692)

Good readers have good memories: They can keep some things in mind while doing other things.
Teaching Working Memory: Resolving Anaphors

Sally loves to go to the park with Jane because she always pushes her very high on the swings.

Jim's mother said he couldn't have a pet because he didn't have time to take care of one.

Authors use shortcuts when writing. They substitute shorter words or phrases for longer bits of text, and we have to figure out what they mean. Requires holding words in mind so you can connect them to later words.

Teaching Working Memory: Inferences

It was 8:55, and the school bell rings at 9:00. Andy was pedaling as fast as he could, because he was worried that he might miss his test.

Where was Andy going? (Text-connecting, local coherence inference)

How was Andy getting there? (Gap-filling, global coherence inference)

Some inferences (global coherence, gap-filling) REQUIRE that readers supply information from their own heads

“Authors expect us to figure some things out, like a detective!”

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5. Inhibition (Chapter 6)

Upon reading these various extracts, they not only seemed to me irrelevant, but I could perceive no mode in which any one of them could be brought to bear upon the matter at hand.

― Poe (1899, p. 87)

Inhibition

(ability to wait, stop and think, and restrain habitual, potent responses; self-control)

In adults: color word inhibition (Stroop)

- Name patches of color
- Read color words
- Then, name the ink color
- green red blue red

In children: happy/sad task

- When you see a happy face, say “sad”
- When you see a sad face, say “happy”

Games: Simon Says, Taboo (trying NOT to say a target word)
Inhibition Problems

• Calling up irrelevant word meanings (jam: traffic jam or edible jam)
• Difficulty inhibiting/ignoring irrelevant word meanings
• Trouble ignoring irrelevant details
• Trouble ignoring distractions while reading
• Reflexively blurting out the first word that comes to mind with partial letter-sound information (“bring” for “bridge”)
• Reflexively blurting out “stories” that are marginally related to a text

Good readers are good at inhibiting things that are not important to understanding.

Teaching Inhibition

Resolving Ambiguous Meanings
• Homonyms and Homophones e.g., bear/bare, deer/dear,
• Idioms and Other Figures of Speech e.g., hold your tongue, Parts and More Parts,
• Ambiguous Sentences e.g., Let’s eat Grandma. vs. Let’s eat, Grandma.
• Books with Multiple Meanings e.g., Amelia Bedelia, riddles books

Teaching Inhibition: Polysemy and Academic Language
• Poly = many; semy = meanings
• Sometimes we expect students to learn (or know) academic meanings for words that also have everyday meanings

readers (and listeners) must inhibit the common meaning and pay attention to the more specialized academic meaning!

Common vs. Academic Meanings...
• I scratched my head in confusion. The general is the head of the army.
• Does head mean:
  a. cabbage
  b. sneaker
  c. part of the body
d. leader of a group
e. to go somewhere

  a. cabbage
  b. sneaker
  c. part of the body
d. leader of a group
e. to go somewhere
6. Social Understanding (Chapter 7)

“What an astonishing thing a book is. It’s a flat object made from a tree with flexible parts on which are imprinted lots of funny dark squiggles. But one glance at it and you’re inside the mind of another person, maybe somebody dead for thousands of years. Across the millennia, an author is speaking clearly and silently inside your head, directly to you. Writing is perhaps the greatest of human inventions, binding together people who never knew each other, citizens of distant epochs. Books break the shackles of time. A book is proof that humans are capable of working magic.”

– Carl Sagan (Sagan, Druyan, & Soter, 2000)

Social Understanding (understanding internal mental states: thoughts, feelings, intentions, beliefs, desires…)

• Required to understand why characters do what they do
• Supports social inference-making - essential for narrative texts and social informational texts (e.g. history and social studies)
• Supports understanding of author’s purpose
• Reciprocal: Adults who read more fiction have better social understanding! (Kidd & Castano, 2013)

Good readers are good “mind readers”: Can think about characters’ thoughts and feelings.

Teaching Social Understanding (Shanahan & Shanahan, 1997)

• Mapping stories from multiple perspectives

Teaching Social Understanding

Social Understanding

What texts can you think of that would support the development of understanding multiple perspectives?

• Share with your shoulder partner.

Talk about it….
Teaching Social Understanding

Mental and emotional state vocabulary
- Assess how often these words appear in retellings
- Teach these kinds of words to improve social understanding

- cognition (thinking): believe, bet, dream, figure, forget, guess…
- motivation (desires): desire, hope, like, love, miss, need, want…
- emotion (feelings): afraid, angry, bad, bored, cry, frustrated…

Pulling It All Together (Chapter 8)

“Re- vision – the act of looking back, of seeing with fresh eyes, of entering an old text from a new critical direction.”

- Rich (1972, p. 18)

Before reading…

When skilled comprehenders pick up a new text, they approach the reading task very deliberately, with a plan to understand the text for a particular purpose. To prepare to understand a text, they read the text, making connections to their own prior knowledge, about the topic of the text, asking themselves questions about what they might encounter in the text, and making predictions about what they expect to discover as they read. They preview the text’s structure, because they are aware that knowledge of text structure will help them organize incoming information as they read and support their own construction of a model of the text’s meaning in working memory. Thus, even when planning for comprehension before reading begins, skilled comprehenders display remarkable cognitive flexibility, shifting between thoughts of their own prior knowledge, asking questions, making predictions, and previewing text structure, all while maintaining focus on their primary need for understanding the text.

During reading…

Skilled comprehenders build a coherent model of text meaning in working memory. To do this, they flexibly juggle multiple kinds of information as they read, such as literal, sound information, information about text and language organization, word meanings and links to prior knowledge, making appropriate inferences when necessary. They check predictions, visualize events, make text-based inferences, and use social understanding to make inferences based on characters’ internal mental worlds, while continually monitoring understanding and progress toward their planned goal, and updating their mental model of text meaning in working memory. They draw on inhibition to suppress irrelevant information, ignore distractions, and refrain from engaging in behaviors that undermine reading comprehension. They are able to manage flexibly all of these processes while they identify and hold in working memory the most important features of text to construct summaries that will support comprehension and memory for text content.

After reading…

Skilled comprehenders continue to reflect on text content in working memory, connecting the new information they have learned to their existing knowledge structures, in ways that capitalize on their existing conceptual organization, flexibly shifting and adjusting their own knowledge structures as necessary in response to the new information gleaned from text. They also draw conclusions about the questions and predictions that guided their planning and processing of the text, and they evaluate the extent to which they were successful in implementing their plan to reach particular comprehension goals. These post-reading activities necessarily recruit working memory as readers reflect on their summary of text information and flexibly shift between thinking about their own prior knowledge, predictions, and questions, working knowledge structures as necessary, and evaluating the extent to which their comprehension goals were met.

Turn and Talk

- How can you use emojis to help teach social understanding?
- What other ways can you incorporate social understanding into instruction?

Come up with at least three things to try!
Rethinking your knowledge of reading comprehension…

How have you re-visioned reading today?

Questions?


Learn more about executive skills and reading comprehension in this book!

Learn more about poor comprehenders in this book.

Thank you!

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For more information, visit: http://www.kellycartwright.com