Executive Skills and Reading Comprehension
Inspiring the Future of Successful Comprehension

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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)

"She’s my best reader. She just can’t comprehend!"
-- Classroom Teacher (Applegate et al., 2009)

*meaningless reading = specific reading comprehension difficulties (RCD); "poor comprehenders" or "word callers"
executive skills
critical set of mental skills that enable the management of reading processes toward the end goal of reading comprehension

Plan for the Day
• What are executive skills?
• Why are they important (in general and for reading)?
• How can we teach them to support students' reading comprehension?

What are executive skills?

Coming to terms….  
• executive skills
• executive functions
• executive functioning skills
• executive control
• executive control processes

What are executive skills?

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 task meaning in mind while updating it as you read through a text

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

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 distractions in the environment while reading

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

Why are executive skills important?

Preschool executive skills predict...

Growth in emergent literacy, vocabulary, and math across Pre-K
(McClelland et al., 2001)

Kindergarten literacy and math skills (Bar & Razza, 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, Materek, Cole, Levine, & Mahone, 2009; Locascio, Mahone, Bank, & Cutting, 2010)
- **working memory** (Borella, et al., 2010; Cain, 2006; Carretti, Cornoldi, De Beni, & Romani, 2005; De Beni, Palladino, Panagia, & Cornoldi, 1999; Dahl-E, Hart, & Sørensen, 2005)
- **cognitive flexibility** (Cartwright et al., 2016, Cartwright et al., 2017)
- **inhibition** (Borella, Carretti, & Pelegrynis, 2010; Cain, 2006; Locascio, et al., 2010)
- **social understanding** (Brown, Oram-Cardy, & Johnson, 2013; Guajardo & Cartwright, 2016)

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, and books are put together and use what they know to help them remember what they read
- **Are flexible thinkers**: Can think about (and do) lots of things at the same time
- **Have good memories**: Can keep some things in mind while doing other things
- **Are good at ignoring** (inhibiting) things that are not important to understanding
- **Are good “mind readers”:** Can think about characters’ thoughts and feelings

Introducing the executive skills...

4 points for each:

- **definition**
- **example**
- **everyday examples, such as in familiar games**
- **applications to instruction**

**1. 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

How many moves would it take you to get these colored balls from the starting position to the goal position, moving only ONE ball at a time?
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**

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**Planning for Students**

**2. Organization**

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

**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)

**Teaching Conceptual Organization**

**Concept Maps** (organizing information in our heads)

- Use pre- and post-reading concept maps to assess growth of conceptual organization; have them self-assess!
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.

Guo et al., 2009; Nation & Snowling, 2000; Shiotsu & Weir, 2007)

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.)

She quickly brushed the dog in the backyard.

Organization: Causal Connections

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 a string of unrelated events!

Teaching Organization:
Causal Connections in Narratives

Story sequencing (putting pictures in correct order) with verbal explanation for WHY they are connected - keep track of their use of connecting words:

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

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...

(Cani, 2002; Trabasso et al., 1981)

Teach Informational Text Organization

Teach them 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)

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3. Cognitive Flexibility

(ability to consider multiple bits of info & actively switch between them)

- 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
Cognitive Flexibility and Reading Comprehension

- Good readers are flexible thinkers: They can think about (and do) lots of things at the same time.
- Assess by sorting two ways at the same time.
- Poor comprehenders are significantly less flexible!

Good readers have good memories: They can keep some things in mind while doing other things.

Teaching Cognitive Flexibility

- first, single sorts
- then, sort completions (when 3, ask child to complete, then repeat)

Good readers are flexible thinkers:
- They can think about (and do) lots of things at the same time.
- Teaching Cognitive Flexibility
  - Multi-feature Questions - sound \& meaning
  - I am thinking of a red food that starts with /b/.
  - I am thinking of a flower that rhymes with lazy.
  - Tell me /p/ word that names a kind of food.

Teaching Working Memory:

- Multi-feature Questions - sound \& meaning
  - I am thinking of a red food that starts with /b/.
  - I am thinking of a flower that rhymes with lazy.
  - Tell me /p/ word that names a kind of food.

4. Working Memory

- Storage AND Processing
  - Constructing and remembering text meaning (storage), while...
  - Processing anaphors (e.g., pronoun references)
  - Encountering new ideas in a text & updating
  - Connecting text with prior knowledge
  - Inferring missing bits by connecting text parts or filling gaps
  - Using strategies to monitor/maintain meaning
  - Keeping goal of reading in mind while reading

Good readers have good memories: They can keep some things in mind while doing other things.

Working Memory and Reading Comprehension

Teaching Working Memory:

- Resolving Anaphors
  - Sally loves to go the 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)

(Bower-Crane & Snowling, 2005; Cain & Oakhill, 1999; Elbro and Buch-Iversen, 2013)

5. 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 colors

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)
- Trouble ignoring irrelevant details
- Reflexively blurring out “stories” that are marginally related to a text
- Trouble ignoring distractions while reading
- Reflexively blurring out the first word that comes to mind with partial letter-sound information (“bring” for “bridge”)

Teaching Inhibition

Resolving Ambiguous Meanings

(incorporating incorrect ones, focusing on correct ones; also requires working memory)

Homonyms and Homophones

- e.g., bear/bare, deer/dear,
- Idioms and Other Figures of Speech
  - e.g., hold your tongue

Ambiguous Sentences

- e.g., Let’s eat Grandma. vs. Let’s eat, Grandma.

Books with Multiple Meanings

- e.g., Amelia Bedelia, riddles books

(Yuill, 1996, 2008; Zipke, 2008; Zipke, Div, & Cairns, 2009)

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!

“sentence” in language arts vs. math class!

Common vs. Academic Meanings...

(Logan & Kifer, 2017)

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

In this case, does head mean:

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

Social Understanding

Teaching Social Understanding

- 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

- Mapping stories from multiple perspectives

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...

"Re-visions - the act of looking back, of seeing with fresh eyes, of entering an old text from a new critical direction."

- Reck (1972, p. 18)

(Familiar literacy skills in underlined blue font and executive skills in BOLD blue font)
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 preview 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 goal 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 letter-sound information, information about text and language organization, word meanings, and links to prior knowledge, making gap-filling inferences when necessary. They quickly predict, 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, revising knowledge structures as necessary, and evaluating the extent to which their comprehension goals were met.

Thank you!
Questions?
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Learn more about executive skills and reading comprehension in this book!

Learn more about poor comprehenders in this book.

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