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Bonnie J. F. Meyer,

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Development, Impact, and Outreach of the Text Structure Strategy to Boost Reading Comprehension

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8/11/18

Intelligent Tutoring for the Structure Strategy (ITSS)

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Critical Importance of Reading Comprehension Across the Life Span

But many struggle – 64% of 8th graders at or below basic reading levels (NAEP, 2017) and they lack needed proficiency.

Presentation

Overview

People

Passion

Persistence

Past

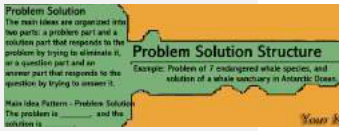
Present

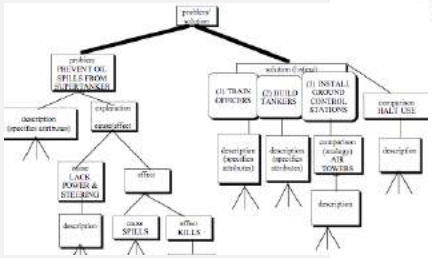
Overview

Reader Variables: Verbal Ability & Word Knowledge, Education, Age, World Knowledge, Perspective, Values, Norms, Reading Expertise, Working Memory Capacity, Styles, Interests, etc.

Text Variables: Text Structure, Topic, Coment & Word Familiarity, Signaling (explicit emphasis cues), Cohesion, Number of Levels in Structure, Amount and Type of Details, Sentence Length, Left-branching Sentences, Genre, Typography, etc.

Strategy Variables: Structure Strategy, Rereading, Underlining, etc.

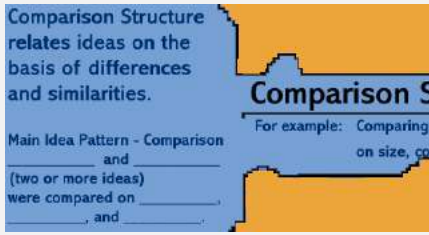


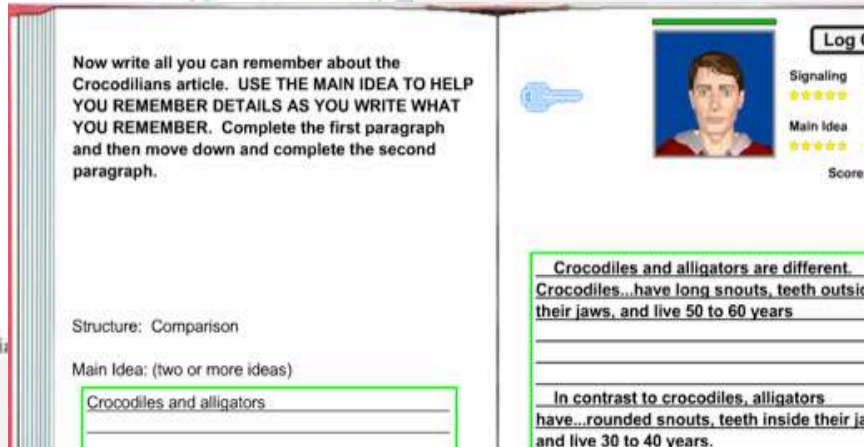


Medical decision-making

TaskVariables: Mode or Rate of Presentation, Response Mode, Task Requirements, Type and Setting of Task, etc.

Figure 1. Interactions among reader, strategy, text, and task varia





OVERVIEW: Text Structure Strategy Increases Reading Comprehension of 4th Graders Through 80-year-olds

e.g., Meyer & Wijekumar (2007, 2016) Intelligent Tutoring of the Structure Strategy (ITSS): A Reading Strategy Tutor

Below grade-level reader in Grade 5 – student's recall of an article comparing pygmy monkeys to emperor monkeys **before ITSS:**

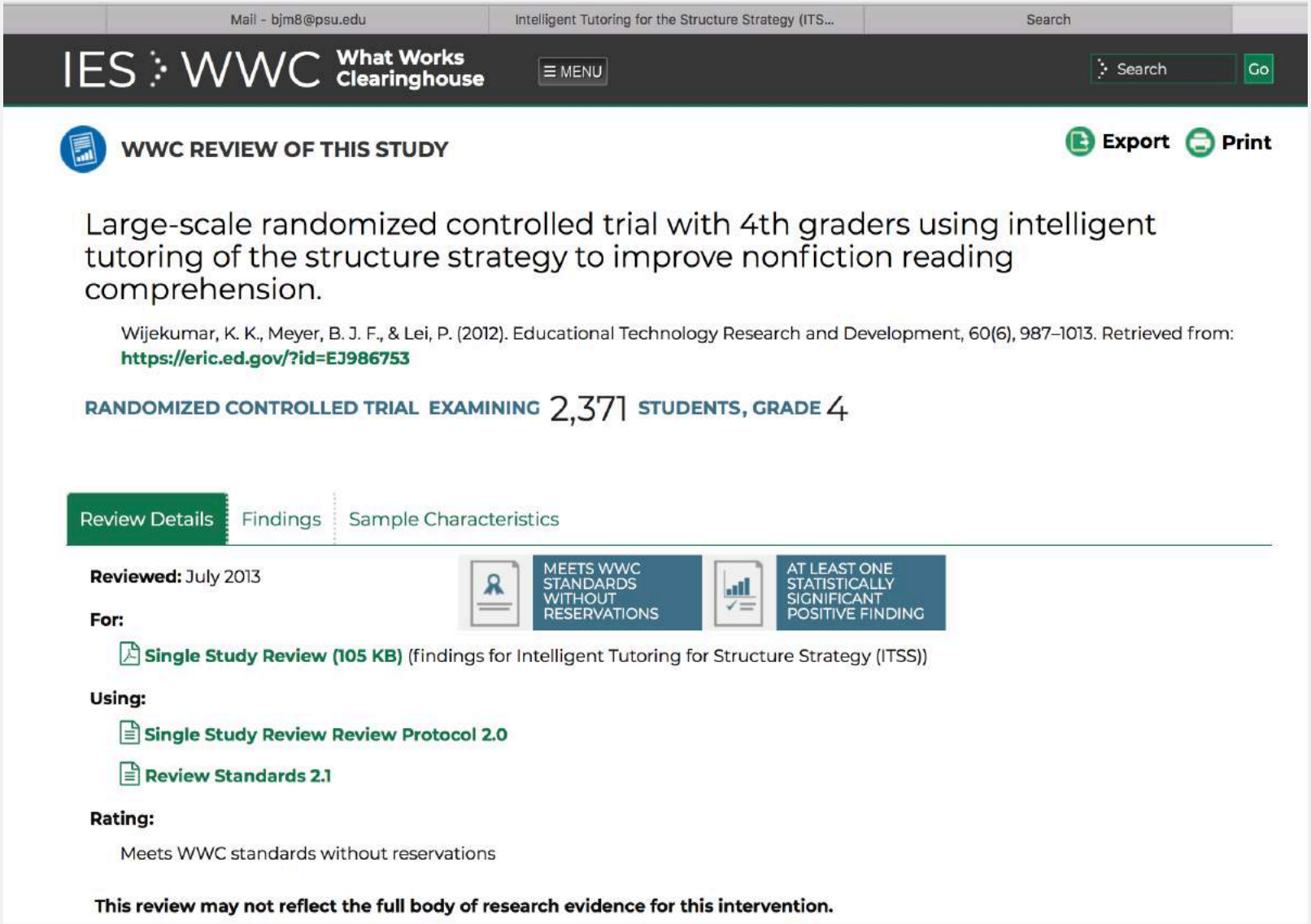
"The monkeys are the smalls Monkeys weghy Less 4 onces a few in. tall."

Same student's recall of an article comparing black flying fox bats to leaf-nosed bats **after 10 ITSS lessons** with comparison texts:

"There are 2 different kinds of bats. A Black flying fox bat and a leaf-nosed bat. The Black flying fox bat is one of the bigest, they grow up to 6 feet wide and weigh more than 3 pounds. they are jet black.

Leaf-noised is smaller than the Black flying bat. the leaf-nois bat is only 1 foot wide. The leaf-nois bats come in different (colors) and mostley feeds on masquitoes and moths."

Strong Evidence What Works Clearinghouse



Evidence for ESSA

READING GRADES: 3 - 6

Intelligent Tutoring for the Structure Strategy (ITSS) - Elementary

Essa Rating	No. Studies	No. Students	Average Effect Size
STRONG	2	5,028	+0.15

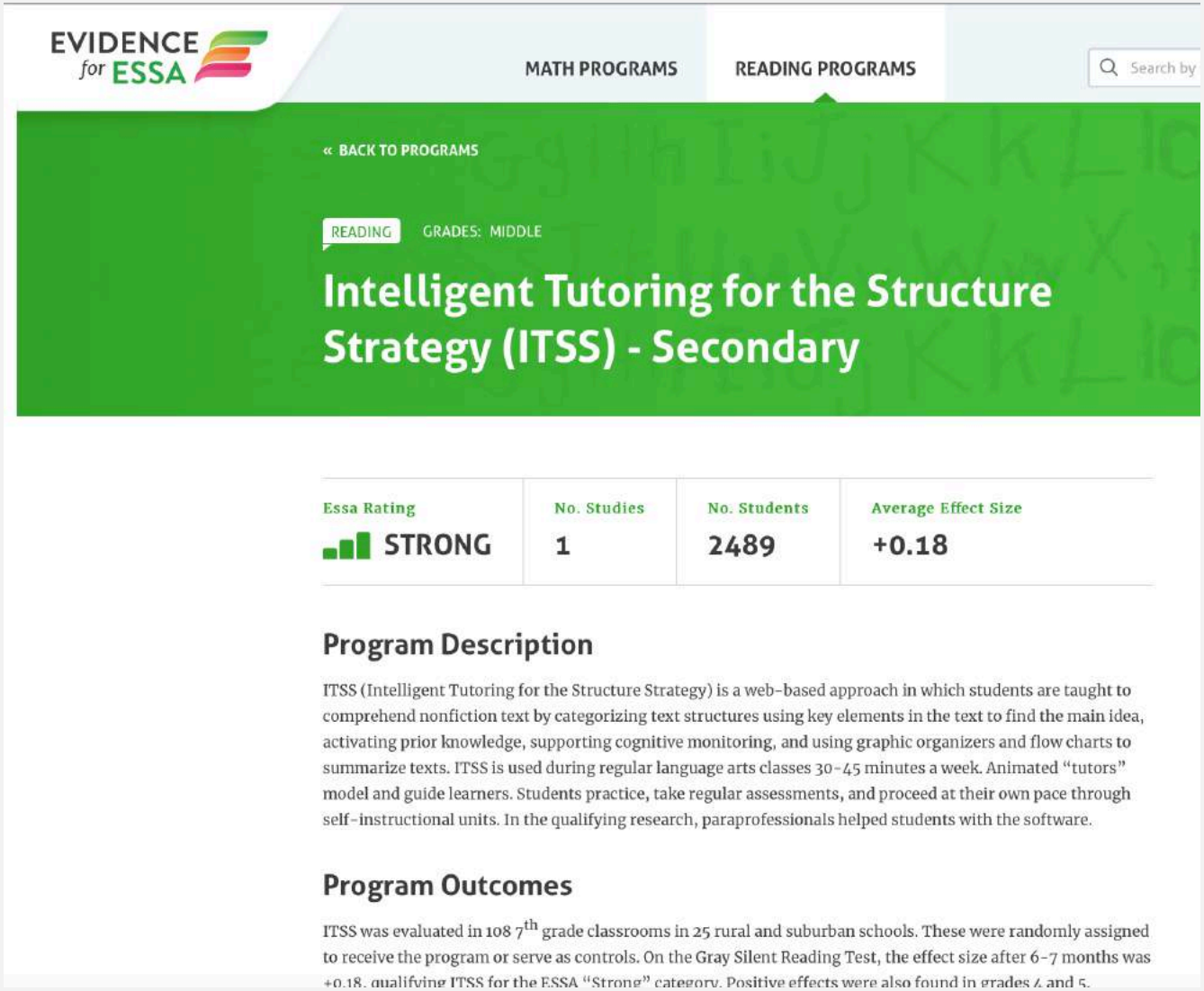
Program Description

Intelligent Tutoring for the Structure Strategy (ITSS) is a web-based approach in which students are taught to read nonfiction texts by seeking signals within texts to guide their comprehension. For example, students would learn to look for words like "differ" and "in contrast" to know that a text is making comparisons. After identifying the text structure, students are scaffolded by the text structure patterns to select important ideas from the text to form a main idea and generate strategic hierarchical memory structures. These text structures can also be used to generate summaries, inferences, and elaborations, and to monitor comprehension. Students work with software in which animated "tutors" model and guide the learner, using graphic organizers, highlighted text and other devices. Students practice, take regular assessments, and receive feedback, proceeding at their own pace through the material.

Program Outcomes

ITSS has been compared to control groups in two studies involving fourth and fifth grade students from 45 rural and suburban schools across 3 states. One of the studies showed significant positive effects on a reading comprehension measure, qualifying ITSS for the ESSA "Strong" category. The mean effect size was +0.15. A study involving seventh graders also showed positive effects.

Evidence for ESSA



Evidence for ESSA

Wijekumar, K., Meyer, B. J. F., & Lei, P. (2017). Web-based text structure strategy instruction improves seventh graders' content area reading comprehension. *Journal of Educational Psychology*.
https://doi.org/10.1037/edu0000168

Journal of Educational Psychology, Vol 109(6), Aug 2017, 741-760

PEOPLE

Passion for research area

Persistence and curiosity

Past development and impact

Present outreach & future for text structure instruction

People: Thanks to research collaborators (partial listing)

George W. McConkie	Sherry L. Willis	Wendy Middlemiss
Carol H. Walker	Michael Marsiske	Elena S. Theodorou
G. Elizabeth Rice	Andrew P. Talbot	Ana I. Schwartz
Brendan J. Bartlett	Carlee (Pollard) Ranalli	James P. Dillard
Bruce K. Britton	Connie Russo	Carole Young
Roy O. Freedle	Dorothy Evensen	Yu-Chu Lin
Leonard W, Poon	Melissa N. Ray	Karen R. Harris
Kausalia (Kay) Wijekumar	Gregory Convertino	Roy B. Clariana
Pui-Wa Lei	Kristen M. Weber	Ping Li
Jennifer J. Ireland	John Carroll	Steve Graham
D. Jake Follmer	Denise H. Solomon	David Brandt; Michael Cook

PEOPLE home and schools

- Passion –developing
- Persistence & Curiosity
- Past
- Present

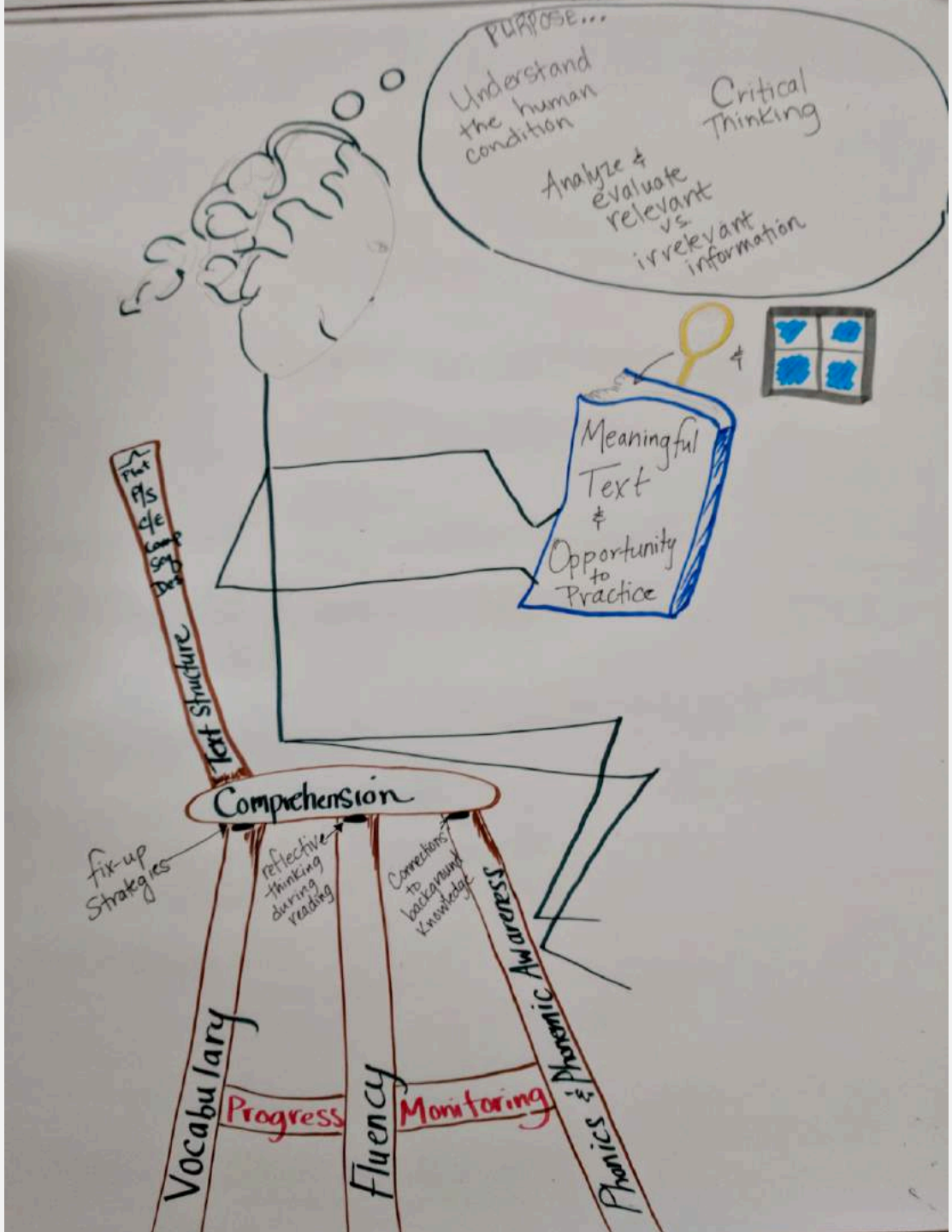
Three Grown Children: teacher, veterinarian, & computer scientist

Three grandchildren ages two to five years

Home-Grown Productive Partnership

- Daughter/teacher
- National Board Certified Teacher; taught text structure strategy & extensions in Grades 5 – 8
- Team leader across middle school disciplines where she integrated the text structure strategy into science, math, and writing classes.
- Regional Literacy Coordinator working with 59 school districts

Daughter, a teacher and collaborator –a "homegrown" Productive Partnership in schools



Her quick Sketch of K-12 Evidence-Based Best Practices

Note back of chair: Text Structure as Integral Component of Reading Comprehension Instruction

PEOPLE participating in our studies of all ages and backgrounds

Passion –developing

Persistence & Curiosity

Past

Present

Three Development Grants from the Institute of Education Sciences in the U.S. Department of Education Grants (2003 – 2019+) and Four Efficacy Grants

INTELLIGENT TUTORING USING THE STRUCTURE STRATEGY to Improve Reading Comprehension of Middle School Students, Meyer [PI], Co-PI: Wijekumar, Middlemiss, & van Horn; collaborators: Lei & Sperling

Improving Reading Comprehension of Middle Grades English Language Learners by Combining **S**tructure Strategy with **W**eb-Based Adaptive Tutoring for **ELL**earners (**SWELL**), Wijekumar [PI], Co-PI: Meyer, Lei, & Schwartz

Development of a web-based writing partner (**WE-WRITE PERSUASIVELY**) to improve writing persuasive essays for 5th grade students, Wijekumar [PI], Co-PI: Harris, Graham, Meyer, & Lei

Two Efficacy Grants from IES

(Another 2 IES efficacy grants just began in July 2018 following up on the SWELL and We-Write grants to TAMU [PI Wijekumar])

Efficacy and Replication Research on the Intelligent Tutoring System for the Structure Strategy -- Rural and Suburban Schools Grades 4, 5, 7, and 8. Wijekumar [PI], Co-PIs: Meyer, Lei, and Kulikowich).

Efficacy and Replication Trial of the Individualized Adaptive ITSS with 4th- and 5th-Grade Students in High Poverty Schools. Wijekumar [PI], Co-PIs: Meyer, Lei, & Walpole.

People

PASSION –for developing programmatic research about text structure

- Persistence & Curiosity
- Past
- Present

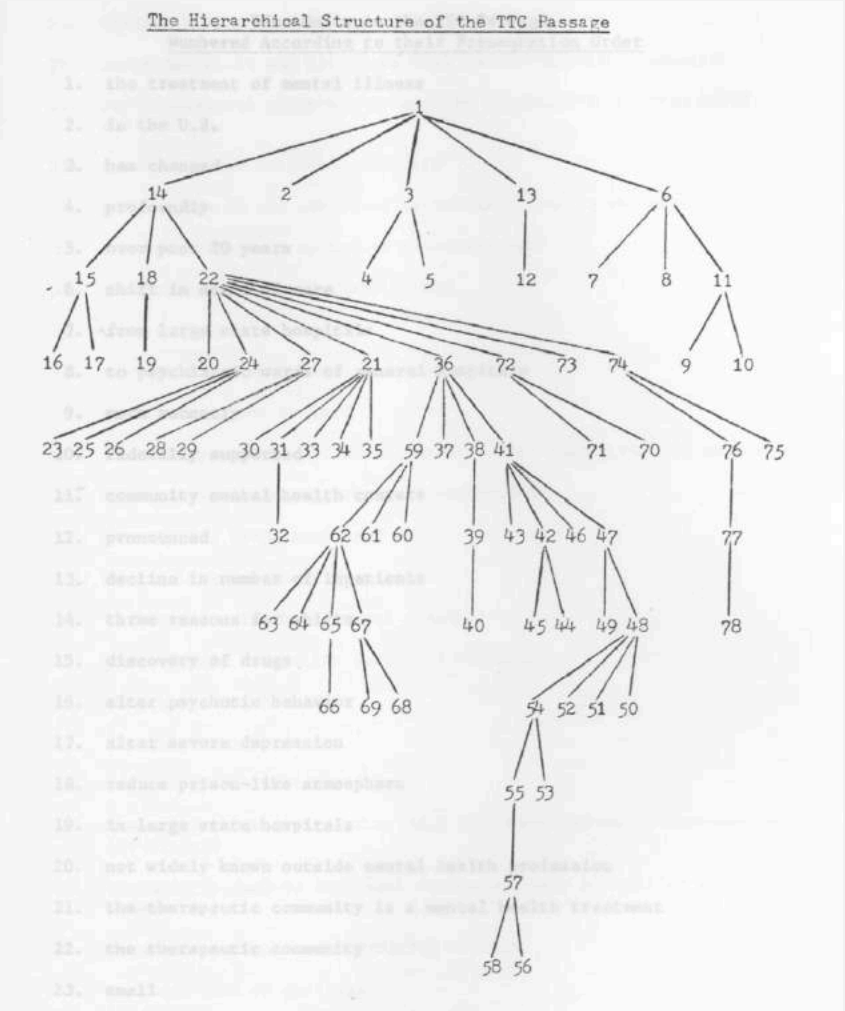
Passion:
Find, Use, & Think About Relationships Among Ideas & Data

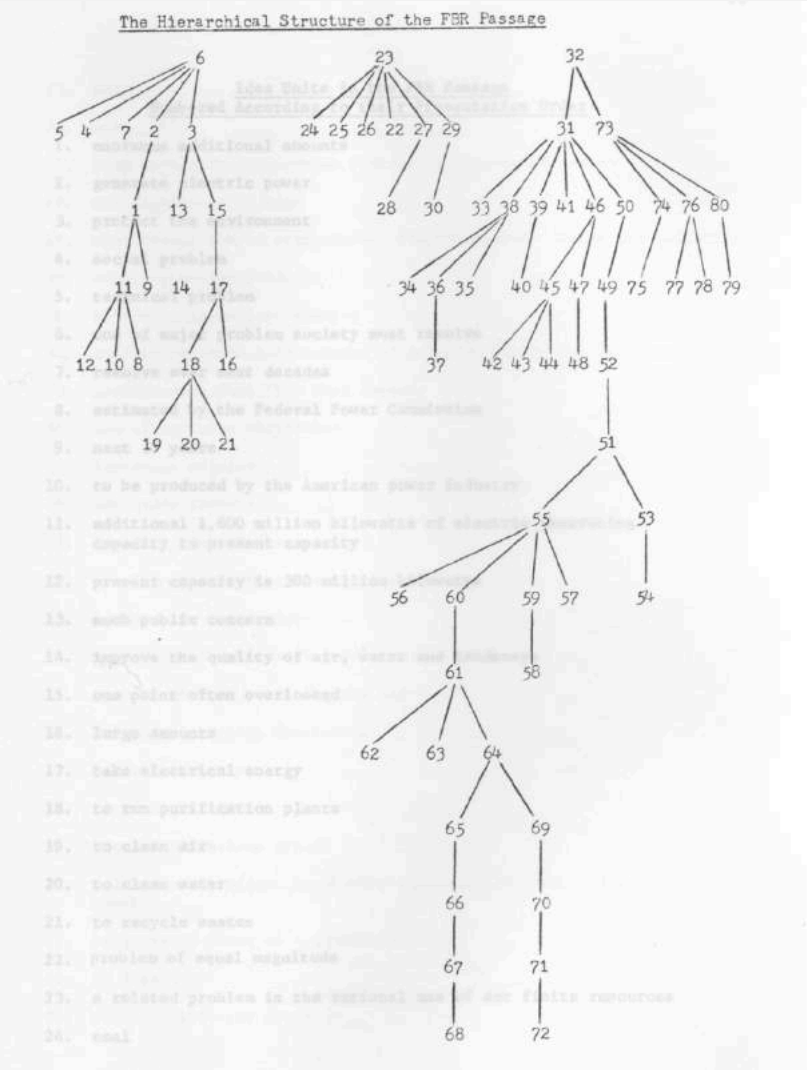
Tip: Look for relationships between different research areas (Meyer & McConkie, 1973)

Recall method & hypotheses from Verbal Learning Psychology with word lists

Related to ideas from Reading Comprehension & authentic materials: *Scientific American* articles (informative & persuasive science texts)

Scientific American articles varied in logical structure (outline of all text ideas)





Text Structure Studies That Influenced Current Web-Based Tutoring of the Structure Strategy: Basic Research

Study	Findings	Influence on Structure Strategy Interventions
Meyer (1971) Meyer & McConkie (1973)	Logical structure predicted text recall better than serial position or rated importance. Structure of text was related to aspects of cognitive structures constructed by readers.	Method for studying comprehension: Identifying main ideas versus details in the logical structure of a text

Reading the Brain and Reading in the Brain: Integrative Approaches toward First and Second Language Comprehension. Li, P [PI], Clariana, R. & Meyer, B. J. F. [Co-PI}, National Science Foundation, 8/1/2015-7/31/2019.

Follmer, D. J., Fang, S.-Y., Clariana, R., Meyer, B. J. F., & Li, P. (2018). What predicts adult readers' understanding of STEM texts? *Reading and Writing, 31*(1), 185-214.

Similar to my 1971 master's thesis but with high technology: fMRI & eye movements data of children and adults reading STEM texts in the scanner along with programs to generate recall patterns per participant (serial, recency, or hierarchical)

rather than paper & pencil & Wang calculators in a Cornell room the size of a closet!

Miyatsu, Nguyen, & McDaniel (2018).
Cited the text structure strategy work for optimal implementation of outlining and marking (highlighting and underlining)

Miyatsu et al.'s (2018) goal:

Making study strategies that are popular with students work to their best advantage based on evidence-based

Cited our text structure strategy work with both Grades 4-8 with ITSS (e.g., Meyer et al., 2002) Meyer & Wijekumar, 2017) and adults in classrooms (e.g., Meyer & Poon, 2001) as best practice implementation of two of five student-favored practices: outlining & marking.

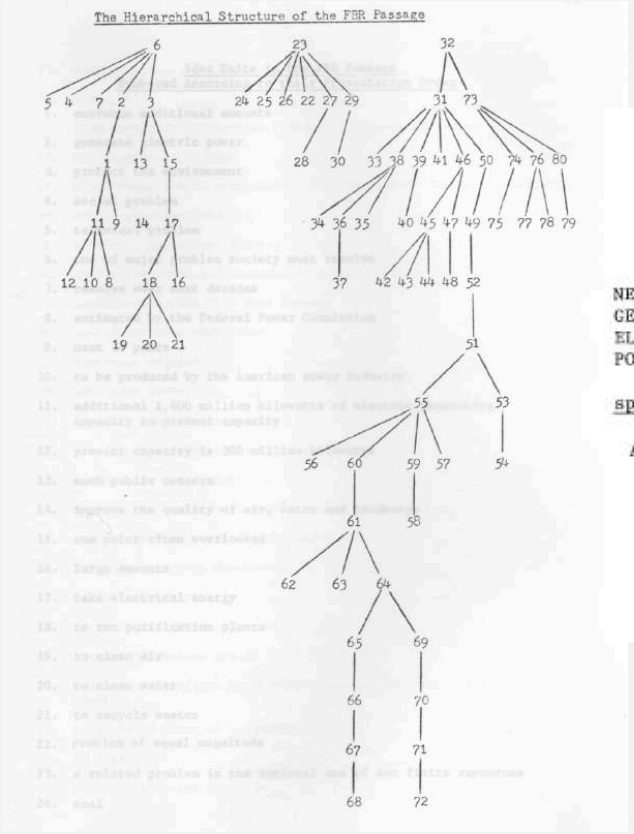
Speaking of Outlines

May have kept outlining with intuitive structures (with 91% agreement) had I not taken a linguistics class, where the professor noticed the parallel between my master's thesis and Dr. Joseph E. Grimes' work in linguistics.

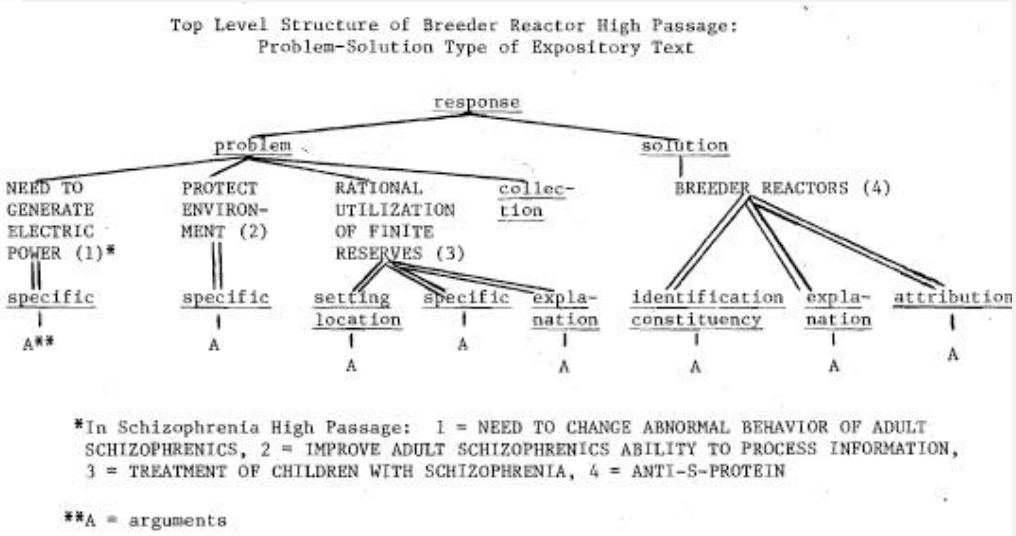
I made an appointment with Dr. Grimes, took his advanced seminar that became his 1975 book, *The Thread of Discourse*, put him on my doctoral committee, and made my special interest for Educational Psychology, semantic discourse analysis.

Upshot: more tools to experimentally manipulate text to answer research questions

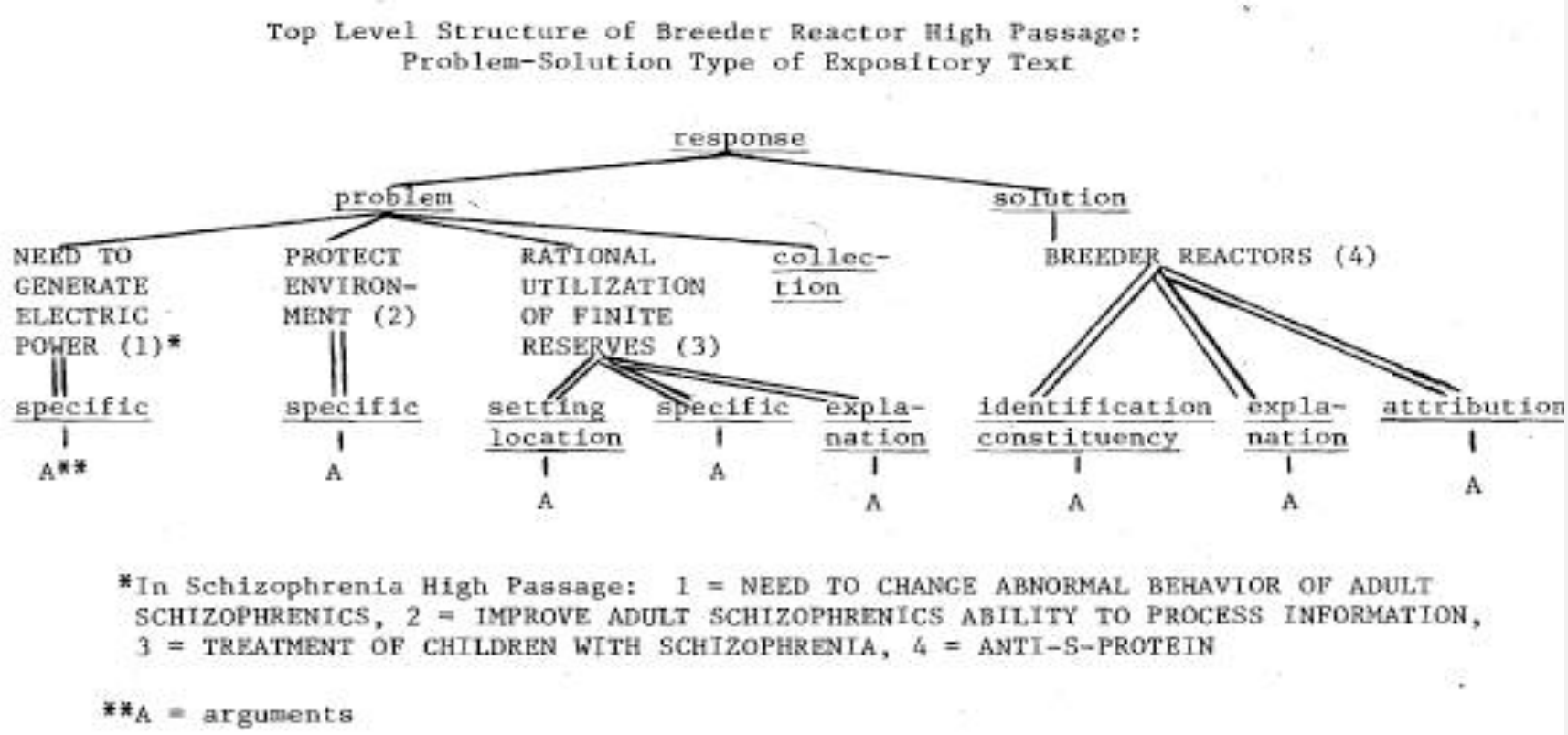
Free flowing hierarchical structure (Meyer, 1971)



Application to texts of multiple paragraphs: Grimes' Semantic Grammar of Propositions (Meyer, 1974; 1975)



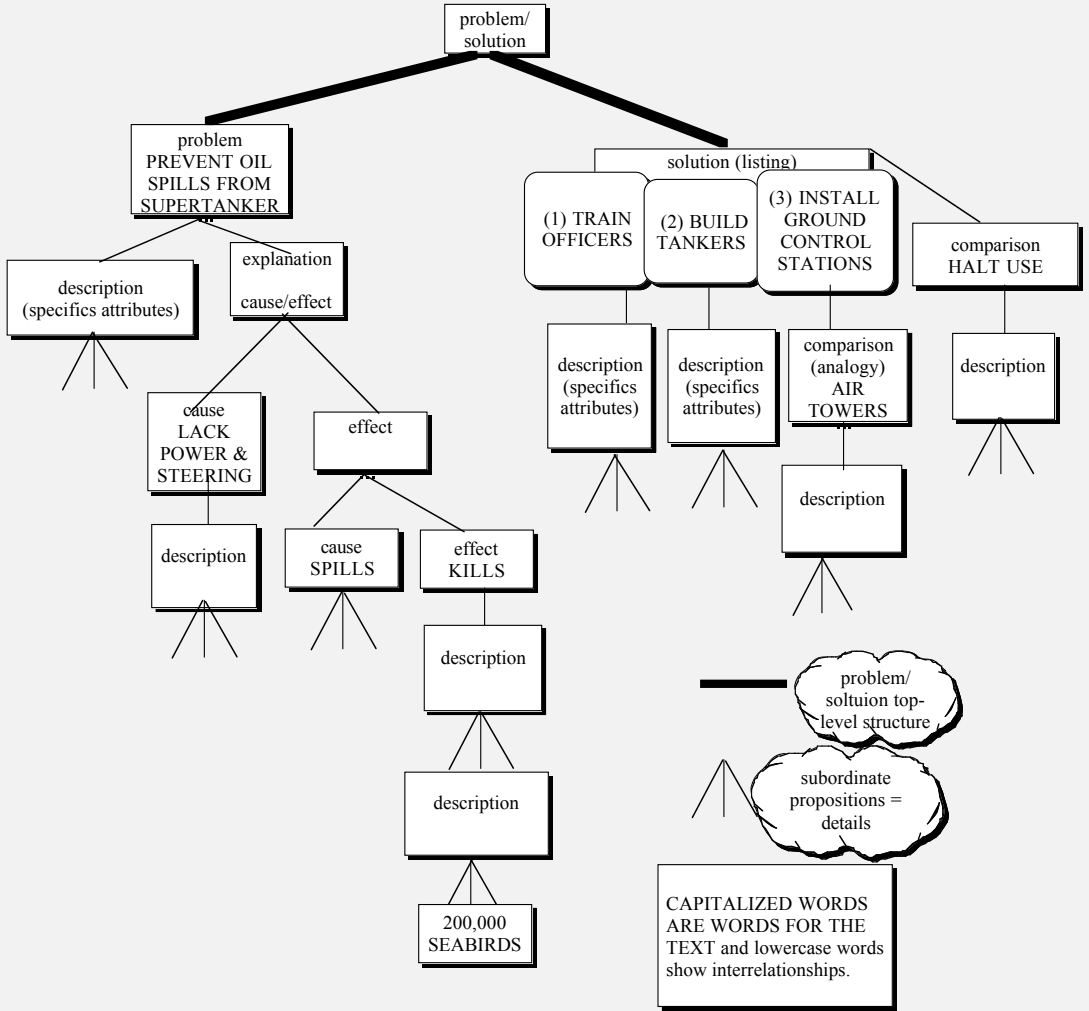
Text from Scientific American article (Meyer, 1971; 1974; 1975)



Text Structure Studies
Basic Research

Study	Findings	Influence on Structure Strategy Interventions
Meyer (1974/1975)	Patterns of rhetorical relationships influenced learning and memory from text when high in the hierarchical, logical structure, but not low in the structure. Location in hierarchical structure of organization was a factor in main ideas vs. details.	Focus on top levels of the content structure. Identification and study of different top-level structures; led to Meyer et al. (1980). Role of signaling words for cueing different text structures.

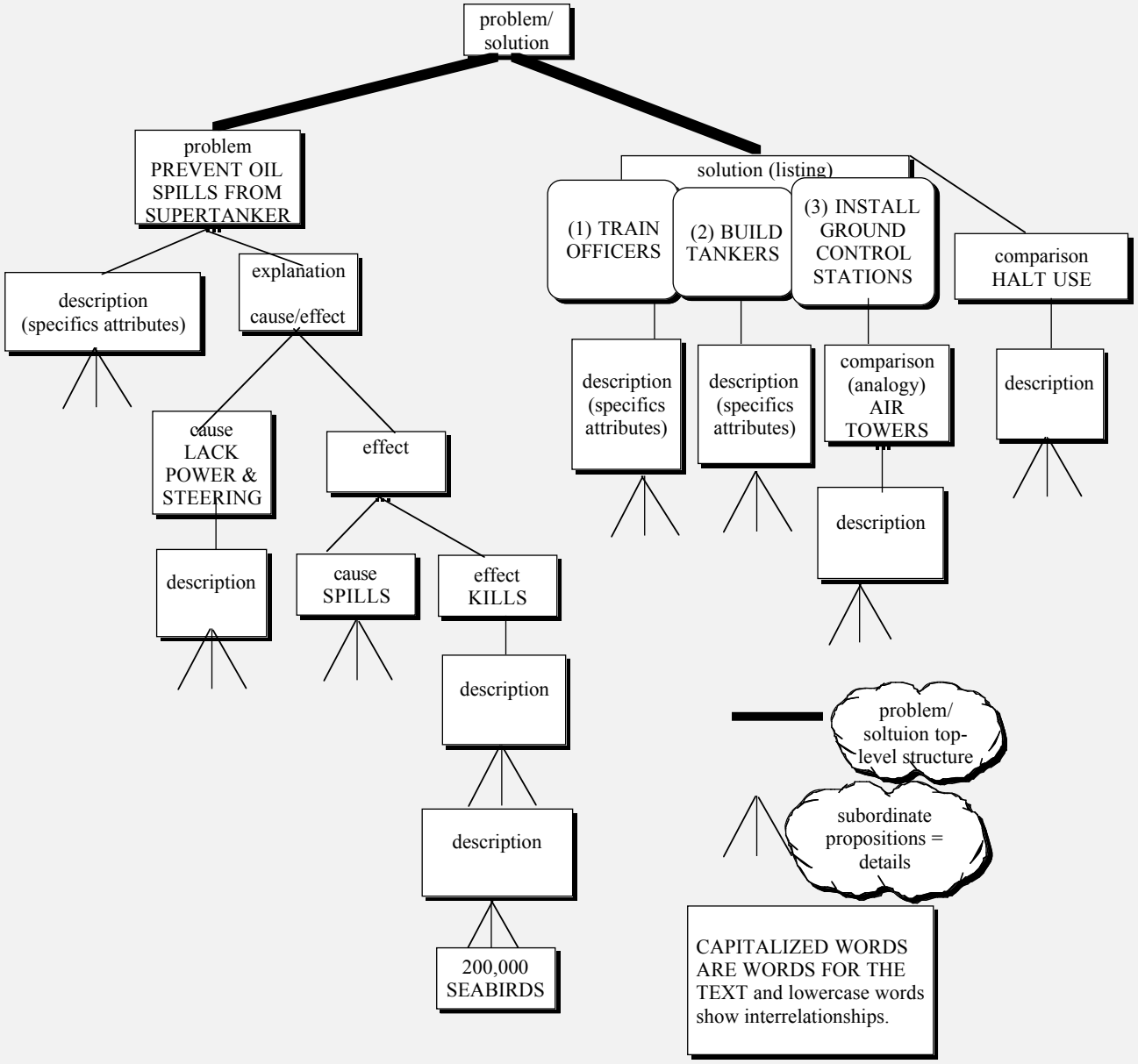
Pattern & type of relationships affect recall high in the structure, but not low (Meyer, 1975) -- Led to ---> Focus on relationships at the top levels of logical hierarchical structures = top-level structures



Passion: Text Structure Studies

Basic Research

Study	Findings	Influence on Structure Strategy Interventions
Basic Research		
Meyer, Brandt, & Bluth (1980)	Good 9th grade readers can use problem-and-solution and comparison top-level structures to organize recall, while poor readers just list things remembered. Signaling text structure switches readers with good decoding and poor comprehension skills to use of structure strategy instead of default list strategy.	Identification of the structure strategy and default list strategy. Importance of teaching students with poor comprehension skills how to use signaling words as part of the structure strategy.



Meyer, Brandt, & Bluth, 1980

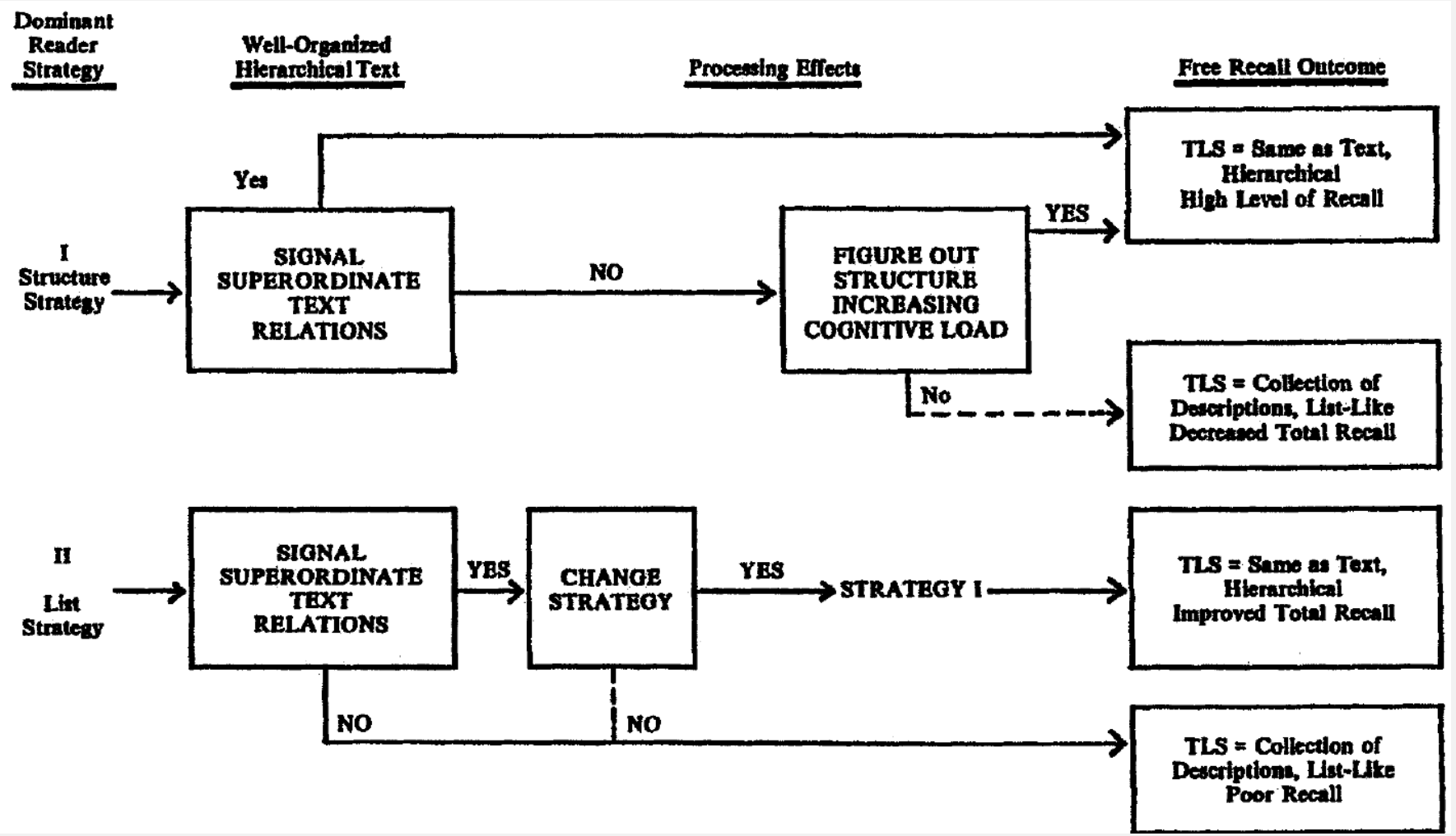
Authentic Expository Text & Signaling (Meyer, 1975; Meyer, Brandt, & Bluth, 1980)
underlined = signaling; caps = main idea; lower case = major details; italics = minor details;

A PROBLEM OF VITAL CONCERN IS PREVENTION OF OIL SPILLS FROM SUPERTANKERS. A typical supertanker carries a half-million tons of oil and is the size of five football fields. A wrecked supertanker spills oil into the ocean; this oil kills animals, birds, and microscopic plant life. *For example, when a tanker* crashed *off the coast of England, more than 200,000 dead seabirds washed ashore*. Oil spills also kill microscopic plant *life which provide food for sea life and produces 70 percent of the world's oxygen supply.* Most wrecks RESULT FROM THE LACK of power and steering equipment to handle emergencies, *such as storms*. *Supertankers have only one boiler to provide power and one propeller to steer the ship.*

Second paragraph of Authentic Expository Text & Signaling (Meyer, 1975; Meyer, et al., 1980) underlined = signaling; caps = main idea; lower case = major details; italics = minor details;

THE SOLUTION TO THE PROBLEM IS NOT TO IMMEDIATELY HALT THE USE OF TANKERS ON THE OCEAN since about 80 percent of the world's oil supply is carried by supertankers. INSTEAD, THE SOLUTION LIES IN THE TRAINING OF OFFICERS OF SUPERTANKERS, BETTER BUILDING OF TANKERS, AND INSTALLING GROUND CONTROL STATIONS TO GUIDE TANKERS NEAR SHORE. First, officers of the supertankers must get top training in how to run and maneuver their ships. Second, tankers should be BUILT with several propellers *for extra control* and backup boilers *for emergency power*. Third, GROUND CONTROL STATIONS SHOULD BE INSTALLED at places where supertankers come close to shore. These stations would act like airplane control towers, guiding *tankers along busy shipping lanes and through dangerous channels*.

Meyer, Brandt, & Bluth (1980)



Text Structure Studies
Basic Research

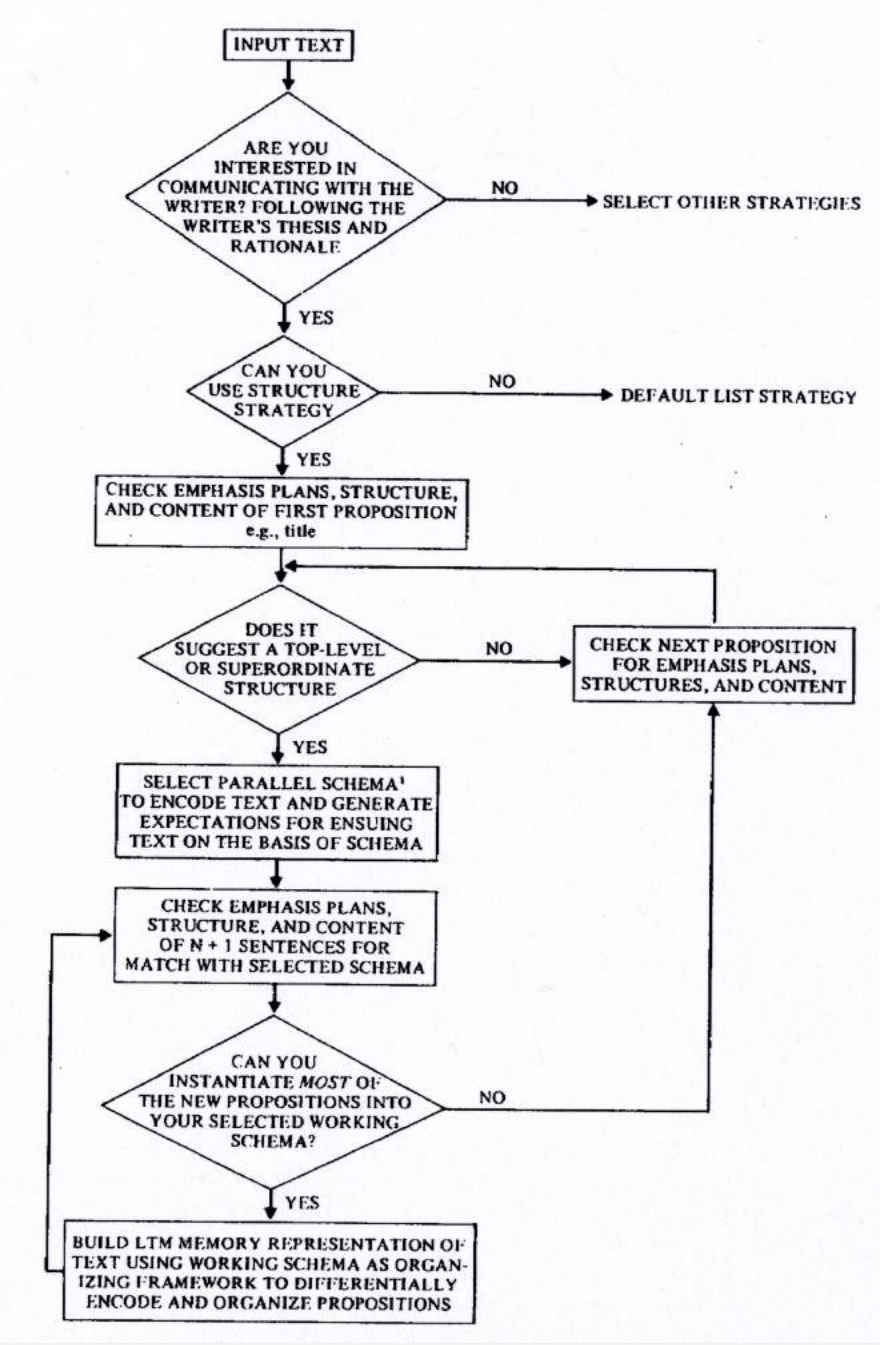
Only 48% of the entire sample of 9th-grade students organized their recall with the same structure as the text on at least one of the problem-and-solution and comparison texts (Meyer et al., 1980).

Sample of default list strategy:
"*This passage is about oil spills. The oil spills on the ocean and poisens them. When the oil spills it kills animals too and, poisens them. I can only remember something about 3 football fields.*"

Text Structure Studies
Basic Research

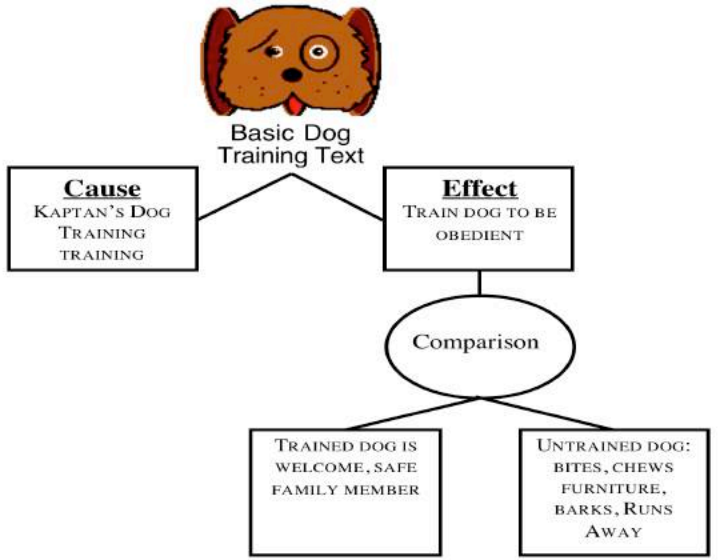
Study	Findings	Influence on Structure Strategy Interventions
Basic Research		
Meyer (1984), Meyer & Rice (1982)	Think-alouds and recall data supported the structure strategy processing model and importance of signaling cues.	Importance of top-level structure in finding the main idea. Emphasis in subsequent interventions on signaling.

Processing model for use of the structure strategy (Meyer, 1984; Meyer & Rice, 1982).



The Structure Strategy

The structure strategy teaches readers to identify the structure of expository text (Comparison, Problem & Solution, Cause & Effect, Sequence, Description, Listing) and to use that structure to organize their reading comprehension.



PASSION –for developing programmatic research about text structure

Text Structure & Signaling: Comparison

Comparison	Signaling Words used in Comparison Structure
Relates ideas on the basis of differences and similarities. The main idea is organized in parts that provide comparison between differences and similarities.	**instead; but; however; or; alternatively; whereas; on the other hand; while; compare; in comparison; in contrast; in opposition; not everyone; all but; have in common; similarities; share; resemble; the same as; just as; more than; longer than; less than; act like; look like; unlike despite; although; just; options; difference; differentiate; different;...(plus others you can find).**
For example: Comparing Killer whales and Blue whales on size, color, and life span.	

Meyer, Young, & Bartlett, 1989

Text Structure & Signaling: Problem & Solution

Problem/Solution Structure	Signaling Words used in Problem/Solution Structure
The main ideas are organized into two parts: a problem part and a solution part that responds to the problem by trying to eliminate it, or a question part and an answer part that responds to the question by trying to answer it. **Examples: Scientific articles often first raise a question or problem and then seek to give an answer or solution.** **Problem of 7 endangered whale species, and solution of a whale sanctuary in Antarctic Ocean**	**Problem:** **problem, trouble, difficulty, hazard, need to prevent, threat, danger, puzzle, question (?), query, riddle, perplexity, enigma, riddle, issue,...and more you can find....** **Solution:** **to satisfy the problem, ways to reduce the problem, to solve these problems, protection from the problem, solution, response, answer, reply, comeback, recommendation, rejoinder, return, to set the issue at rest, suggestions ...and more you can find....**

Meyer, Young, & Bartlett, 1989

Text Structure & Signaling: Cause & Effect

Cause and Effect Structure	Signaling Words used in Cause and Effect Structure
Presents causal or cause and effect-like relationships between ideas. The main idea is organized into cause and effect parts. **Directions often follow the Cause and Effect Structure. For example, if you want good pictures, follow these steps (the cause). Your good pictures are the effect.**	**cause, lead to, bring about, originate, produce, make possible owing to, by means of, accomplish, by, since, due to, because, in order to, reasons, give reasons for, the reason why, if/then, this is why, on account of, in explanation, effect, affects, so, influenced by, as a result, result from, consequence, consequent, thus, therefore, accordingly, for the purpose of, ... and more.…**
For example: Inner ear damage can lead whales to beach themselves.	**Signaling in example: lead to**

Meyer, Young, & Bartlett, 1989

Text Structure & Signaling: Sequence

Sequence	Signaling Words used in Sequence Structure
Ideas grouped by order in time (sometimes order of location). The main idea is the sequence of steps, procedure, or history presented. **Examples: history of the Civil War, growth from birth to 12 years old, procedures in a recipe or manual.**	**Later, afterwards, afterward, after, after that, later on, then, subsequently, as time passed, following, continuing on, to end, finally, year(s) ago, at the start of first year…later that year, in the first place, in the second place, first and foremost, first, second, third, 1, 2, 3, 4, ..., next, primarily, secondarily, early, before, to begin with, to start with, more recently, again, finally, until, additionally, the former, the latter, not long after, soon, now, today, after a short while, meanwhile, immediately, last, steps, stages, time line, history, sequence, development……and more – plus look for a series of dates for histories.**
Growth stages of humpback whale: stage 1 nursing calf – up to 6 months, stage 2 leaving mom – 2 years old, stage 3 jumping high – 3 years old, stage 4 reaching adult size – 6 years old.	

Meyer, Young, & Bartlett, 1989

Text Structure & Signaling: Listing

Listing	Signaling Words Cueing the Use of a List
Listing can go with any of the other structures. Listing simply groups ideas together. Articles are often organized as a listing of descriptions about a topic. A sequence always has a listing of ideas, but more than that the list has a set order in time. A listing can occur when groups of causes are presented, groups of effects are listed, groups of problems are stated, groups of solutions are listed, groups of ideas are compared to another idea, and so forth.	**And, and also, also, in addition, in addition to, and then, further, furthermore, include, besides, moreover, first, second, third, fourth, etc., two, three, four, five, …., subsequent, again, at the same time, another, and so forth, too, plus, together, jointly, likewise, double, to name a few, and more you can find…..**
For example: My favorite whales include humpbacks, finbacks, minkes, and also the rare Right whale.	

Meyer, Young, & Bartlett, 1989

Basic Research: Meyer & Freedle (1984)

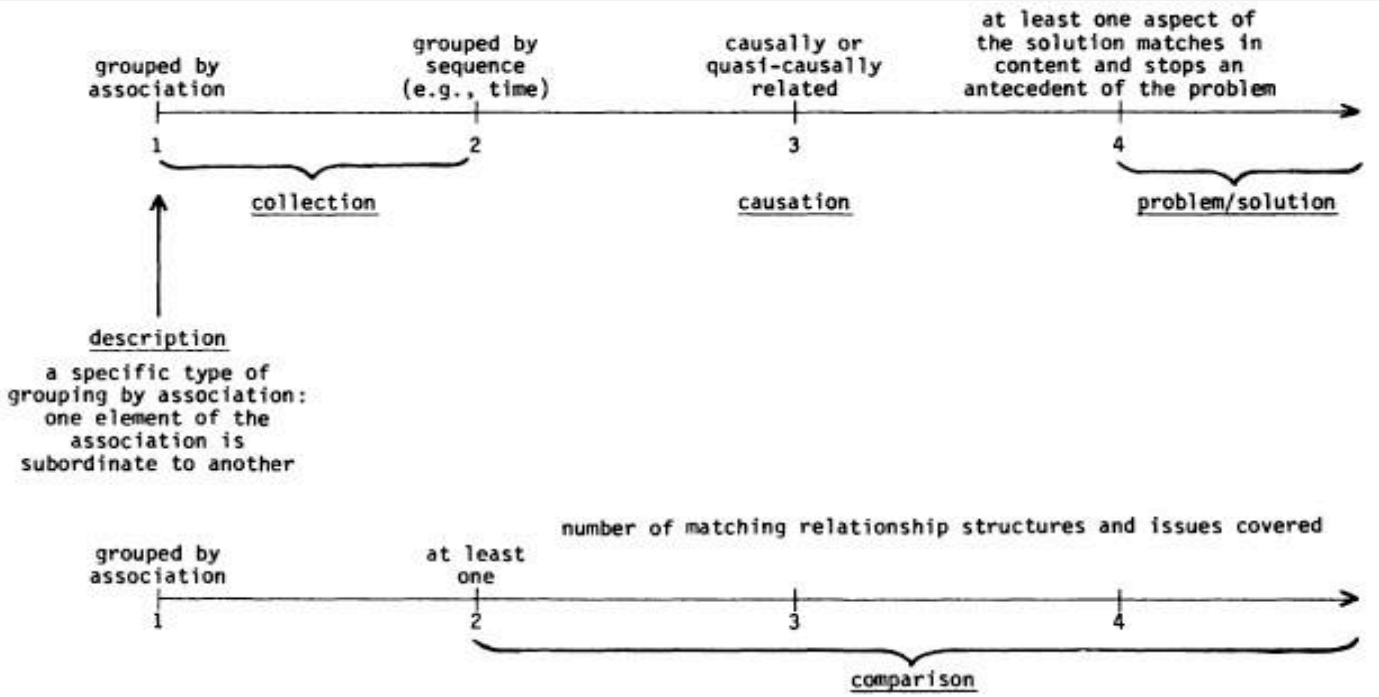


FIGURE 1. Type and number of specified organizational components required for the different discourse types.

Study	Findings	Influence on Structure Strategy Interventions
Meyer & Freedle (1978; 1984)	More organized structures (i.e., comparison, causation) had more mnemonic hooks than description. Empirical results & analyses of Grimes' (1975) 18 rhetorical relations led Meyer (1975, 1985) to posit 5 common text structures.	Training of four structures: description, problem-solution, causation, and comparison by Bartlett (1978) with 9th graders.

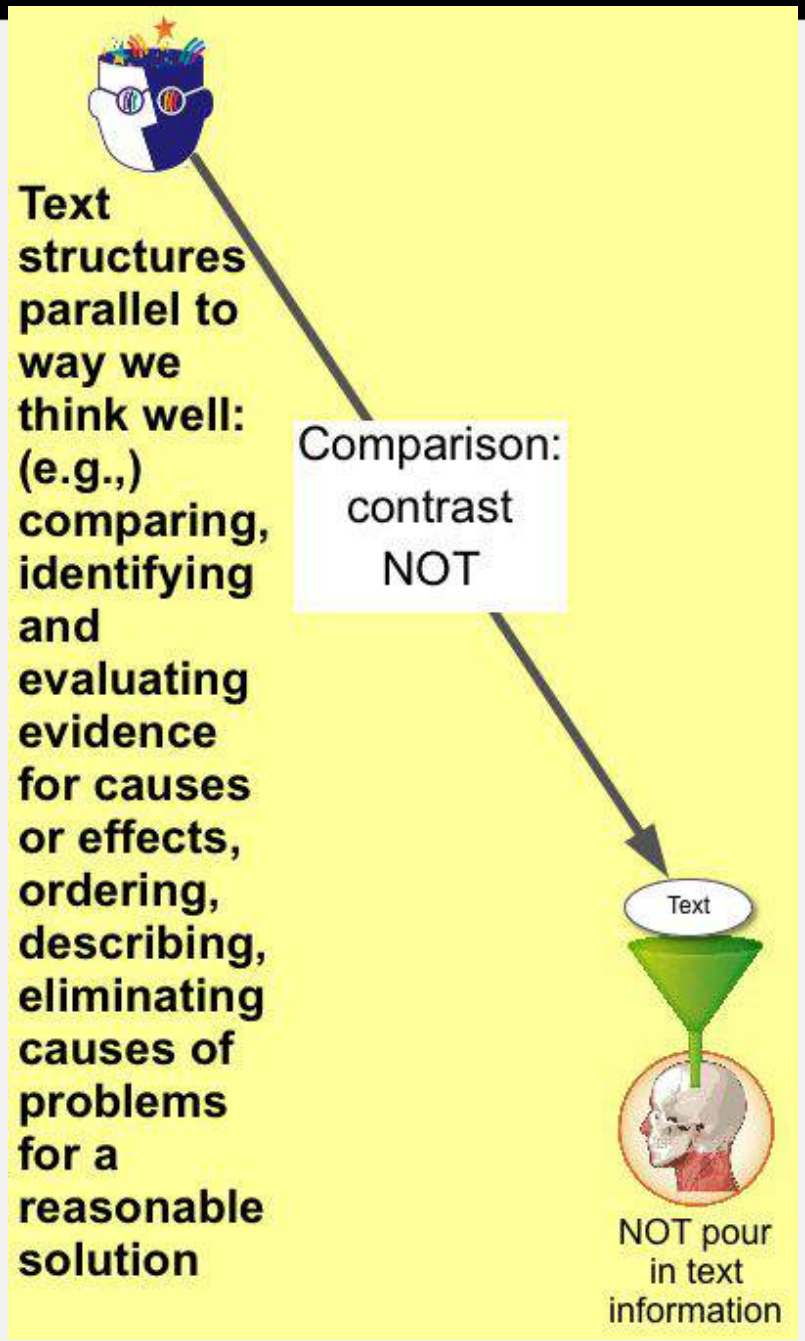
Power of structures (e.g., comparing, finding causes & effects, looking for solutions)

- Text structures not only describe text, but are cognitive entities in coherence representations of good readers
- (Meyer & Freedle, 1984; Sanders & Noordman, 2000).

The Power of the Structure Strategy

Enables learners to:

1. Follow the logical structure of text and understand how an author organized and emphasized ideas.
2. Use processes parallel to these structures to increase learning and thinking (e.g., comparing, finding causes, looking for solutions to block causes of problems).
3. Students to use these text structures to organize their own thinking and writing.


Text structures parallel to way we think well: (e.g.,) comparing, identifying and evaluating evidence for causes or effects, ordering, describing, eliminating causes of problems for a reasonable solution
Comparison: contrast
NOT
Text
NOT pour in text information

Passion: Text Structure Studies

Power of Structure Strategy

enables learners to use text structures to organize their own reading, thinking, and writing from single or multiple sources.

Meyer & Poon (2001)

e.g., medical decision making

Structure Strategy

- promotes understanding compatible with coherence-based processes in the Landscape model for text comprehension (e.g., van den Broek, P., Young, M., Tzeng, Y., & Linderholm, T. (1999), situation models (Kintsch, 1998), and macrostructures (van Dijk, 1980).
- teaches that text structures can embed and build on each other to provide a hierarchical, logical structure for nonfiction texts.

Structure Strategy

- Good readers use their knowledge of text structures to build coherent memory representations (e.g., Meyer, Brandt, & Bluth, 1980; Meyer et al., 2010).

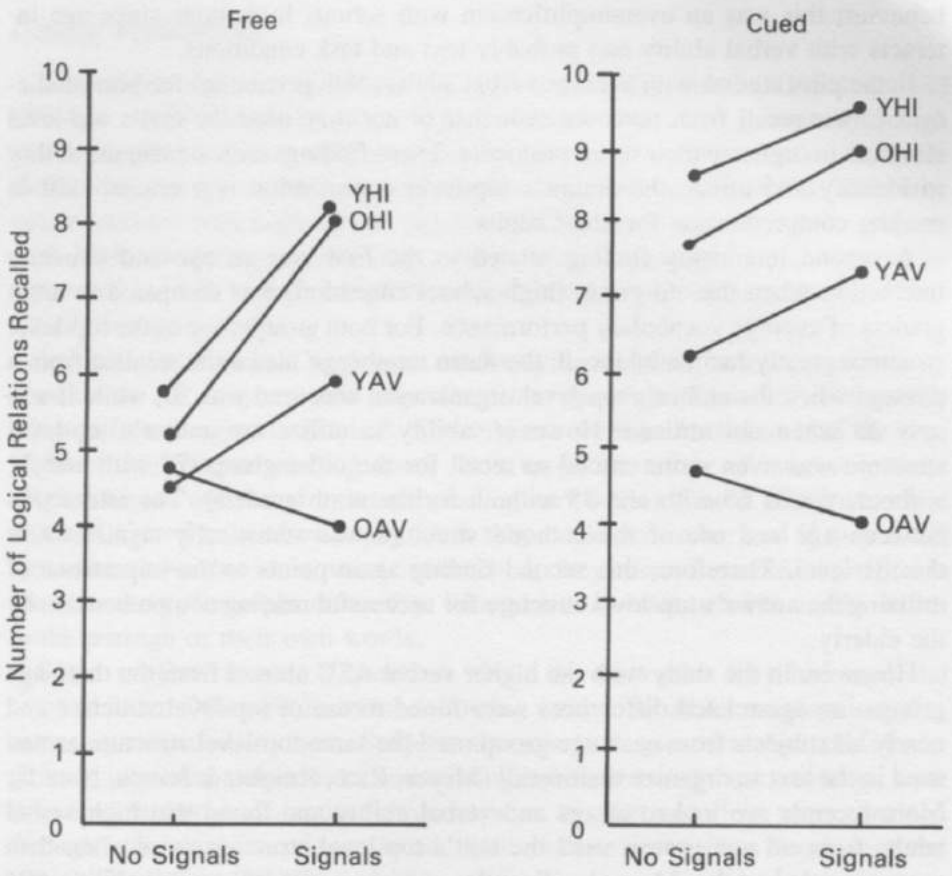
- Goal for proficient readers is to ultimately use their knowledge of these relationships to build coherent memory representations even with muddled texts.

Signaling words ("in contrast")

can cue text structure and guide readers toward coherent text representations with their key role in selection and encoding (e.g., Meyer & Poon, 2001).

Explicit signals of important relationships within and among paragraphs in expository texts provide efficient processing instructions for readers with strategic knowledge about text structures (Meyer & Poon, 2001; Sanchez, Garcia, & Bustos, 2016).

What About Readers Who do Not Know How to Use Signal Words or Text Structures Strategically?



Key: YHI = Young with High Vocabulary Scores
YAV = Young with Average Vocabulary Scores
OHI = Old with High Vocabulary Scores
OAV = Old with Average Vocabulary Scores

Figure 8. The effects of signaling on free and cued recall of logical relations for the four age and vocabulary groups.

Haunted by Average Verbal Adults Not Benefitting from Signaling Words,

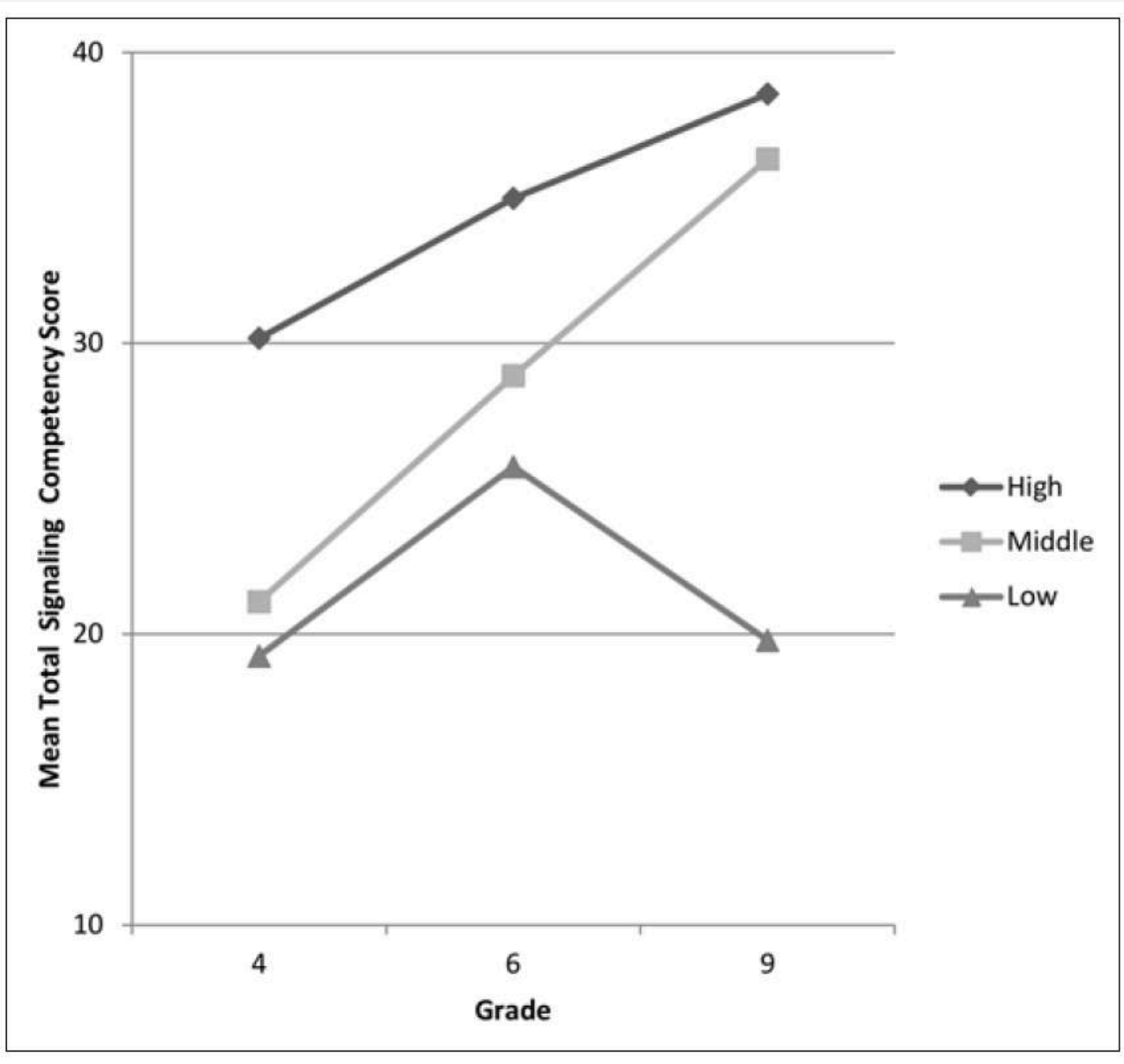
while older adults with more verbal skills benefited from Signal Words as did young adults with average and high verbal skills.

Penguin Form of Signaling Test

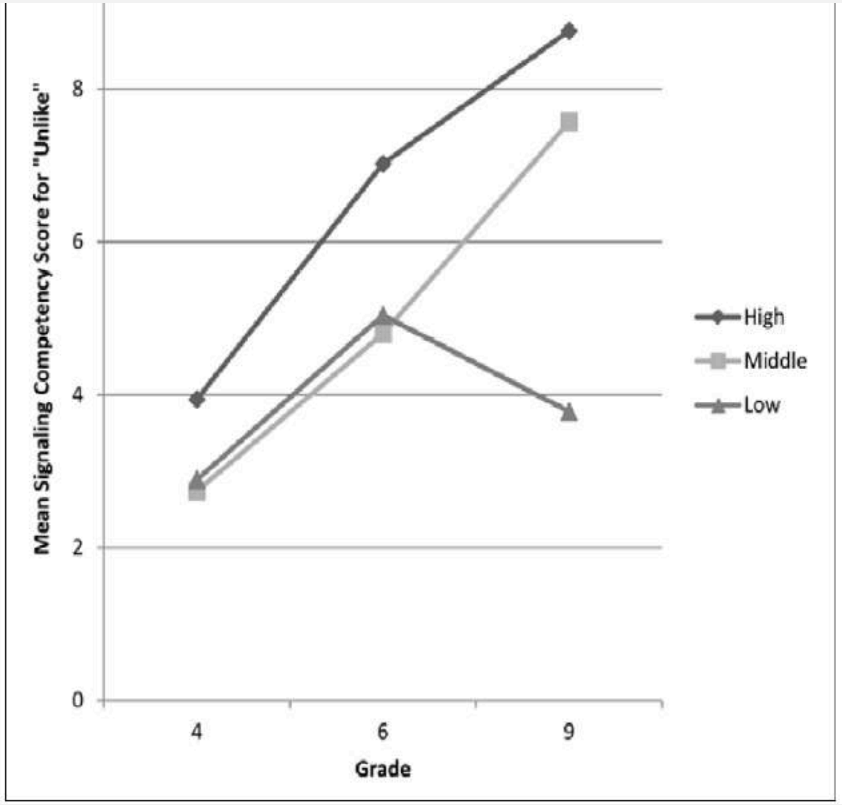
Emperor penguins and Adelie penguins are _____ from one another. Emperor penguins are large penguins. They are the largest of all penguins and may grow to 4 feet tall. These penguins can weigh more than 90 pounds. Emperor penguins display orange ear patches. They have long, yellow-orange streaked beaks in black faces. Emperor penguins feed principally on shallow water seafood. Emperor penguins live on Antarctica's pack ice.

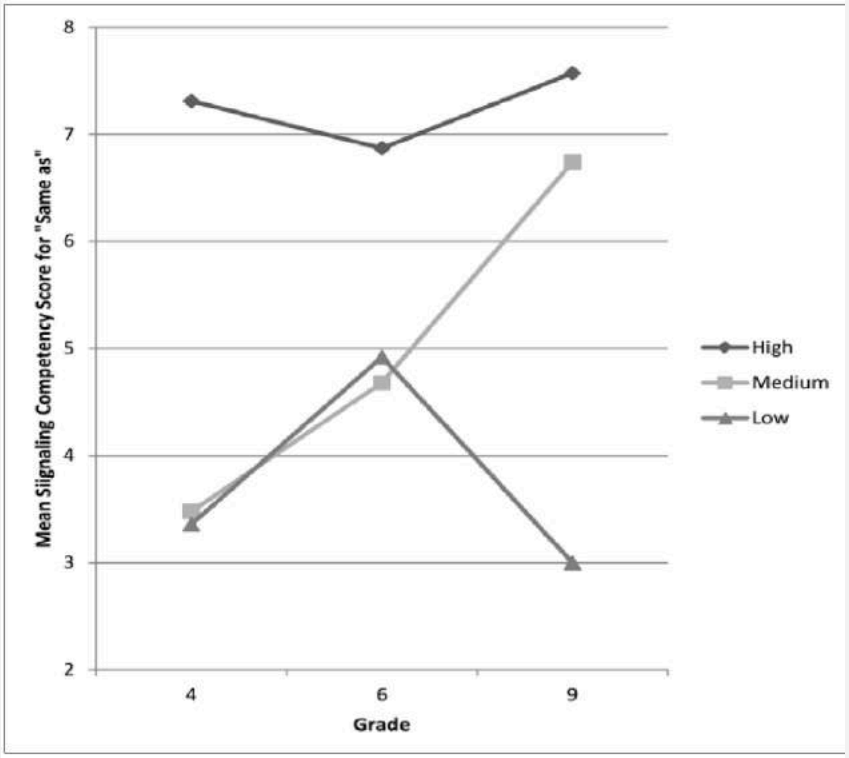
_____ the large emperor penguins, Adelie penguins are _____ penguins. Adelie penguins grow only about 2 feet high. They weigh only about 11 pounds. Adelie penguins have white ringed, beady, black eyes. Adelie penguins have short, feathered beaks on cute faces. Adelie penguins feed almost entirely on krill. _____ the emperor penguins, Adelie penguins live on Antarctica's pack ice.

Meyer, Ray, & Middlemiss (2012) Signaling Test (summed over two versions (Total Possible = 56) & Found Little Change Toward Understanding of Signals by Low Comprehenders

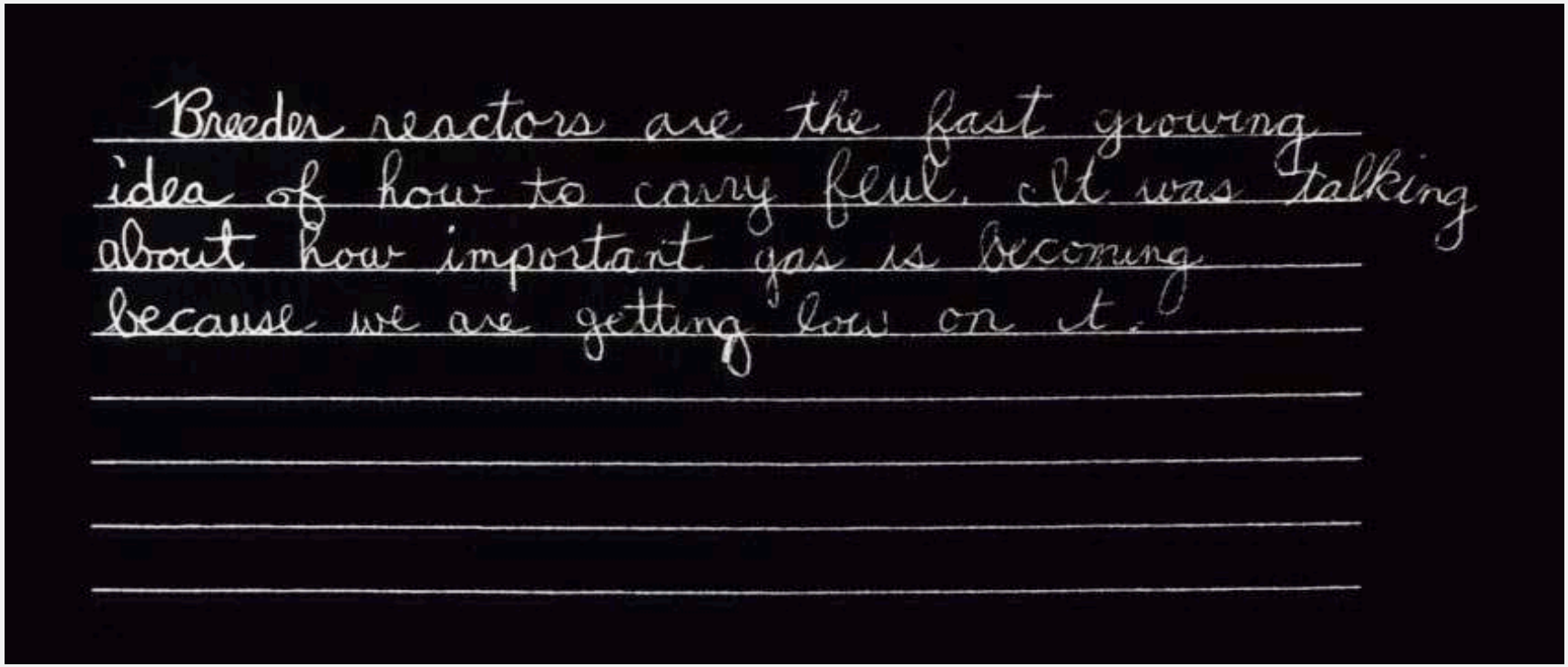


Meyer, Ray, & Middlemiss (2012) “Unlike” and “Same as” (scale is 14 summed over two versions of the Signaling test)





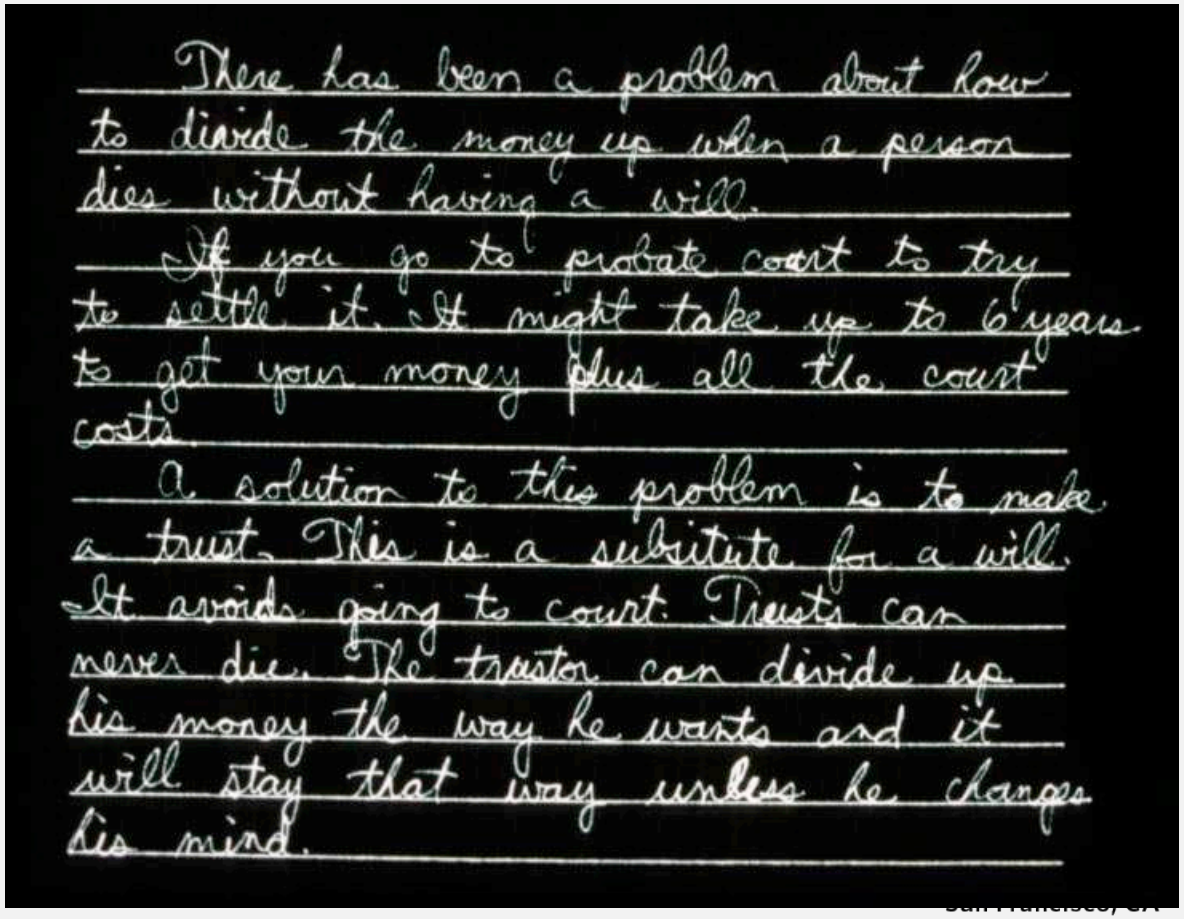
Default List Strategy from Young Adult



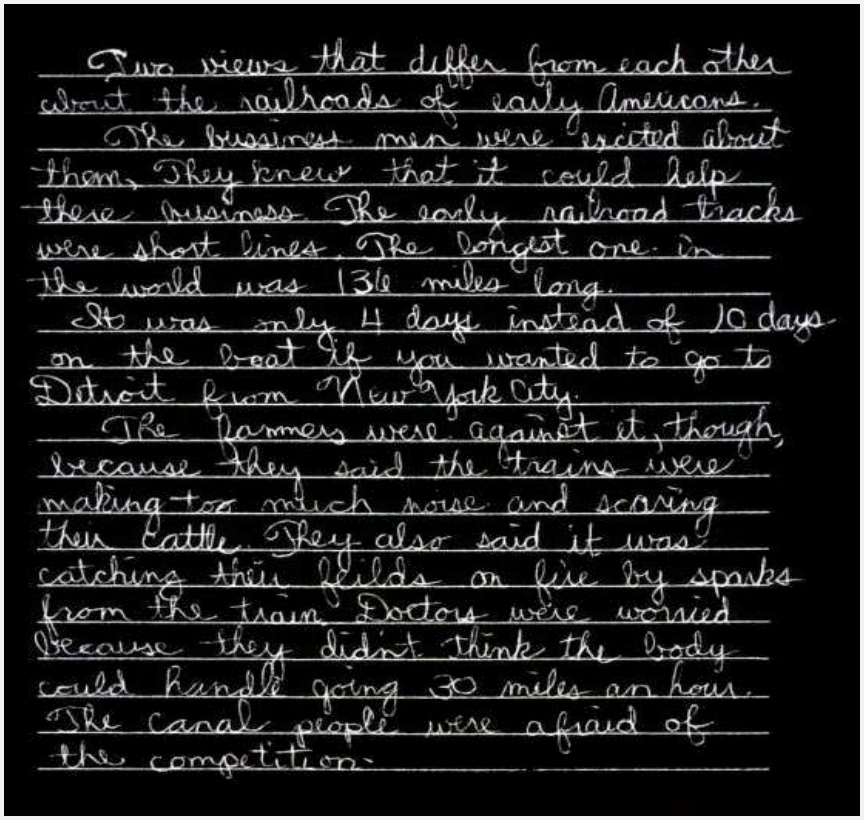
Meyer, Young, & Bartlett, 1989

Modeling the structure strategy, teaching the 5 text structures & signals, & how to strategically use them for encoding, monitoring, & retrieval (Meyer, Young, & Bartlett, 1989; Meyer & Poon, 2001) & ITSS

Same adult after structure strategy instruction (Meyer et al., 1989)



Same adult after structure strategy instruction (Meyer et al., 1989)



Two views that differ from each other about the railroads of early Americans.

The bussiness men were excited about them. They knew that it could help there bussiness. The early railroad tracks were short lines. The longest one in the world was 136 miles long.

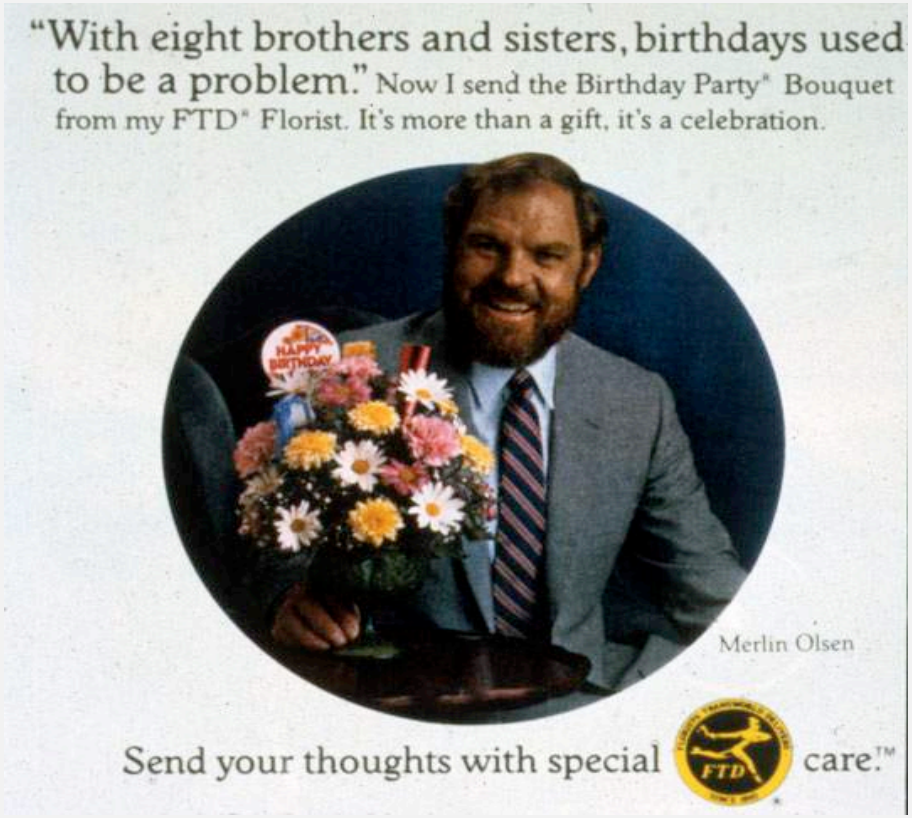
It was only 4 days instead of 10 days on the boat if you wanted to go to Detroit from New York City.

The farmers were against it, though, because they said the trains were making too much noise and scaring their cattle. They also said it was catching their fields on fire by sparks from the train. Doctors were worried because they didint think the body could handle going 30 miles an hour. The canal people were afraid of the competition.

Doubled Young and Old Adults' Recalls: Teacher & Student Manuals in appendices of Meyer, Young, & Bartlett (1989, see below) and lessons adapted to fifth-graders in Meyer et al. (2002) and all versions of ITSS and SWELL.

Meyer, B. J. F., Young, C. J., & Bartlett, B. J. (1989; also Taylor & Francis, 2014). *Memory improved: Enhanced reading comprehension and memory across the life span through strategic text structure*. Hillsdale, NJ: Lawrence Erlbaum.

Structure Strategy: Test for You!



Structure Strategy: Test for You!

Comparison Text Structure in Everyday Life from Ads to Political Debates to Refutation text to Legal Documents

Structure Strategy: Test for You!

People

Passion–for developing programmatic research about text structure

Persistence & Curiosity

- Past
- Present

PERSISTENCE & Curiosity

First online instruction with the structure strategy:

Meyer, B. J. F., Middlemiss, W., Theodorou, E., Brezinski, K. L., McDougall, J., & Bartlett, B. J. (2002). **Effects of structure strategy instruction delivered to fifth-grade children via the Internet with and without the aid of older adult tutors.** *Journal of Educational Psychology, 94*, 486-519.

Meyer et al. (2002) first on-line attempt teaching structure strategy on web to 5th graders with adult tutors

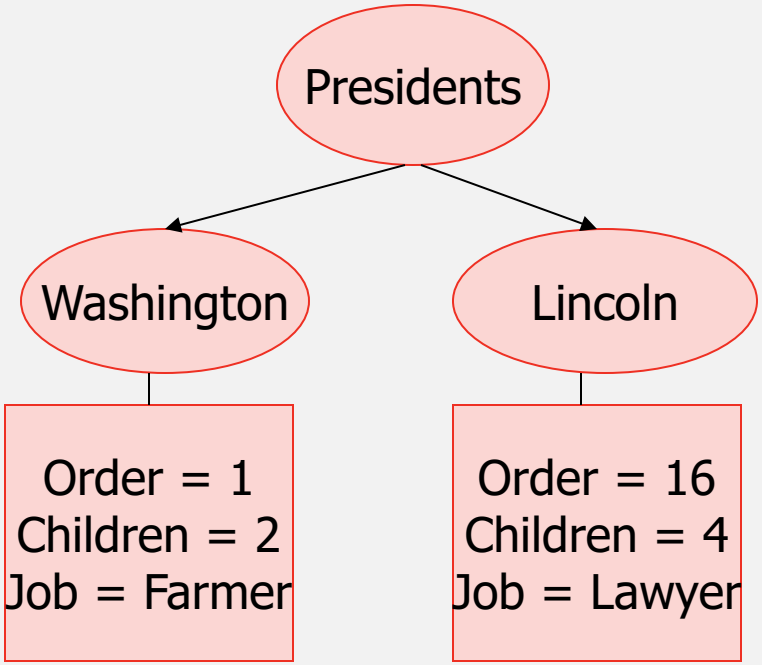
**Meet Miss Ivy,
tutor for Web-based
Intergenerational Tutoring
of the Structure Strategy**

Tutor emails gave students delayed feedback on their last lesson, encouragement, daily assignments, other examples as necessary.

Approach to the Text Structure Strategy

The structure strategy teaches readers to:

1. Identify text structures organizing expository text & their signaling words
2. Write a main idea using a particular pattern for each text structure (Main idea pattern for comparison: _____ and _____ (2 or more ideas) were compared on _____, _____, and _____).
3. Use the main idea & structure to organize their reading comprehension and recall

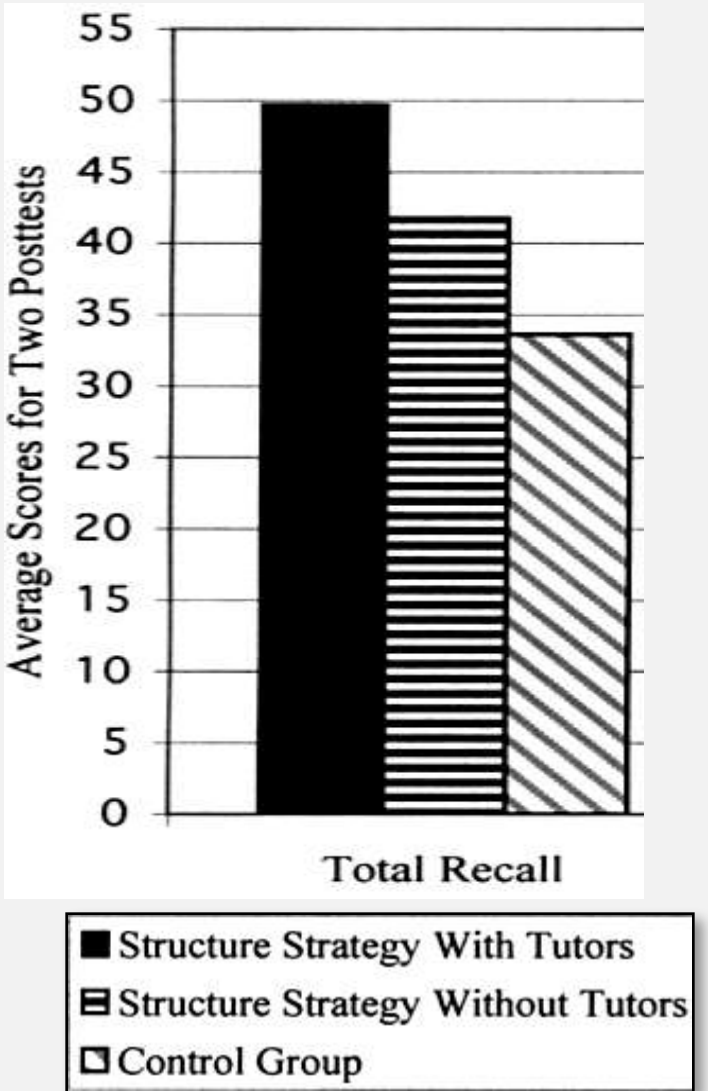


Initial Web-Based Structure Strategy Intervention (with random assignment)

Study	Training Materials	Findings	Influences on the Structure Strategy Intervention
Meyer et al. (2002)	5th-grade students typed work in structure strategy lessons on Internet; adult tutors prepared feedback & assistance in email messages to 5th-graders. 25 lessons	structure strategy groups superior to control group (d = .43 - .92).	Emphasis on comparison and problem-solution structures: review in later lessons & integration with multiple text structures. Needs for improvements: immediate feedback, audio for poor reader, & better delivery.

Meyer et al. (2002)

Difference between structure strategy group (with tutoring) vs. control (regular school reading activities) evident **2½ months** after the end of training (effect size for total recall = .92).



Presentation

Overview

People

Passion

Persistence

Past

Present

Instruction about text structures yielded positive effects for reading comprehension with children and younger and older adults

- e.g., Armbruster, Anderson, & Ostertag, 1987; Bartlett, 1978; Carrell, 1985; Cook & Mayer, 1988; Culatta et al., 2010; Englert & Hiebert, 1984; Gordon, 1990; Meyer, 1999; Meyer & Poon, 2001; Meyer et al., 2002, Meyer, Young, & Bartlett, 1989; Paris, Cross, & Lipson, 1984; Polley, 1994; Raphael & Kirschner, 1985; Richgels, McGee, Lomax, & Sheard, 1987; Samuel et al., 1988; Slater, Graves, & Piche, 1985; Taylor & Beach, 1984; Weisberg & Balajthy, 1989; Williams et al., 2004, 2005, 2007, 2009)
- Also recent meta-analysis in JEP and RRQ

See: Special Issue on Reading Comprehension edited by Karen Zabrucky in *International Electronic Journal of Elementary Education* (IEJEE)

Meyer, B. J. F., & Ray, M. N. (2011). Structure strategy interventions: Increasing reading comprehension of expository text. ***International Electronic Journal of Elementary Education.***

Ray, M. N., & Meyer, B. J. F. (2011). Individual differences in children's knowledge of expository text structures: A review of literature. ***International Electronic Journal of Elementary Education.***

Presentation

Overview

People

Passion

Persistence

Past

Present ITSS grants

Overall Goals for our Studies in Schools

How to better reach

and teach children the structure strategy to improve their

reading comprehension

What is Intelligent Tutoring of the Structure Strategy (ITSS)?

Reading comprehension instruction based on the structure strategy (Meyer, Young, & Bartlett 1989, 2014; Meyer & Poon, 2001) and particularly Meyer et al. (2002) with Grade 5 students & web-based delivery.

Structure Strategy with ITSS and Reading Comprehension

- Text Structure – Comparison, Problem and Solution, Cause and Effect, Sequence, and Description
- Expanding access to the structure strategy
- Consistent delivery, modeling, assessment scaffolding, and feedback
- Multiple domains
- Wide range of reading levels and prior knowledge
- Designing for learners
- Integrating with current practices

What is Intelligent Tutoring of the Structure Strategy (ITSS)?

Identification of text structure

Strategic use of text structure for encoding and retrieval

Learning signaling words for each of five text structures

Monitoring comprehension through summarizing main points according to identified text structure.

Retrieval using text structure as a guide.

What is ITSS?

- Web-based tutoring program
- Animated talking tutor
- Teaching the Structure Strategy
- Began with 5th- and 7th- grade students extended in current efficacy grant to 4th graders and 8th graders
- Extended to ELL learners –native Spanish speakers in Grades 4-6; **ITSS lessons** with adaptations for Spanish ELL is called **SWELL**

The Structure Strategy

- Selection, Encoding, Strategic Memory, Comprehension Monitoring, and Application
- Five Text Structures and Nested Structures
- 4 Steps to Application
  - Signal Words (AKA linking words, clue words,…)
  - Identify Text Structure
  - Summarize Using a Main Idea Pattern
  - Recall/apply/monitor

ITTS Texts

- 34% science
- 28% social studies & history
- 23% animals
- 9% sports/contemporary famous people
- 6% foods or recipes

Initial ITSS Lessons (+multi-lessons in content domains for 8th graders)

- 65 lessons with another 30 parallel lessons for extra practice or choice of topics
- 145 texts
  - 13 to 810 words
    - *M* = 95 words
  - Lexiles
    - range 320 - 2060
    - *M* lexile grade equivalent = 5.43
  - Flesch-Kincaid grade equivalent
    - range 2.6 - 12
    - *M* = 7.0

    +Easy versions at 2 or 3 grade levels

Table 2. Order, Number, and Type of ITSS Lessons by Structure

Lessons	Highlighted top-level structure (in context of other structures[a])				
	Comparison (C[a])	Problem-and-solution (P&S[a])	Cause-and-effect (C&E[a])	Sequence (S[a])	Description (D[a])
Order of lessons	1	2	3	4	5
Total number	12	12	16	12	13
		Type of lessons			
IT models strategy	2	2	1	1	1
Practice[b, c]	7[c]	4[c]	4[c]	7[c]	7[c]
Let's check	1	1[c]	3	1	1
Review structures		1	1	1	1
Review via writing		1	1	1	1
TLS integration[d]		3	6	1	2
Taught in context of other structures[1]	d[a], c&e	C[a], C&E, d	P&S, C, d	P&S, C&E	S, C&E, C
Other[a]	2				

Reasons ITSS starts with 12 Comparison Text Structure Lessons

Evidence that comparison text structure is within the range of elementary and middle school students but not yet completely mastered (Cain, Patson, & Andrews, 2005; Cain & Nash, 2011; Englert & Hiebert, 1984; McClure, Geva, 1983; Meyer, Wijekumar, & Lei, 2018; Peterson, 1986; Richgels, McGee, Lomax, & Sheard, 1987).

Meyer et al., 2010

Measures

Table 3. Counterbalanced Reading Comprehension Measures: Reliability, Testing Time, and Range

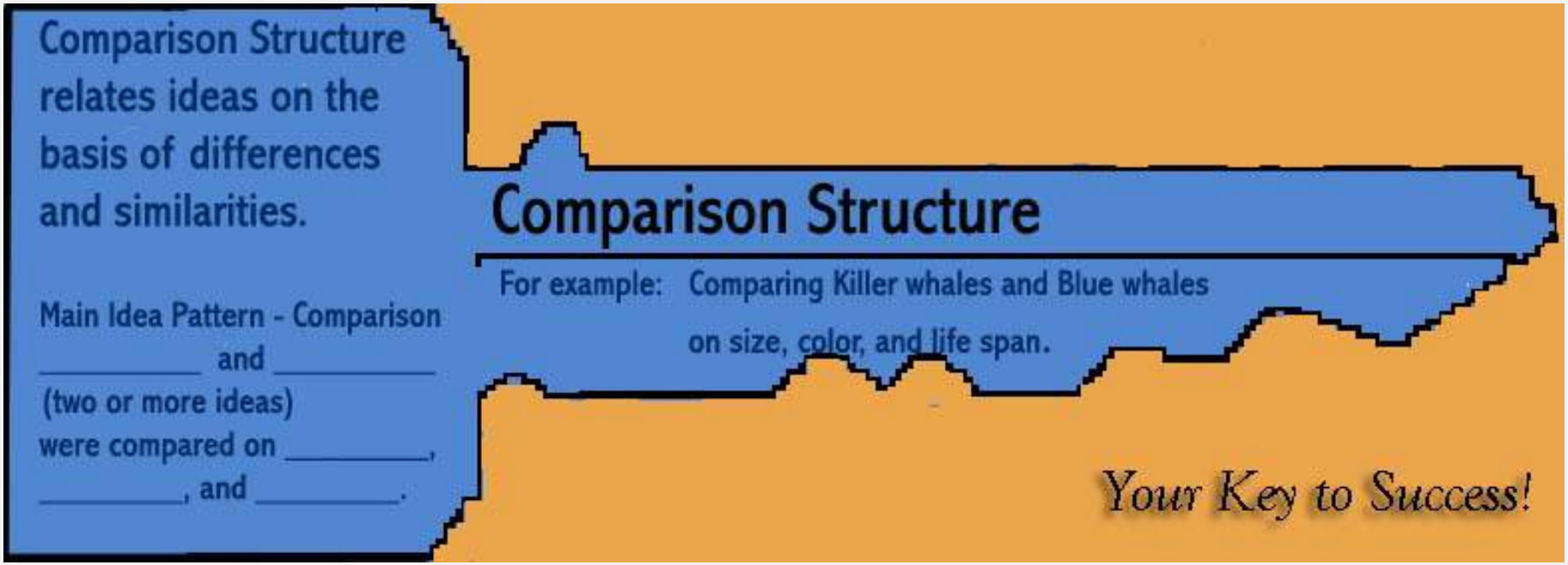
Measure type	Measure name	Reliability	Testing (Pre, P1, P2)[a]	Score range
Transfer task: Standardized reading comprehension test (Gray Silent Reading Test [GSRT])				
Multiple-choice questions correct	GSRT	0.85[b]–0.95[c]	Pre, P1	0–65
Experimenter-designed measures[c]				
Problem-and-solution free recall task	Total recall Top-level structure	93%[d] 97%[d]	Pre, P1, P2 Pre, P1, P2	0–72 1–9
Competency rating for use of problem-and-solution structure	Problem-and-solution competency	93%[d]	Pre, P1, P2	1–6
Comparison free recall task	Total recall Top-level structure	90%[d] 96%[d]	Pre, P1, P2 Pre, P1, P2	0–96 1–9
Competency rating for use of comparison structure	Comparison competency	98%[d]	Pre, P1, P2	1–6
Fill-in comparison signaling	Signaling test	97%[d]	Pre, P1, P2	0–28

[a] Pre = pretest; P1 = immediate posttest administered at the end of ITSS instruction; P2 = delayed posttest administered four months after ITSS instruction. [b] Test–retest reliability coefficient. [c] Cronbach alpha. [d] Percentage agreement between scorers for all experimenter-designed measures of reading comprehension.

Documentation

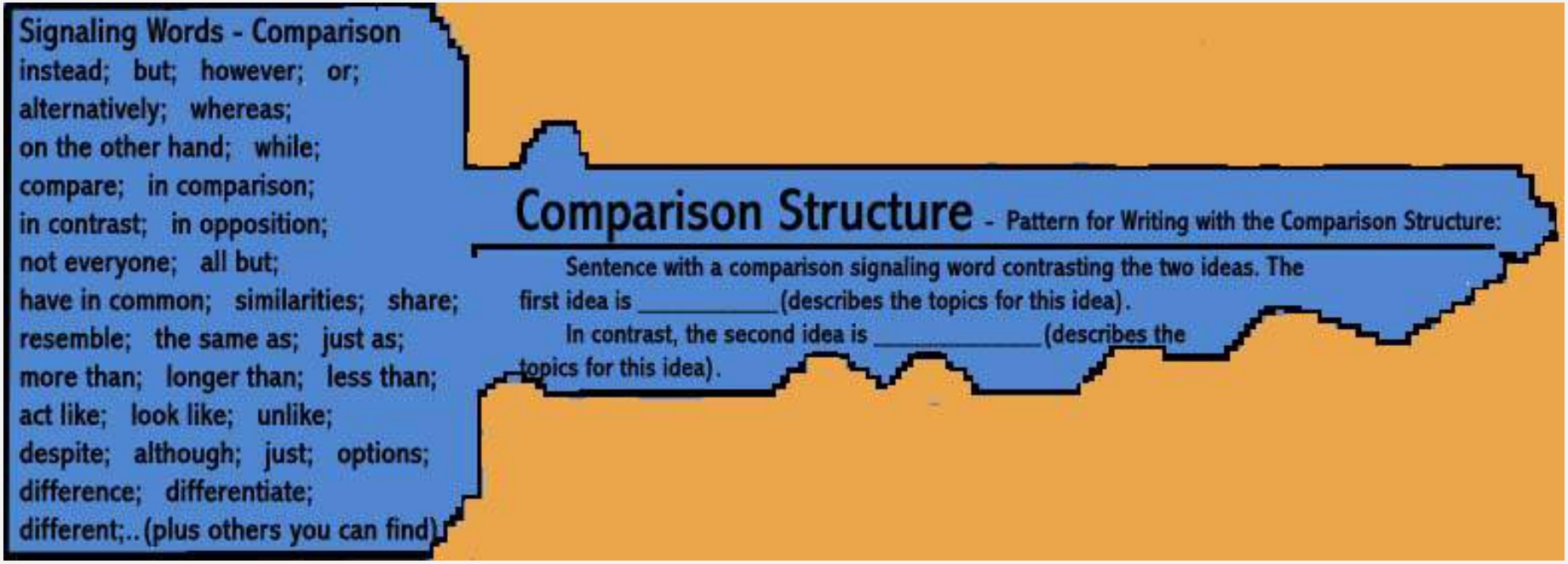
- Teacher Manual
- Teacher Monitoring Screen
- Student Keys for Structures & Signals

Keys to Success - Comparison



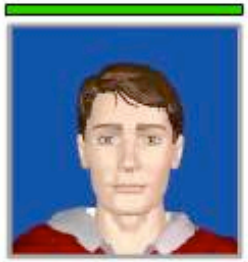
From Meyer et al., 2010

Keys to Success - Comparison



From Meyer et al., 2010

Restart Page



Log Out

Welcome Back Bonnie

Comparison

Elephants

Two different kinds of elephants exist today; these two types are the African elephant and the Indian elephant. These interesting creatures differ dramatically in ears, backs, and how long they live. African elephants have very large ears. Their backs arch down in the middle. African elephants live 50 to 60 years.

Indian elephants have small ears. The backs of the Indian elephants arch up in the middle. They live 70 to 80 years.

Structure: Comparison

Main Idea:

African and Indian elephants

(two or more ideas) were compared on

ears, back, life span

The African and Indian elephants are different.

In contrast to the African elephant the Indian elephant has...

Simple Main Idea

Crocodile and Alligator were compared on snouts, teeth, and lifespan

Double-click the key to close it.

Comparison Structure

Crocodile	Alligator

Relates ideas on the basis of differences and similarities.

Main Idea Pattern - Comparison

_____ and _____ (two or more ideas) were compared on _____, _____, and _____.

Example: Comparing Killer whales and Blue whales on size, color, and life span.

Restart Page

Log Out

Welcome Back Bonnie

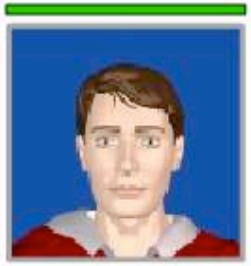
Comparison

Structure: Comparison
Thorough main idea:

Crocodile and Alligator were compared on snouts (Crocodile = long tapered; Alligator = broad rounded), teeth (Crocodile = visible [illegible] = [illegible] lifespan [illegible] to 40 years).

Your Key to Success!

Now write all you can remember about the Crocodilians article. USE THE MAIN IDEA TO HELP YOU REMEMBER DETAILS AS YOU WRITE WHAT YOU REMEMBER. Complete the first paragraph and then move down and complete the second paragraph.



Log Out

Signaling ★★★★★ Structure

Main Idea ★★★★★ Details ★★★★★

Score: 10

Comparison

Structure: Comparison

Main Idea: (two or more ideas)

Crocodiles and alligators

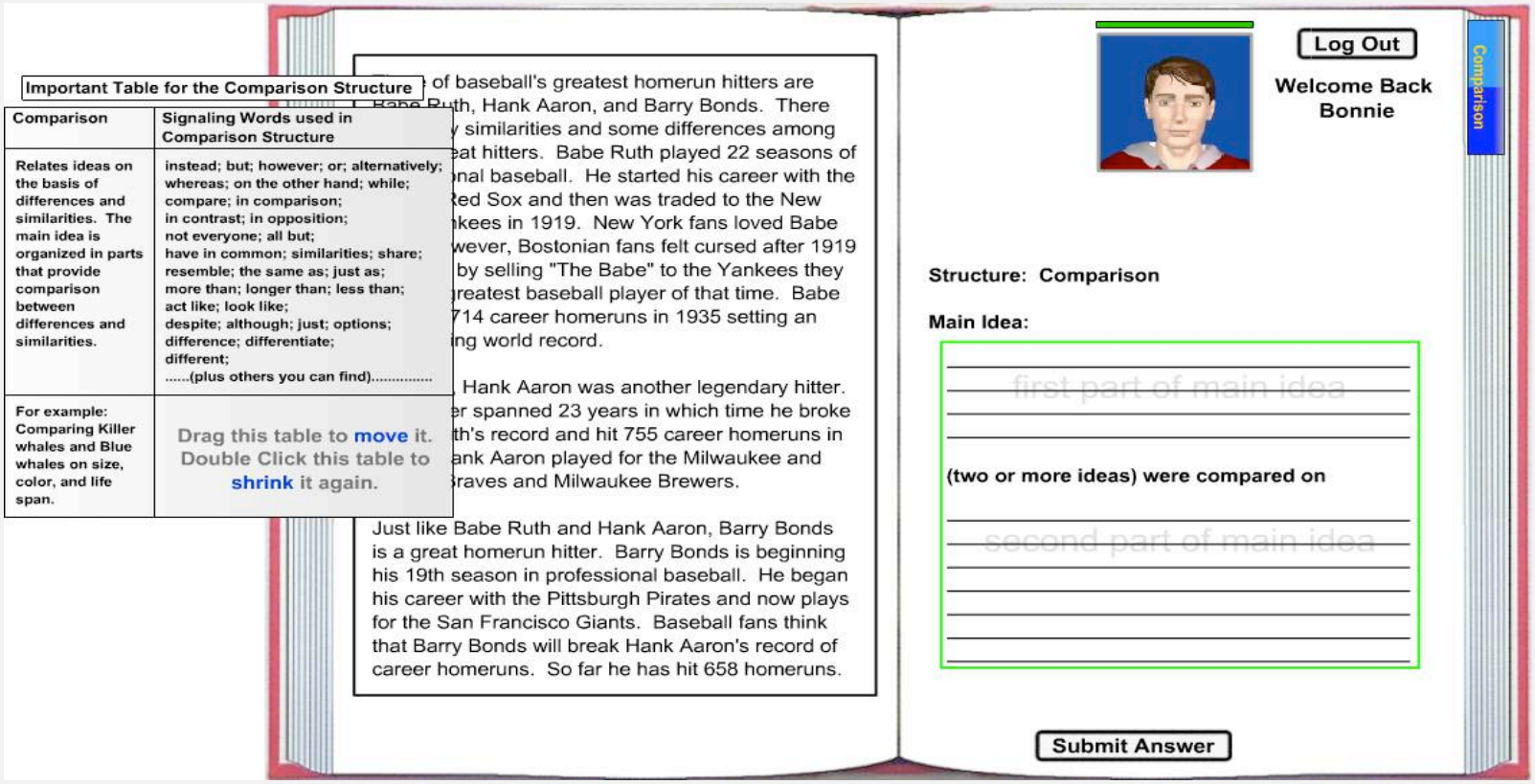
were compared on

snouts, teeth, life span.

Crocodiles and alligators are different. Crocodiles...have long snouts, teeth outside their jaws, and live 50 to 60 years

In contrast to crocodiles, alligators have...rounded snouts, teeth inside their jaws, and live 30 to 40 years.

ITSS


Important Table for the Comparison Structure
Comparison
Signaling Words used in Comparison Structure
Relates ideas on the basis of differences and similarities. The main idea is organized in parts that provide comparison between differences and similarities.
instead; but; however; or; alternatively; whereas; on the other hand; while; compare; in comparison; in contrast; in opposition; not everyone; all but; have in common; similarities; share; resemble; the same as; just as; more than; longer than; less than; act like; look like; despite; although; just; options; difference; differentiate; different; .....(plus others you can find).....
For example: Comparing Killer whales and Blue whales on size, color, and life span.
Drag this table to move it. Double Click this table to shrink it again.
of baseball's greatest homerun hitters are th, Hank Aaron, and Barry Bonds. There similarities and some differences among eat hitters. Babe Ruth played 22 seasons of nal baseball. He started his career with the ed Sox and then was traded to the New kees in 1919. New York fans loved Babe wever, Bostonian fans felt cursed after 1919 by selling "The Babe" to the Yankees they reatest baseball player of that time. Babe 714 career homeruns in 1935 setting an ng world record.
Hank Aaron was another legendary hitter. er spanned 23 years in which time he broke th's record and hit 755 career homeruns in ank Aaron played for the Milwaukee and raves and Milwaukee Brewers.
Just like Babe Ruth and Hank Aaron, Barry Bonds is a great homerun hitter. Barry Bonds is beginning his 19th season in professional baseball. He began his career with the Pittsburgh Pirates and now plays for the San Francisco Giants. Baseball fans think that Barry Bonds will break Hank Aaron's record of career homeruns. So far he has hit 658 homeruns.
Log Out
Welcome Back Bonnie
Comparison
Structure: Comparison
Main Idea:
first part of main idea
(two or more ideas) were compared on
second part of main idea
Submit Answer

Comparison

Remember to use one signaling word in your first sentence when you start paragraph 1 about Babe Ruth and another signaling word in your first sentence when you start paragraph 2 about Hank Aaron, and another signaling word in your first sentence when you start paragraph 3 about Barry Bonds. Use your main idea to help you remember the details for your paragraphs.

Signaling words found: similarities, differences, however, similarly, just like

Structure: Comparison

Main Idea:

Babe Ruth, Hank Aaron, and Barry Bonds

(two or more ideas) were compared on

career/years playing professional baseball (Babe Ruth = 22; Hank Aaron = 23; Barry Bonds = 19 so far), # of career homeruns (Babe Ruth = 714; Hank Aaron = 755; Barry Bonds = 658 so far), and what teams they played for (Babe Ruth = Boston Red Sox and New York Yankees; Hank Aaron = Milwaukee & Atlanta Braves and Milwaukee

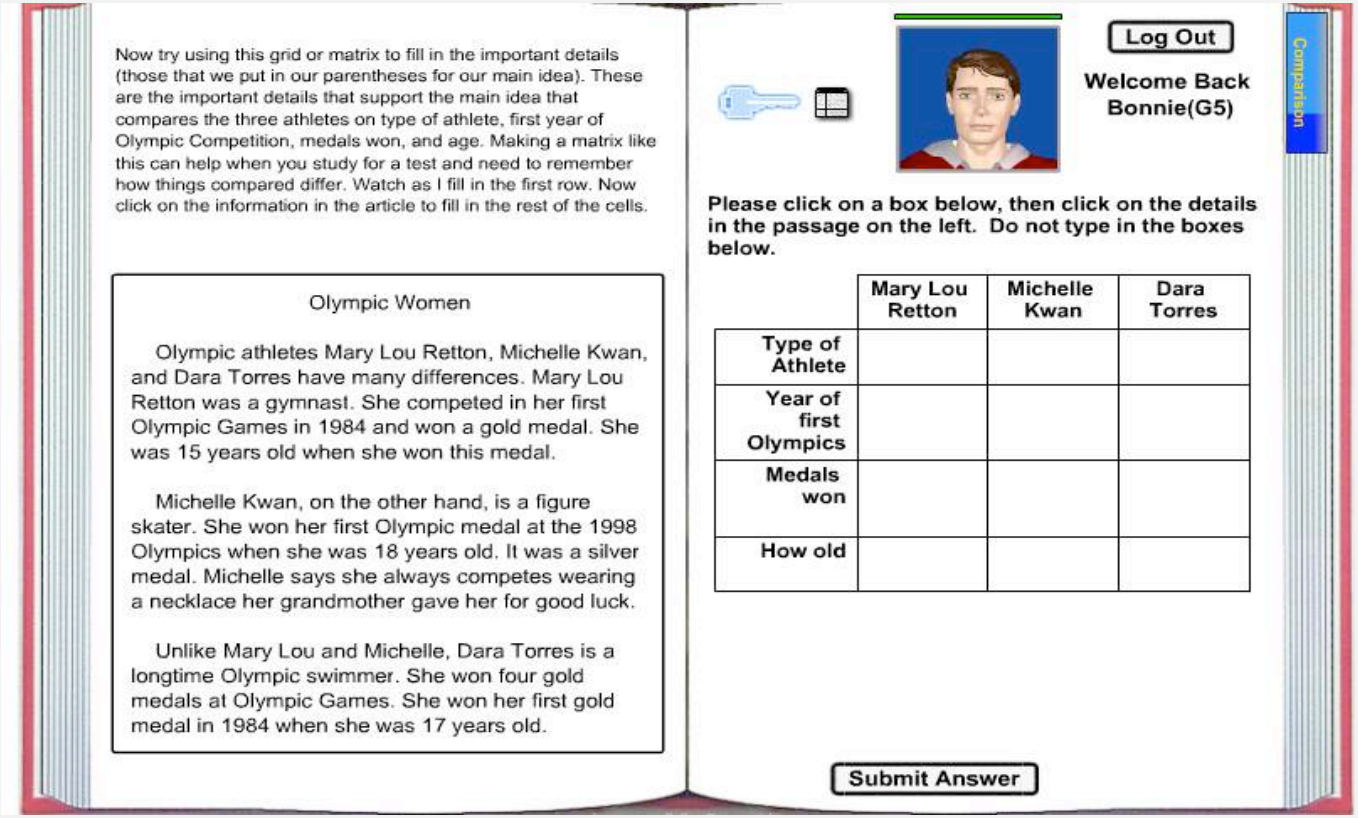
Log Out

Welcome Back Bonnie

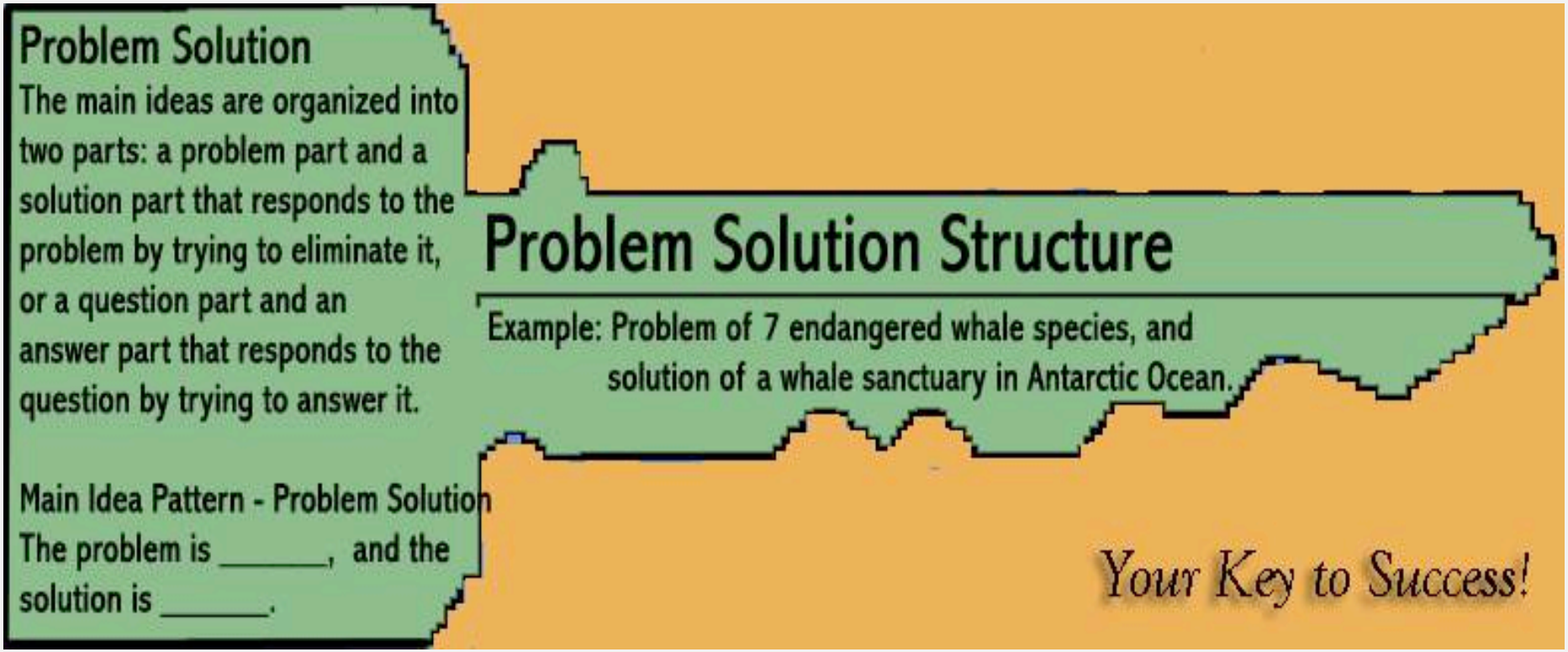
Submit Answer

Comparison

Less typing/clicking adaptation for 4th graders



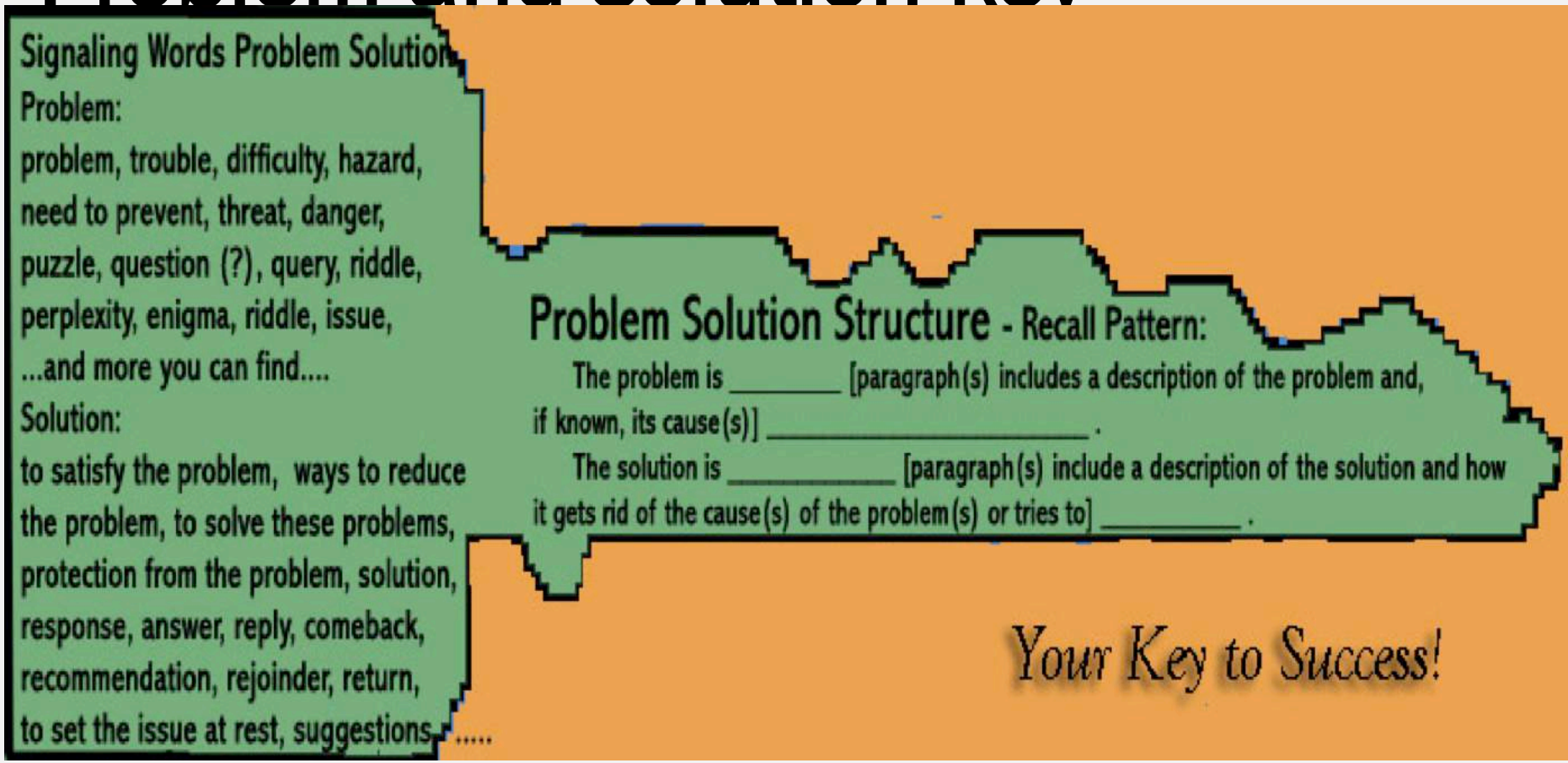
Problem-and-solution key



From Meyer, Wijekumar, & Lin (2011)

From Meyer, Wijekumar, & Lin (2011)

Problem-and-solution key



Comparison

Remember to use your main idea to help you remember the details about the article. Check to make sure you have stated the problem. Look to see that you stated what causes the problem (why there is a problem). Be sure you wrote about who the problem affects and how, when, and where the problem affects them. Also, check to be sure you have two solutions that each try to get rid of the cause of the problem.
When you have finished writing, check to make sure you have stated the problem and the solutions with as many details as you can remember. If you remember anything else after checking, then add it.

Structure: Problem/Solution
Signaling Words: solutions, problems, solution

Structure: Problem / Solution

Main Idea: The problem(s) is/are

Suffering from allergies often means a stuffy nose, red and puffy eyes, itchy throat, sneezing, and coughing. Breathing bits of waste and body parts of house dust mites causes problems for people

and the solution(s) is/are

One important solution in treating allergies to dust mites is to completely seal up pillows, mattresses, and box springs with special covers that trap bits from dust mites inside. Another solution to be used with these special covers is to wash blankets and sheets every two weeks in water hot enough to kill the live dust mites

Log Out

Welcome Back Bonnie

Problem/Solution

Please Complete your full recall for Problem and Solution

Submit Answer

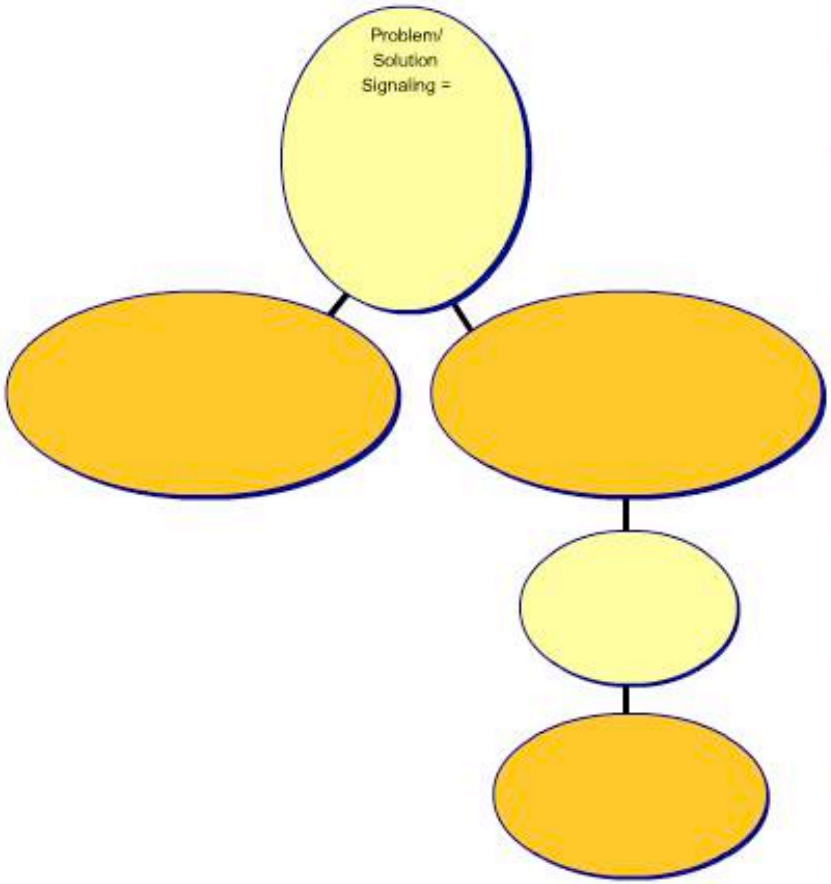
Let's look at an article that fits this organization.

Rabies is a serious threat to the health of people. Rabies is passed to a person through a bite from an animal with rabies. Pets that can get rabies include dogs, cats, and ferrets. Rabies attacks the central nervous system and it kills people unless they get treatment right after they are bitten and before they get sick.

The solution is not killing all pets that might bite, but instead taking the danger out of possible bites. The best solution to the rabies problem is to be sure pets get their rabies vaccines and booster shots.

Click on the five signaling words for the Problem/Solution structure. When you click on them, they will appear in the top-level structure of the diagram. Carefully look at the article and your list of signaling words on your Problem/Solution key.

Welcome Back Bonnie



Comparison

Problem/Solution

Hi, Bonnie, the structure strategy helps you to figure out the most important information to learn and remember.

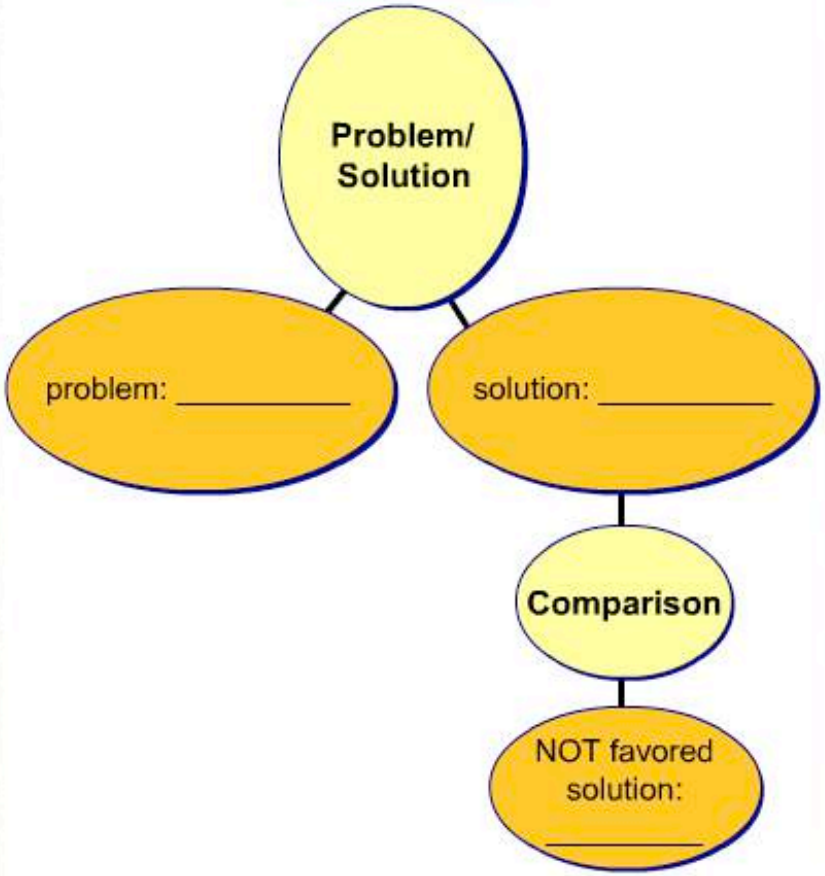
Today let's see how both the Comparison and Problem/Solution structures can work together in one article. One structure will be the structure at the top (called the top-level structure), which organizes all the information in the article together, and the other structure will support the top-level structure by organizing one of its parts. In the diagram below, the top-level structure is Problem/Solution. The Solution part is organized by a comparison between a solution favored by the author and a solution not favored by the author. Remember, the higher the idea in the structure diagram, the more important it is to the author.

Restart Page

Log Out

Welcome Back Bonnie

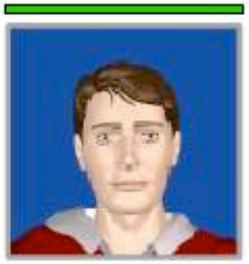
Problem/Solution



Comparison

Problem/Solution

First let's write a main idea with the Problem/Solution structure's pattern. I will write my main idea first, and then you can write your main idea below mine. Remember, don't write in my space!



Log Out

Welcome Back Bonnie

The problem is people can get rabies from getting bitten by animals with rabies, and the solution is to get rabies vaccines and booster shots for pets.

Structure: Problem / Solution

Main Idea: The problem(s) is/are

first part of main idea

and the solution(s) is/are

second part of main idea

Submit Answer

Problem/Solution

Comparison

Problem/Solution

Watch me as I fill in the diagram with ideas from the article. First I'll put the problem in the space for the problem. For the problem I'll write, 'People get rabies from bites of animals like pet dogs, cats, and ferrets.' Then, I'll write about the favored solution. I'll write, 'Get pets their rabies vaccines and booster shots.' Next, I will add the unfavored solution at the bottom of the diagram. I'll write, 'kill all pets that might bite'. That is an awful solution -- I really like my dog and I always take him for his rabies shots. I agree with the author, that solution should definitely be unfavored at the bottom of the diagram! Since the top-level structure for the article is Problem/Solution we will use the pattern for writing with the Problem/Solution structure, not the pattern for the Comparison structure. When we recall, we will organize our solution part with the Comparison structure, comparing the good solution to the bad one.

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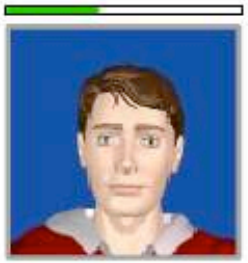
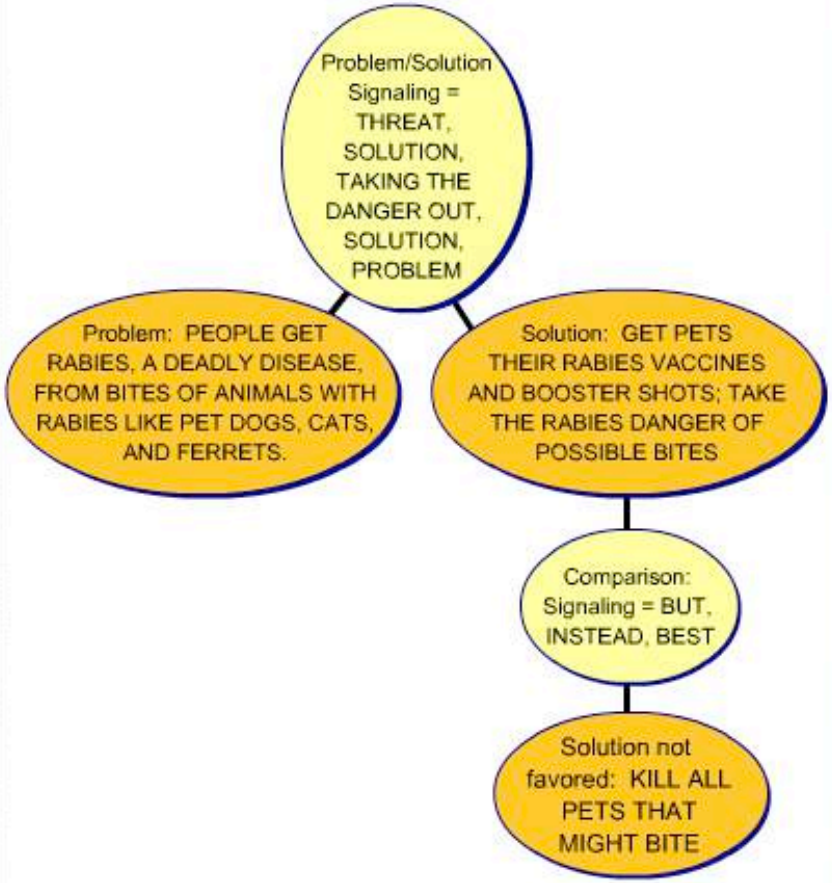


Log Out

Welcome Back Bonnie

Problem/Solution



Comparison

Problem/Solution

Teachers and tests ask you questions about what you read. For example, what would be a good title for this article? What is the main idea? What's happening in the article? For a Problem/Solution article, you might be asked, What was the problem? What caused the problem? How could the problem affect you? What was the solution to the problem? How did the solution solve the problem?

Try answering some of these Problem/Solution questions about the rabies article. If you need some help click here to see the diagram we made of the structure. Also, you can look at what you recalled from the passage.

Your recall:

Rabies is a serious threat to the health of people. Rabies is passed to a person through a bite from an animal with rabies. Pets that can get rabies include dogs, cats, and ferrets. Rabies attacks the central nervous system and it kills people unless they get treatment right after they are bitten and before they get sick. The solution is not killing all pets that might bite, but instead taking the danger out of possible bites. The best solution to the rabies problem is to be sure pets get their rabies vaccines and booster shots.

Log Out

Welcome Back Bonnie

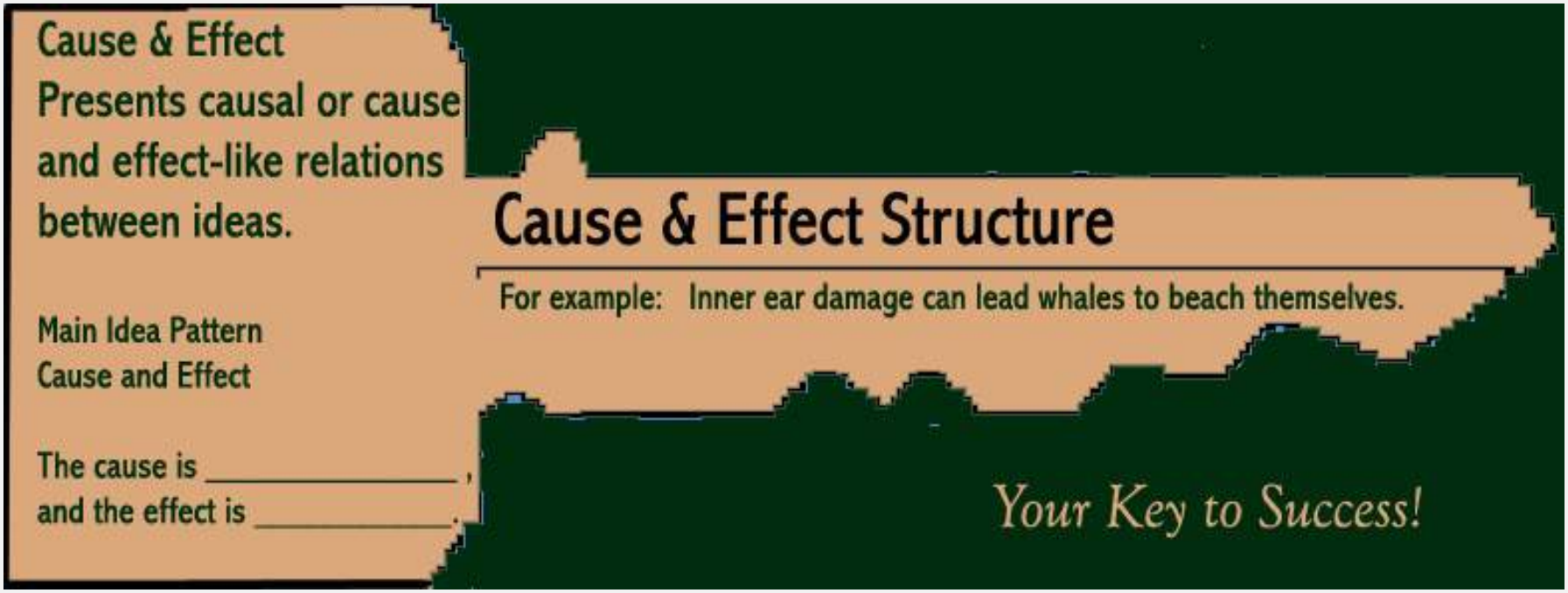
What caused the problem?

Submit Answer

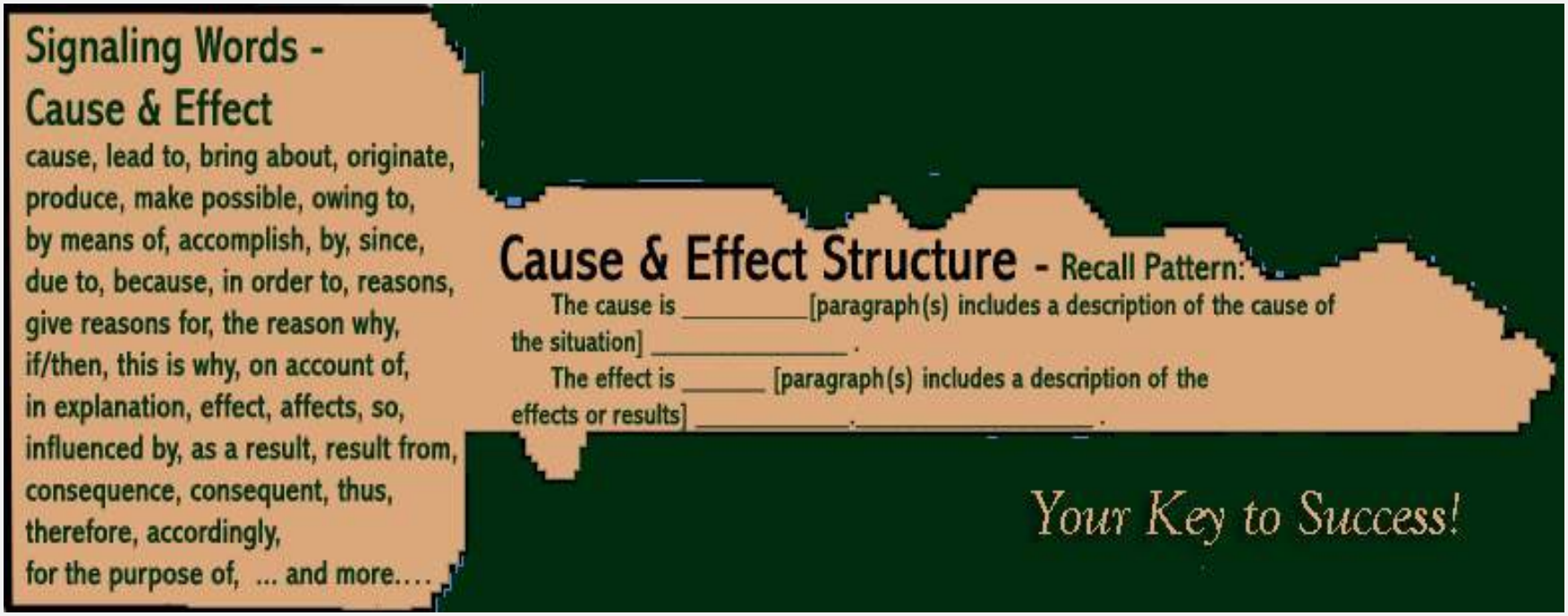
Problem/Solution

From Meyer et al., 2010

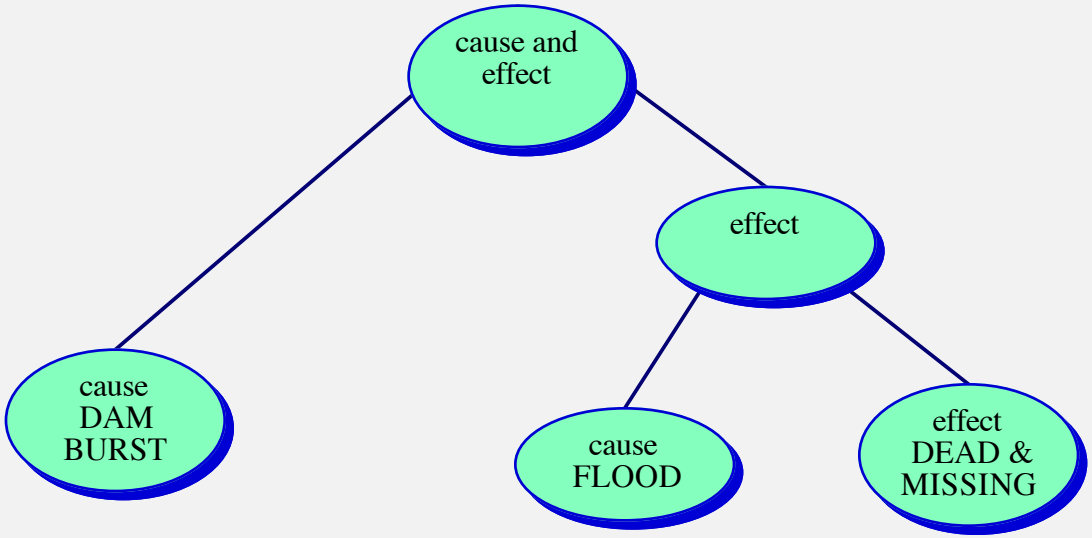
Cause-and-effect key



Cause-and-effect key



Increasing complexity with practice and progress



Comparison

Problem/Solution

Be sure to use at least two signaling words and to include all the causes and effects. To help you remember, use your main idea. When you finish writing CHECK your work! Do you have the causes and the effects and two signaling words? If you have just remembered anything, add it now.

Signaling Words:
1.) Causes
2.) As a result
3.) because
4.) result

Structure: Cause / Effect

Main Idea: The cause is

destroying all of the adult chicken hawks and their nests, breeding grounds, and babies

and the effect is

rats multiplying and overrunning farms and eating the grain in the farmers' barns.

Log Out

Welcome Back Bonnie

Please complete your full recall for cause and effect

Cause Effect

Submit Answer

First Four Paragraphs for Michael Goldman's (1997) 2-page article

Basic Training

You can't teach your dog to read as television's Wishbone does. But you can teach it to be obedient -- and maybe even do a few tricks.

Jackie Martin Kaptan, who trains the famous jack Russell terrier, has 20 years' professional experience working with dogs -- and even tigers, bears and wolves! Her plan can help you develop a perfectly behaved pooch.

Welcome to the Family, Fido!

All dogs need some training. A dog that acts nice and friendly today might not next week. It is, after all, an animal, and can act accordingly.

An untrained dog may bite, chew furniture, bark all night or run away. A trained dog will be a welcome, safe member of the family.

Basic Dog Training Text

Cause

KAPTAN'S **DOG TRAINING**

Effect

TRAIN DOG TO BE OBEDIENT

Comparison

TRAINED DOG IS WELCOME, SAFE FAMILY MEMBER

UNTRAINED DOG: BITES, CHEWS FURNITURE, BARKS

Basic Dog Training Text

Cause
Jackie Kaptan's basic training

Effect
Train dog to be obedient

Comparison

Trained dog is welcome, safe family member

Untrained dog: bites, chews furniture, bark all night, run away

Description Sequence

Sequence
Getting started:
1. Don't wait - start 8 weeks
2. Get right equipment: crate, collar, leash, pack or bag, tennis ball & toys

3. Take a class

4. Start with basics: Use leash & teach "Come"

Teach Basic Commands: "Come" is the most important of basics; other basics = sit & stay

List of Basic Rules for 1st 8 weeks of training:
1. Praise often & consistently
2. Correct with sharp "NO" or a gentle tug on leash
3. Short training time close to meals
4. Keep commands simple.

After 1st 8 weeks training:

Polish basics & add simple tricks

Train yourself to be consistent

Basic Dog Training Text

Cause
Jackie Kaptan's basic training

Effect
Train dog to be obedient

Comparison

Trained dog is welcome, safe family member

Comparison
Maybe even teach a few tricks: speak, shake, roll over

Untrained dog: bites, chews furniture, bark all night, run away

Description

Dog has much to offer: want to be with you & work

Comparison
Not happy sitting in backyard week after week

Description Sequence

Sequence
Getting started:
1. Don't wait - start 8 weeks
2. Get right equipment: crate, collar, leash, pack or bag, tennis ball & toys

3. Take a class

4. Start with basics: Use leash & teach "Come"

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4. Keep commands simple.

After 1st 8 weeks training:

Polish basics & add simple tricks

Train yourself to be consistent

First ITSS grant examined how best to deliver ITSS.

Examined types of feedback & choice (Meyer et al., 2010) and my favorite individualized vs. standard ITSS –online assessment in a lesson to determine the best next lesson for a student (Meyer, Wijekumar, & Lin, 2011).

Improvement of ITSS Through Greater Individualization

Meyer, B.J.F., Wijekumar, K.K., Lin, Y. (2011). Individualizing a Web-Based Structure Strategy Intervention for Fifth Graders' Comprehension of Nonfiction. *Journal of Educational Psychology, 103 (1),* 140-168.

Primary Research Questions

Did students in the more individualized ITSS perform better than students in standard ITSS on

- generation of comparison signaling words on an unpracticed task?
- far transfer to a standardized test of reading comprehension?

Secondary Research Question

Did the variation in individualization of instruction affect learning goals or quality of work in ITSS lessons?

Individualized ITSS did not provide students with more time in ITSS, lessons, or texts read than standard ITSS

	Standard (n = 66)	Individualized (n = 65)	$t(129)$	p
Number of texts read	51.52 (27.23)	51.72 (23.25)	.05	.963
Number of lessons worked	37.11 (15.65)	38.40 (14.01)	.50	.619
Number of 30-minute ITSS sessions	34.53 (10.44)	35.06 (9.51)	.31	.759

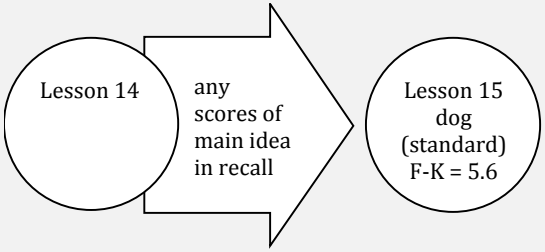
Instead, more Individualized ITSS

better matched a student's practice lesson to the student's online performance in the immediately prior practice lesson.

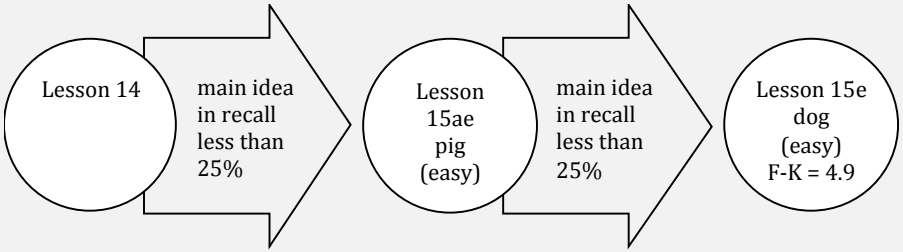
More Individualized Lessons (vs. Standard Lessons)

- Parallel lessons for extra practice with harder and easy versions while keeping text structure and signaling constant
- Change in sequencing of lessons
- Skipping of lessons

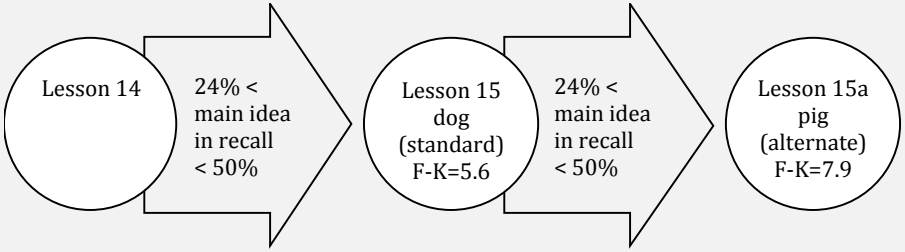
Standard ITSS path from Lesson 14 to 15



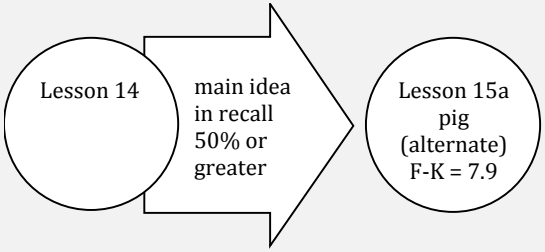
Remediation path with easy texts



Remediation path with standard and alternate texts



Enrichment path with alternate texts



65 Individualized Students

Classification of Differentiation Paths for 65 Individualized Students Varying in Reading Comprehension

Classification of Differentiation Paths in Individualized ITSS	Reading Comprehension Ability Groups		
	Low	Middle	High
All Remediation	7	7	1
Balance of Remediation & Enrichment	8	6	8
Mainly Enrichment	2	4	9
All Enrichment	2	7	4

Note. $\chi^2(6) = 12.85, N = 65, p = .045$

Adapt ITSS to On-line Performance vs. Standard Lesson Sequence

Students in more Individualized ITSS condition showed greater improvements (d = 0.55)

than students in Standard ITSS

(d = 0.30) on the GSRT, a standardized reading comprehension test.

Individualized greater gains on standardized test

Interaction Between Standard Versus Individualized ITSS on GSRT Pre- and Posttests

Individualization Condition / Reading Ability	*M (SD)* Pretest	*M (SD)* Posttest	Paired sample *t*-test	d[a]
Standard ($n = 66$)	35.41 (13.33)	39.35 (11.87)	$t(65) = 2.58, p = .012$	0.30
Low ($n = 24$)	23.58 (9.89)	31.62 (11.54)	$t(23) = 3.37, p = .003$	0.81
Middle ($n = 20$)	37.95 (9.47)	41.05 (9.38)	$t(19) = 1.16, p = .260$	0.33
High ($n = 24$)	46.00 (8.83)	46.23 (9.51)	$t(21) = .08, p = .934$	0.03
Individualized ($n = 65$)	34.05 (12.76)	41.06 (11.95)	$t(64) = 5.12, p < .0005$	0.55
Low ($n = 19$)	22.74 (8.51)	35.47 (11.10)	$t(18) = 6.39, p < .0005$	1.50
Middle ($n = 24$)	32.46 (8.87)	40.08 (11.68)	$t(23) = 3.42, p = .002$	0.86
High ($n = 22$)	45.55 (9.55)	46.95 (10.71)	$t(21) = .62, p = .541$	0.15

Adapt ITSS to On-line Performance vs. Standard Lesson Sequence finding for Signaling Test

Students in the more Individualized ITSS condition made more substantial gains on the signaling test from pretest to immediate posttest (d = .78) and pretest to delayed posttest (d = .61), than students in Standard ITSS from pretest to immediate posttest (d = .25) and pretest to delayed posttest (d = .30).

Adapt ITSS to On-line Performance vs. Standard Lesson Sequence

Students receiving more individualized ITSS demonstrated higher mastery achievement goals when working in ITSS than students receiving standard ITSS instruction ($d = 0.53$).

Achievement Goals on the Posttest for Individualization Conditions and Reading Ability Levels

Means, (SD), and Effect Sizes for Learning Goals on the Post-test for Individualization Conditions and Reading Ability Levels

Goal Orientation / Reading Ability	*M (SD)* Individualization Conditions		d[a]
	Standard ($n = 66$)	Individualized ($n = 65$)	
Mastery/Learning Goals	16.60 (5.28)	19.39 (4.39)	0.53
Low ($n = 43$)	16.88 (4.87)	20.24 (3.64)	0.69
Middle ($n = 44$)	18.10 (5.00)	19.16 (4.91)	0.21
High ($n = 44$)	14.94 (5.71)	18.91 (4.47)	0.70

People
Passion
Persistence
Past

Present: Current

Videos online for outreach

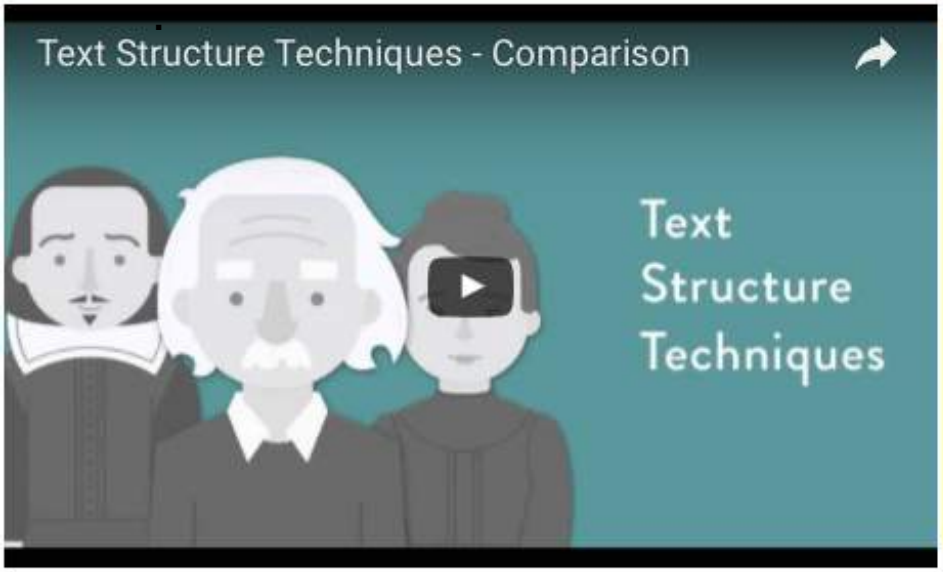
Three videos by Wijekumar and Meyer giving information with slides about the text structure strategy:

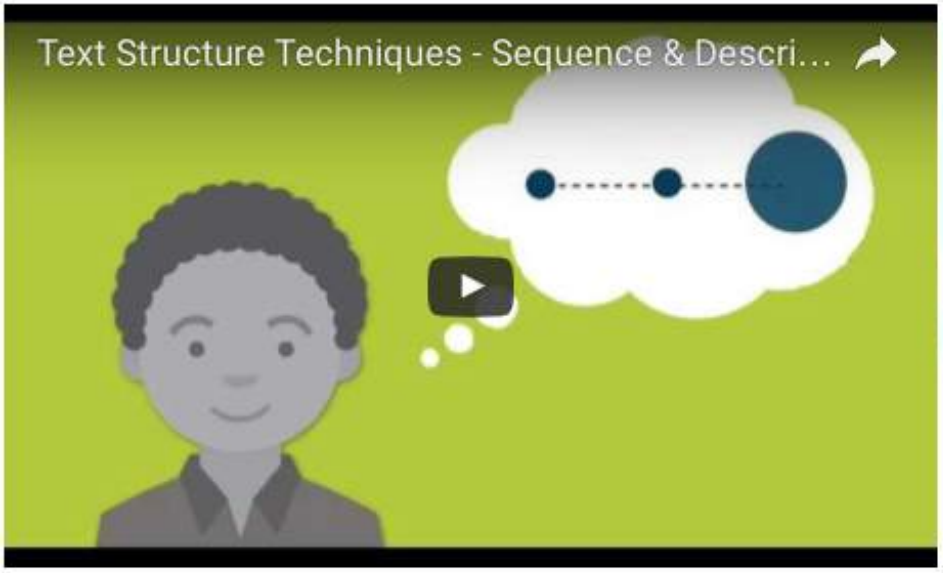
The Structure Strategy about the structure strategy with the comparison text structure
http://youtu.be/GGBUcfXxqZM

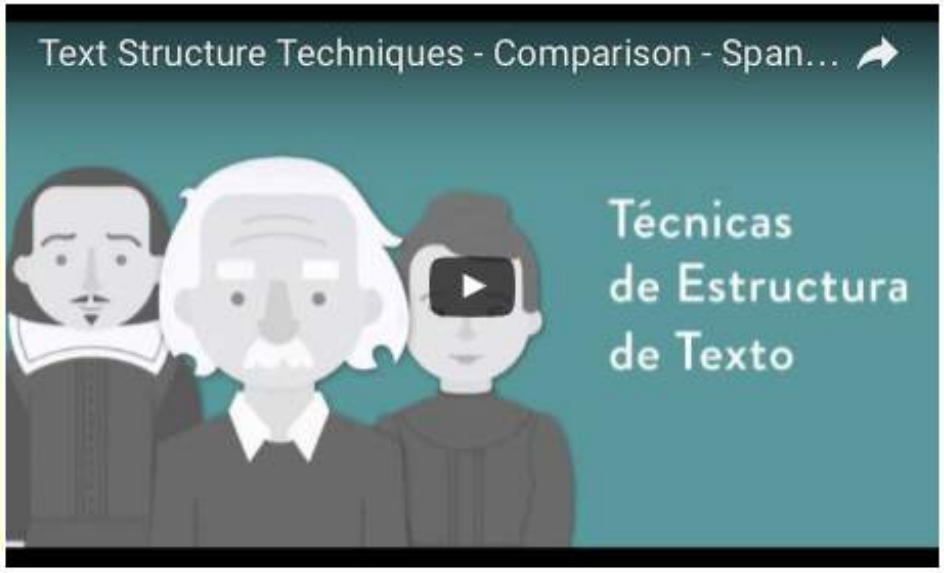
The Structure Strategy - Problem and Solution and Cause and Effect
http://youtu.be/IkPKtZIxrjI

The Structure Strategy - Sequence and Description
http://youtu.be/W78aU7d0xoY

Peppy videos about text students for student and teachers: Focus on strategic memory related to 5 text structures, e.g., http://youtu.be/d_ZL0yEeUac







Application: Book for Teachers

Meyer, B. J. F., & Wijekumar, K. K. (2017). Intelligent Tutoring of the Structure Strategy: A Reading Strategy Tutor. In S. A., Crossley & D. S. McNamara (Eds.), *Adaptive Educational Technologies for Literacy Instruction,* pp. 82-103. New York, NY: Routledge Publishers, Taylor & Francis Group.

Wijekumar, K. K., Harris, K. R., Graham, S., & Meyer, B. J. F. (2017). We-Write: A Web-Based Intelligent Tutor for Supporting Elementary Classroom Teachers in Persuasive Writing Instruction. In same book on pp. 184-203.

Recent Development: Recognition of the Importance in Elementary & Middle School of the Text Structure Instruction to Increase Reading Comprehension

Two recent meta-analyses with positive results for text structure instruction and further questions:

Hebert et al. (2016)

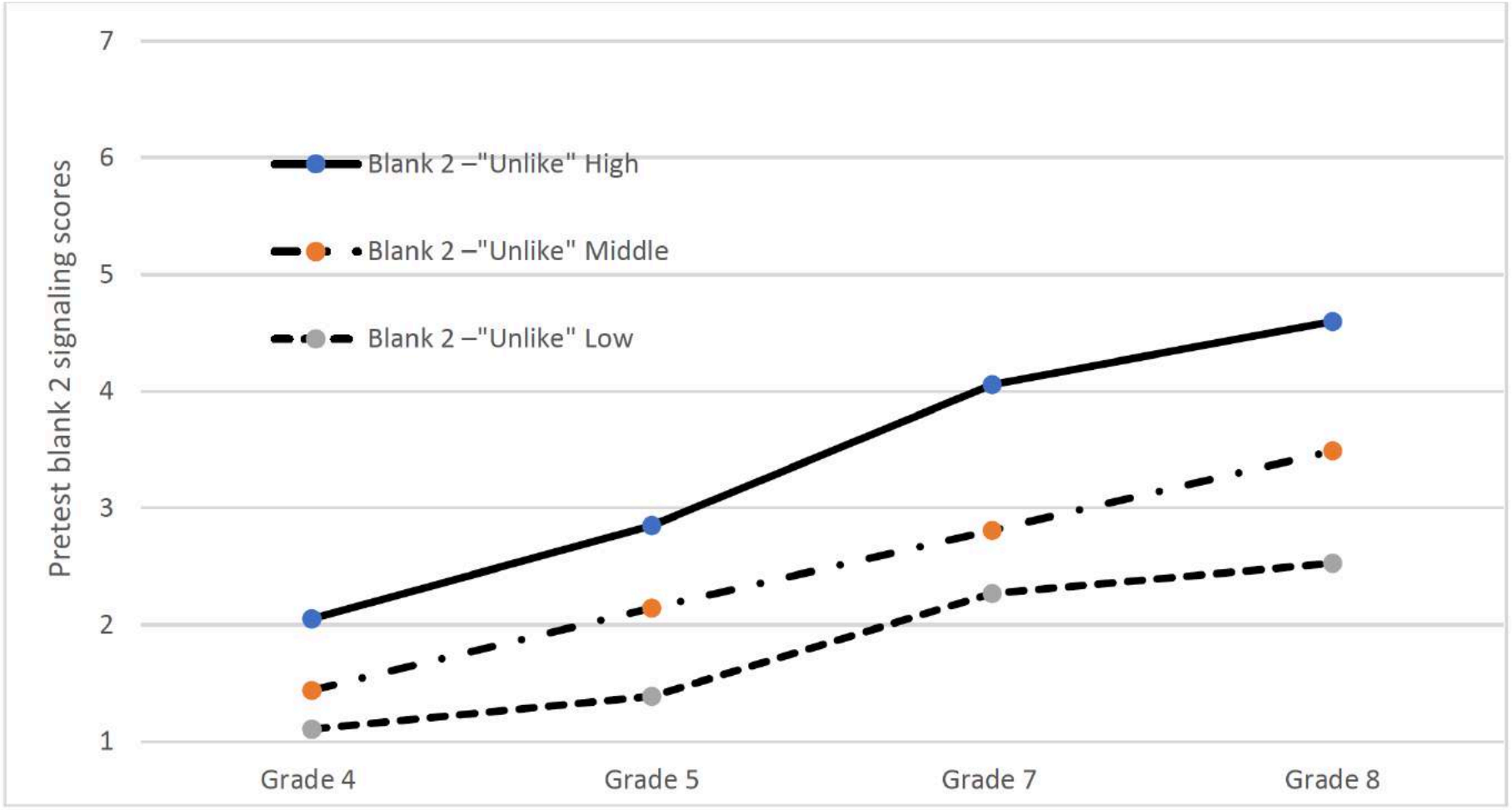
Pyle et al., 2017

Present

Special Issues on Text Structure Instruction in *Reading and Writing: An Interdisciplinary Journal* edited by M. Hebert and K. Wijekumar (in press).

I am excited about the articles in the special issue and Joanna Williams' introduction to them. I have read most of articles and they have much to offer.

Meyer, B. J. F., Wijekumar, K., & Lei, P. (2018). Comparative signaling generated for expository texts by 4th–8th graders: Variations by text structure strategy instruction, comprehension skill, and signal word. *Reading and Writing*, **Online from Special Issue** doi:10.1007/s11145-018-9871-4



Penguin Form of Signaling Test

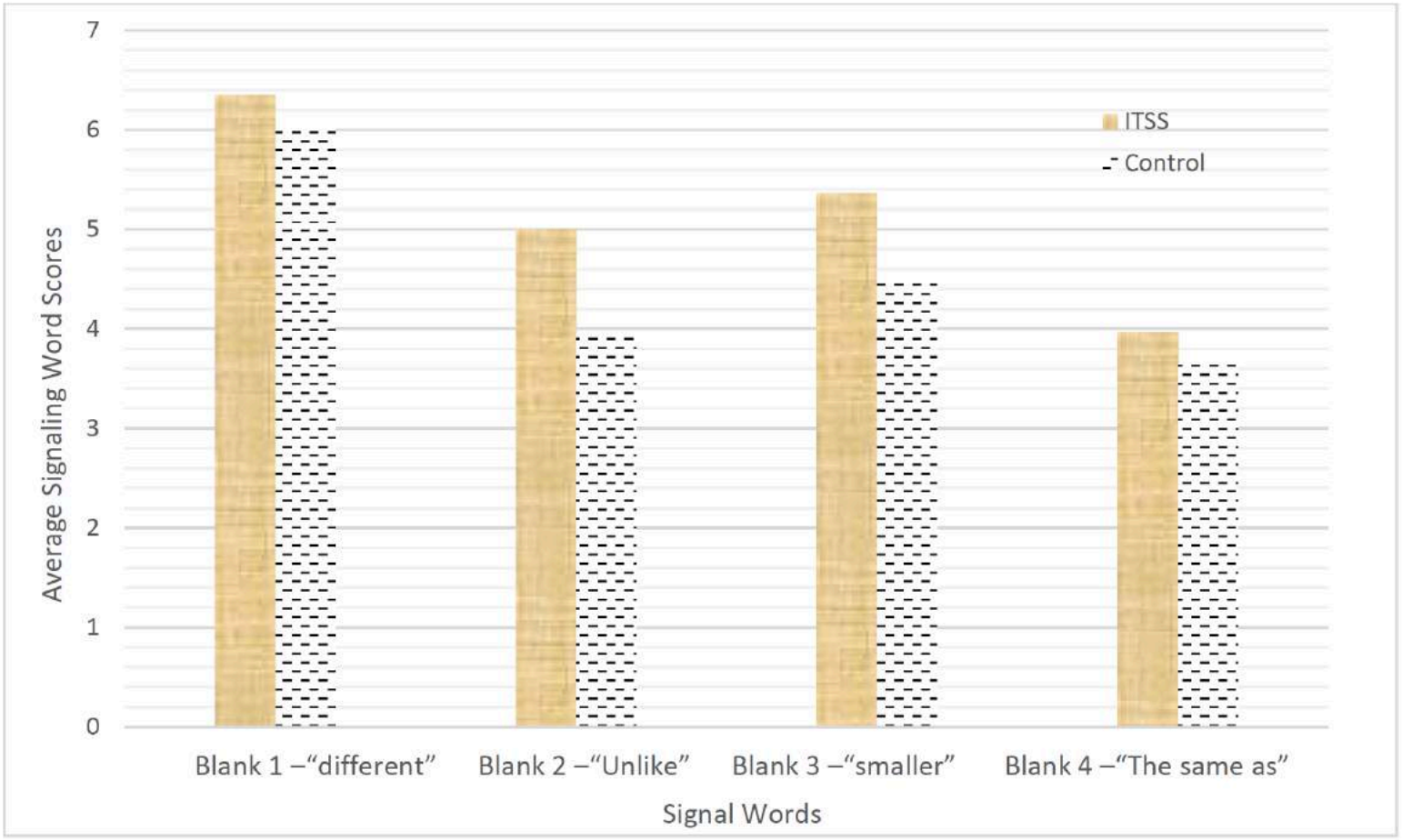
Emperor penguins and Adelie penguins are _____ from one another. Emperor penguins are large penguins. They are the largest of all penguins and may grow to 4 feet tall. These penguins can weigh more than 90 pounds. Emperor penguins display orange ear patches. They have long, yellow-orange streaked beaks in black faces. Emperor penguins feed principally on shallow water seafood. Emperor penguins live on Antarctica's pack ice.

_____ the large emperor penguins, Adelie penguins are _____ penguins. Adelie penguins grow only about 2 feet high. They weigh only about 11 pounds. Adelie penguins have white ringed, beady, black eyes. Adelie penguins have short, feathered beaks on cute faces. Adelie penguins feed almost entirely on krill. _____ the emperor penguins, Adelie penguins live on Antarctica's pack ice.

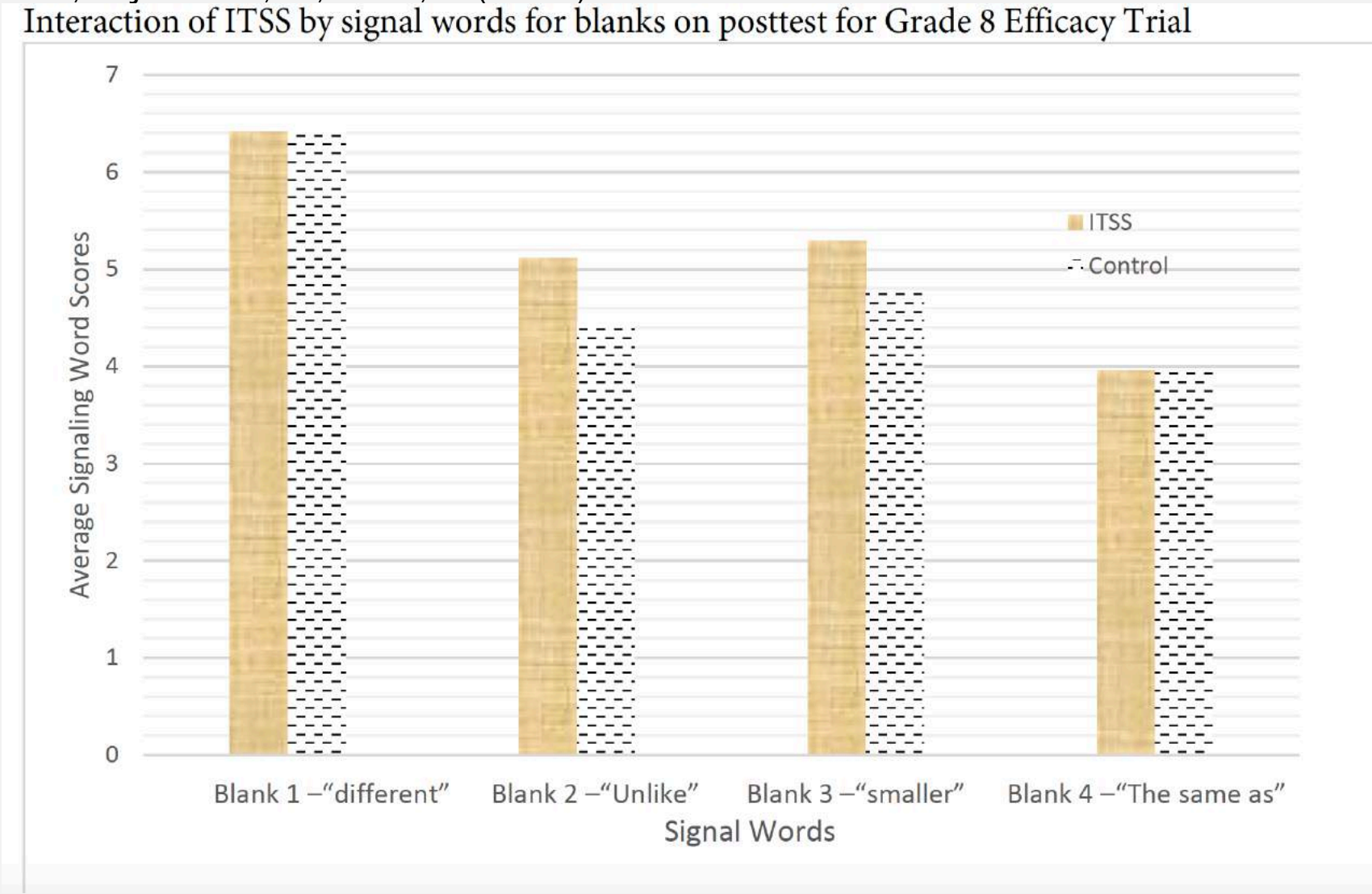
Meyer et al., 2010; 2011, 2018

Meyer, B. J. F., Wijekumar, K., & Lei, P. (2018). Comparative signaling generated for expository texts by 4th–8th graders: Variations by text structure strategy instruction, comprehension skill, and signal word. *Reading and Writing*, **Online from Special Issue** doi:10.1007/s11145-018-9871-4

Interaction of ITSS by signal words for blanks on posttest for Grade 7 Efficacy Trial



Meyer, B. J. F., Wijekumar, K., & Lei, P. (2018).



Wijekumar, K., Meyer, B.J.F., Lei, P. et al. Read Writ (2017). Improving Content Area Reading Comprehension of Spanish Speaking English Learners in Grades 4 and 5 Using Web-based Text Structure Instruction. *Reading and Writing*. Online from Special Issue https://doi.org/10.1007/s11145-017-9802-9

ITSS lessons with two types of adaptations for native Spanish speakers:

English extension SWELL —teaching of novel vocabulary in English and providing students access to on-click assistance at the **word** & **sentence level** —easy definitions, paraphrasing, and pictures (context clues) with linguistically easier versions of sentences.

- 86% of sample were bilingual and classified as English proficient; they used English extension SWELL

cuando

Now let's move on with the comparison s...
Authors often use these signaling words when writing comparison articles. Let's read the article about bears together and see if you can find the three places where there are signaling words.

Double click to return to the lesson. Haga doble clic para volver a la lección.

Polar bears hunt mainly seals and feed on much seal meat.

...available food, such as berries and fish. They feed mainly on vegetation and insects. Black bears live in North American forests.

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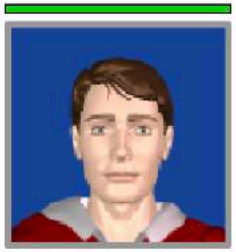
View Spanish



Log Out

9

Comparison

Sentence from text: They feed almost entirely on seals, which are part of Arctic sea mammals.

Double click to return to the lesson. Haga doble clic para volver a la lección.

Log Out

6

Comparison

Now let's move on with
Authors often use thes
comparison articles. L
together and see if you
there are signaling wo

Polar bears and B
from one another. P
the bears. They may
can weigh more thar
frosty white. They ha
around the Arctic Cir
on seals, which are

Unlike huge Polar
Some kinds of Black
long and others reac
bears, they have sha
teeth have flat tops.
of deer, they more c
available food, such
mainly on vegetation
in North American fo

Black bears mainly eat vegetation and insects.

ants

bees

Restart Page

Log Out

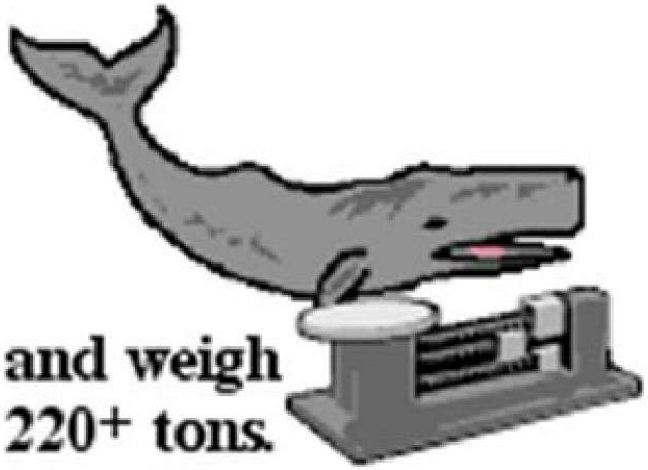
Now let's
Authors of
comparisc
together a
there are s

There
and Bea
animals
100 feet
They are
live in all
krill, whic

Unlike
smaller.
about 15
whales h
in the lov
Beaked
same as
all the oc

Double click to return to the lesson. Haga doble clic para volver a la lección.

Blue Whales can grow 100'



and weigh 220+ tons.

5

Restart Page

Log Out

Comparison

Now let's move on with the comparison structure. Authors often use these signaling words when writing cc
to
th

Double click to return to the lesson. Haga doble clic para volver a la lección.

Blue Whales eat much krill.

Restart Page

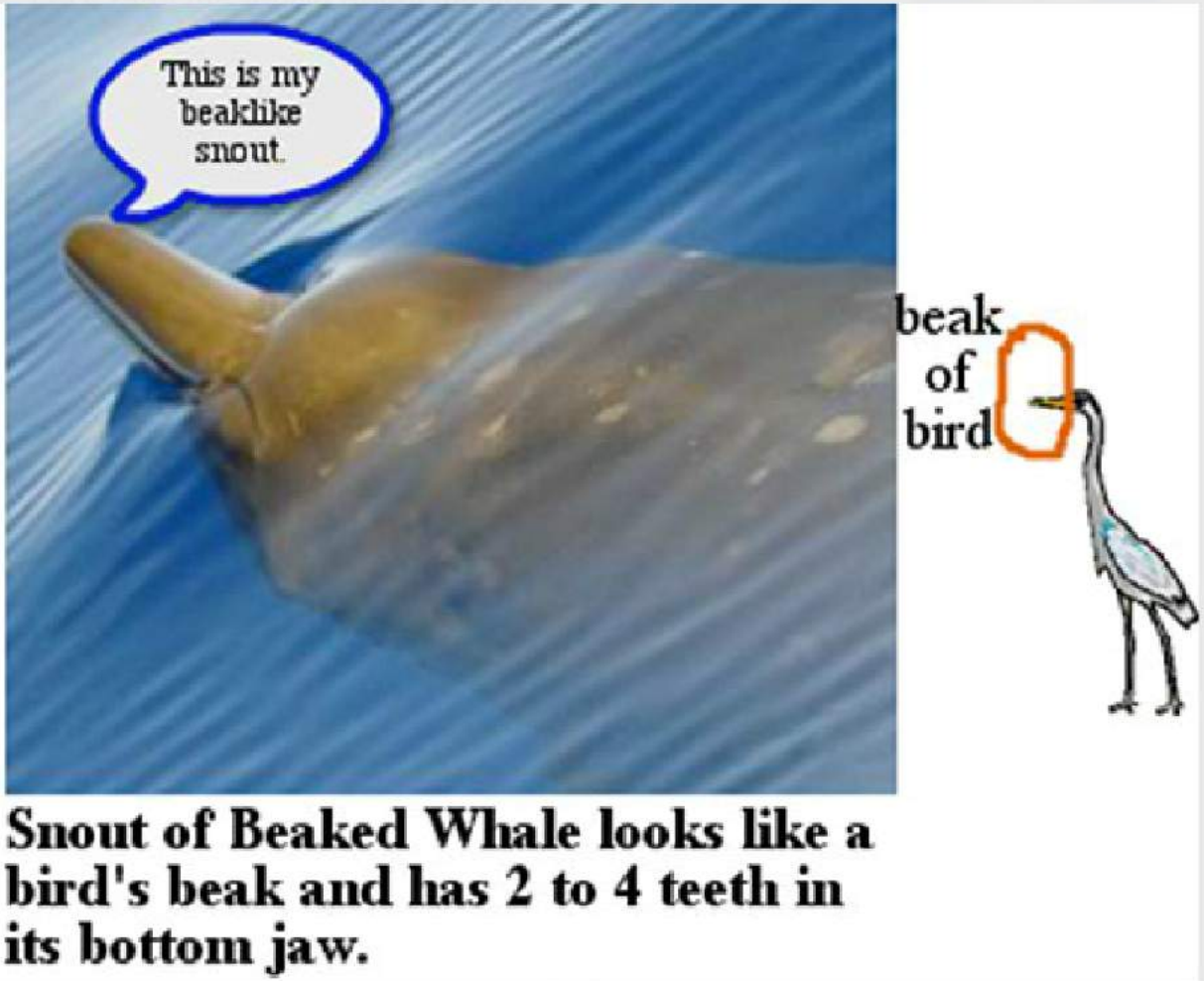
Log Out

Now let's move
Authors often u
comparison art
together and s
there are signa

There are
and Beaked
animals that
100 feet long
They are dull
live in all the
krill, which ar

Unlike the
smaller. Som
about 15 feet
whales have
in the lower j
Beaked whal
same as the
all the ocean

Double click to return to the lesson. Haga doble clic para volver a la lección.



Snout of Beaked Whale looks like a bird's beak and has 2 to 4 teeth in its bottom jaw.

3

Restart Page

Log Out

Comparison

Now let's move on with the comparison structure. Authors often use these signaling words when writing comparison articles. Let's read the article about whales together and see if you can find the three places where there are signaling words.

Double click to return to the lesson. Haga doble clic para volver a la lección.

Blue Whale	Beaked Whale
	
Unlike the huge Blue Whales, Beaked whales are smaller.	

same as the Blue whales, the Beaked whales live in all the oceans.

Log Out

Comparison

3

Double click to return to the lesson. Haga doble clic para volver a la lección.

The J
Wink is t
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Jello. Wi
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growled.

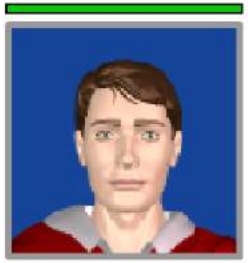
ve

Wink growls if picked up from Mrs. Jello's lap.

Two Very Different Dogs

Double click to return to the lesson. Haga doble clic para volver a la lección.

Dakota never growled.



Log Out

Click 'Finished Reading' when you have finished reading the article.

Comparison

Wijekumar, K., Meyer, B.J.F., Lei, P. et al. Read Writ (2017). Improving Content Area Reading Comprehension of Spanish Speaking English Learners in Grades 4 and 5 Using Web-based Text Structure Instruction. *Reading and Writing*.

ITSS lessons with two types of adaptations for native Spanish speakers :

Spanish scaffolding SWELL— procedural instructions on using the structure strategy and practice text previewed in Spanish followed by the English language of the lesson (with easier or usual ITSS text versions –see Meyer, Wijekumar, & Lin, 2011)

- 3% of sample: children classified as Spanish speakers who were receiving instruction in Spanish and the ITSS Spanish scaffolding.

Comparison

Hola Bonnie, hoy vamos a leer el artículo "Rabia". Al igual que el artículo de adelgazamiento de la mascota regordeta, este artículo es típico en los artículos de ciencia, medicina, y medicina veterinaria que utilizan la estructura de problema / solución. Primero, el autor presenta el problema y te indica a qué o quién afecta el problema. El autor también dice que tan grande es el problema y por qué es un problema. El autor a menudo dice el "quién, qué, cuándo, dónde, por qué y cómo" del problema. A continuación, el autor te da los pasos para evitar el problema (o deshacerse de el). Hoy, para el artículo "Rabia" escribirás el nombre de la estructura, darás clic en las palabras de señalización, escribirás la

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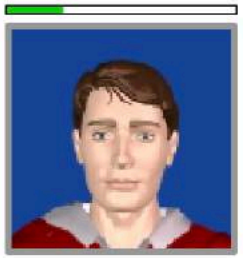

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Welcome Back Bonnie

Problem Solution

Comparison

Hi Bonnie, today we are going to be reading the article "Rabies". Just like the slimming the plump pet article, this article is typical of articles in science, medicine, and veterinary medicine that use the problem and solution structure. First the author presents the problem and tells you who or what the problem hurts. The author also tells how big the problem is and why it is a problem. The author often tells you the "who, what, when, where, why, and how" of the problem. Then, the author gives you the steps for avoiding the problem (or getting rid of it). Today for the "Rabies" article you will type the name of the Structure, click on the signaling words, type your main idea, and type your recall. Let's get started. Listen and read along as I read the article.

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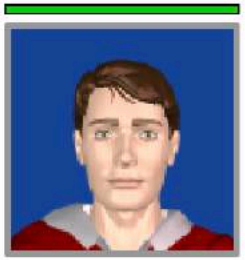


Log Out

Welcome Back Bonnie

Problem Solution

Wijekumar, K., Meyer, B.J.F., Lei, P. et al. Read Writ (2017). Improving Content Area Reading Comprehension of Spanish Speaking English Learners in Grades 4 and 5 Using Web-based Text Structure Instruction. *Reading and Writing*.

Main research question from SWELL development grant:

Do students in Grades 4 and 5 classrooms randomly assigned to SWELL, as a partial substitute for the standard language arts curriculum, outperform students in control classrooms on standardized and researcher-designed measures of reading comprehension?

Promising Answer:

Effect sizes of SWELL on the standardized GSRT reading comprehension measure ranged from moderate (.47 for Grade 5) to large (.79 for Grade 4).

Power of the Structure Strategy

Awareness and strategic used of text structure are important skills of good readers (Meyer, Brandt, & Bluth, 1980), and we have found that these skills can be taught to students who haven't picked up these skills on their own. Understanding nonfiction text is critical to success in school and throughout life.

The structure strategy provides students with a framework for organizing their learning that is linked to how they interpreted what they read. A reader's cognitive representation using the structure strategy is hypothesized to be organized based on how big ideas from the text are related by comparing, describing, sequencing, explaining, and arguing for solutions.

Text Structure Strategy integral component of reading comprehension instruction –not just supplemental!

Next Thorndike Awardee, J. P. Williams, taught 2nd graders to use the text structure strategy

Joanna William's view

text structure instruction should be included as a prominent part of a full reading comprehension curriculum

Main point for moving ahead:

Text structure instruction (strategic use of text structures & signaling) as a critical component of regular reading comprehension curricula for Grades 2 – 7, rather than supplementary

Why?

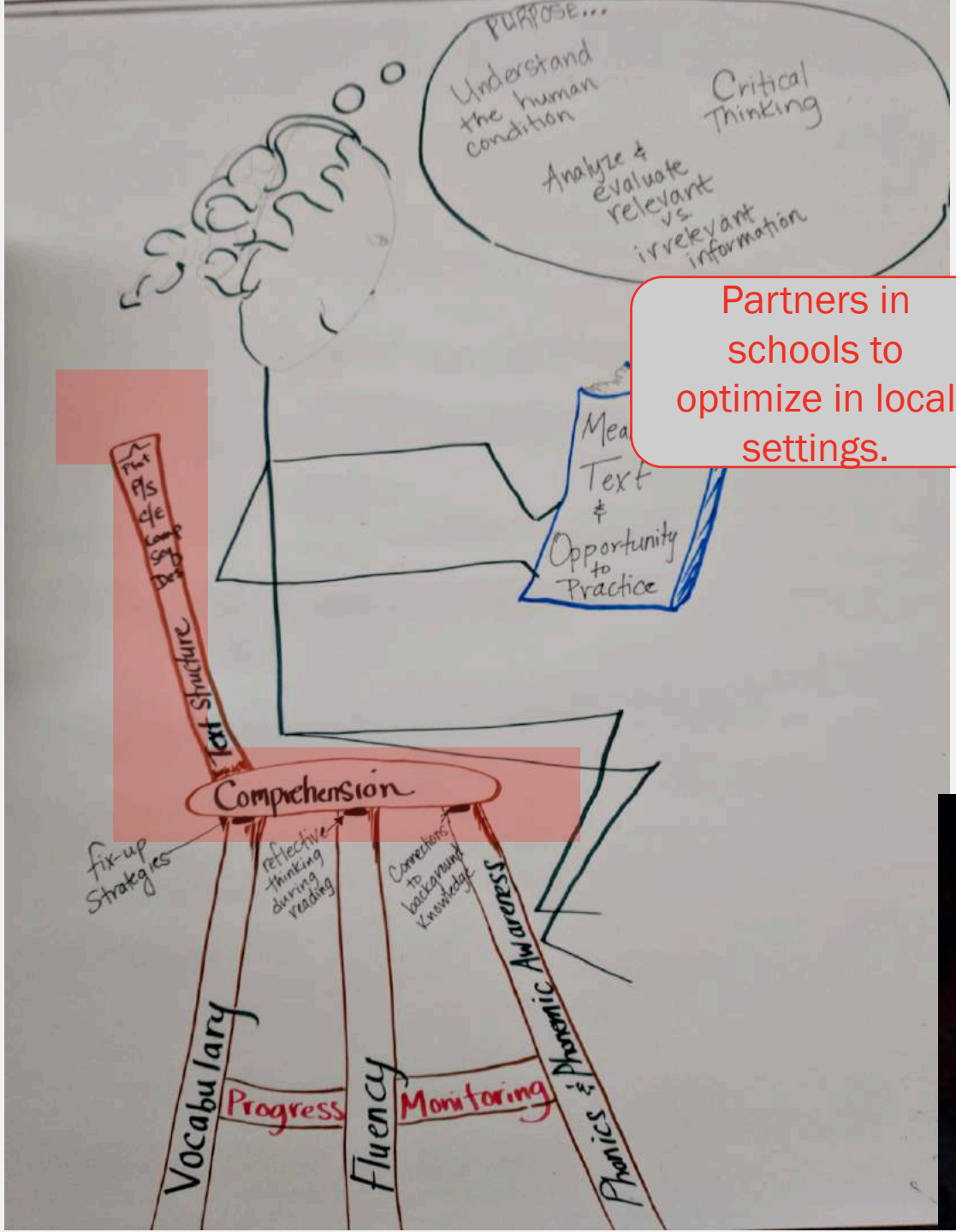
You can integrate other strategies and skills within strategic use of the text structure strategy.

It already has systematic procedures for finding main ideas, monitoring comprehension and self-regulation, self-questioning, making inferences related to text structure relationships, and encoding and retrieval strategies.

Why?

Everyone needs to be able to follow the logical structure of important texts.

Text Structure as Integral Component of Reading Comprehension Instruction



Partners in schools to optimize in local settings.

Jennifer Ireland, a "homegrown" Productive Partnership in schools

Bonnie J. F. Meyer

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