

Executive Functioning for Academic Success

<https://bit.ly/EF23TIE>



Dr. Kelli Nagel



BHSSC
Better Learning • Better Lives

Objectives

- Gain an understanding of executive function and skills
- Understand how executive functions are involved in reading, writing, math and social/emotional skills
- Understand the impact of executive function deficits (EFD) on academics and social/emotional skills
- Gain instructional techniques to address academic and social/emotional difficulties related to EFD



**Why do I need to know
about executive
functioning?**

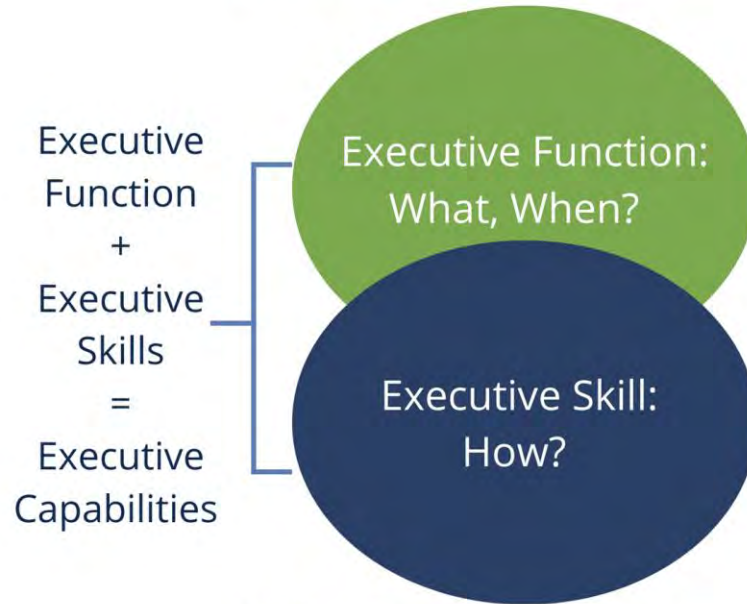
Executive functioning refers to anything that you do with your brain

- Reasoning
- Using language
- Problem-solving



Executive capacities are the brain's supervisory system

Management Structure within Holarchical Model of EF



Executive Functioning

- Executive function managers know **WHEN**
- Executive skill managers know **HOW**
 - **When** interventions are harder than **how** interventions
- Motivation energizes executive control
 - Under around age 14, motivation revolves around what you want them to do
 - At age 14 and over, motivation becomes what they want to do

Executive Functioning

- Executive functioning enables the brain to answer ***what*** and ***when***
 - Executive functioning managers signal executive skill managers in ***what to do*** and ***when to do it*** (e.g. knowing when to make a plan, knowing when to inhibit)



Metacognition Cycle



Executive Functioning and ADHD

- All individuals with ADHD have executive functioning deficits, but not all individuals with executive functioning deficits have ADHD
- Medication for ADHD generally only impact: Inhibit, Modulate, Focus/Select, Sustain
- Most individuals with ADHD will require additional interventions to assist with self-regulation difficulties that medicine doesn't impact

Executive Capacities in School

Learning and Producing

- Learning cannot be directly observed
- Referrals are generally made because of a lack of *production* not a lack of *learning*
 - The assumption is that a lack of production *is* a lack of learning
- In many instances, the lack of production is not a lack of learning, but rather a lack of knowing when or how to demonstrate what has been learned

Self-regulation Executive Function "Clusters"

Engagement



ENERGIZE
INITIATE
INHIBIT
STOP
PAUSE
FLEXIBLE
SHIFT

Attention



PERCEIVE
FOCUS
SUSTAIN

Solution



GENERATE
ASSOCIATE
PRIORITIZE
PLAN
ORGANIZE
DECIDE

Optimization



MONITOR
MODULATE
BALANCE
CORRECT

Memory



MANIPULATE
HOLD
STORE
RETRIEVE

Inquiry



ESTIMATE TIME
ANTICIPATE
GAUGE
ANALYZE
EVALUATE

Efficiency



SENSE TIME
PACE
SEQUENCE
USE ROUTINE

[HTTPS://BHSSCSPED.ORG/](https://bhsscsped.org/)



Executive Functioning and Reading

Executive Functioning and Reading



Executive functioning in learners with reading difficulties:

Decide: known or unknown word

Shift: apply decoding skills for unknown word

Monitor: use of decoding skills

Shift: back to making decision about the next word

Executive Functioning and Reading

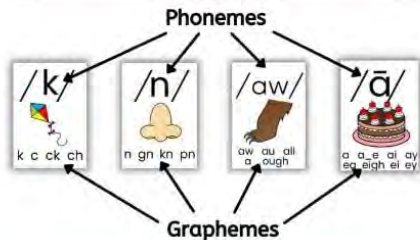
Common behaviors in students with poor executive control while reading

- Inconsistent application of learned decoding skills
- Inconsistent oral reading fluency measures
- Zoning out while reading (reading without comprehension)

Instructional Techniques for Reading Difficulties Related to Executive Function Deficits

WHAT IS A GRAPHEME?

The written representation of phonemes. English has around 250 graphemes.



www.thriveedservices.com

Orthographic Processing

- Some children require direct instruction to learn how to attend carefully to the graphemes that make up words

Orthographic Mapping

- The process of forming letter-sound connections in order to combine and recall the spelling, pronunciation, and meaning of words
- Enables the ability to identify words by sight (i.e. sight words) allowing instant recognition and fluency



Executive Functioning and Writing

Executive Functioning and Writing



- Writing requires learners to have all executive functions intact, as learners must be able to plan, set goals, and self-start
- Learners must be able to chunk or backwards plan to complete a writing assignment in a timely manner
- All learners, but particularly learners with executive functioning deficits, benefit from having a structured plan for writing assignments

Executive Functioning and Writing

Common Behaviors in Students with Poor Executive Control in Writing

- Difficulty generating ideas
- Trouble articulating ideas
- Problems putting their ideas onto paper
- Simple or minimized written output despite verbally responding to writing prompts
- Trouble initiating writing prompt
- Difficulty organizing work space
- Crumpled paper
- Tearing paper when writing or erasing



Executive Functioning and Writing

Common Behaviors in Students with Poor Executive Control in Writing

- Inappropriate pencil grasp
- Difficulty forming the letters to produce written text
- Difficulty with line and spatial awareness on their paper
- Slow writing speed
- Complaints of mechanics of writing (needs pencil sharpened, needs better eraser, uncomfortable seat)
- Written work does not answer the question or only partially answers the question despite verbally stating a full response
- Repeats self in written work (in an open-ended writing prompt)



Executive Functioning and Math

Executive Functioning and Math

- Strong executive functioning skills determine success in math
 - **Attention:** students can only solve problems if they can attend to them
 - **Working memory:** helps children keep information in their mind as they are doing a math problem
 - It is not an endless supply
 - Can be overloaded as math problems become longer, more involved, and procedurally complex

Executive Functioning and Math

Strong executive functioning skills determine success in math

- **Mental Flexibility:**
 - Conceptualizing multiple solutions and selecting the best course of action
 - Also requires the ability to reflect upon already completed work, determine if the answer appears correct, and take new actions to self-correct if necessary
- **Organizational Skills:** required for step-by-step series of calculations

Executive Functioning and Math

Strong executive
functioning skills
determine success in
math



Time Management/Planning:

- Necessary in studying and test preparation
- Necessary for completing math assignments in orderly, time-efficient manner

Self-Awareness:

- Necessary for students to explain their thinking
- Involves the ability to explain rationale to others
- Helps students understand their weaknesses in order to determine which areas they should study

Executive Functioning and Math

- Common behaviors in students with poor executive control when doing math
 - **Rushing through homework**
 - May not take time to look at assignment and think about what they are doing

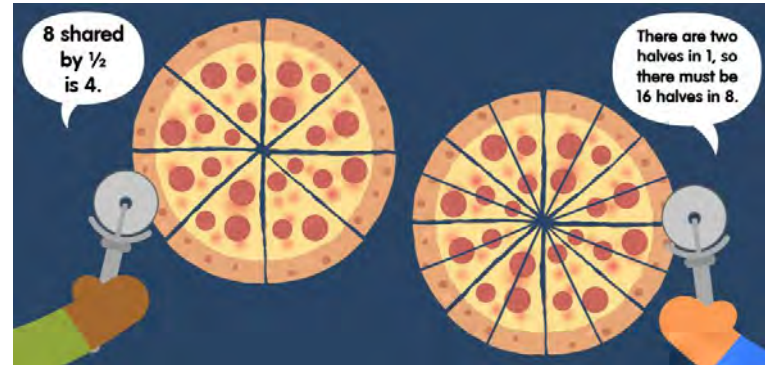


Example: A child might assume that the math homework involves addition because it did yesterday. In his rush to get started, he doesn't notice that in today's assignment, all of the problems have a minus sign, not a plus sign. So he ends up getting all of the answers wrong.

Executive Functioning and Math

Having trouble with new math rules

- May fixate on what they already know
- May have trouble stepping back and
- taking a look at using a new/different strategy



Example: When a child is learning fractions, he might insist that $\frac{1}{4}$ is bigger than $\frac{1}{2}$. He knows the rule that 4 is bigger than 2. But in this case, a bigger number as the denominator means that the fraction is smaller. He has to keep this in mind and use a new rule for deciding which is larger.

Executive Functioning and Math

Give automatic answers to math problems

- May get stuck on approaching equations a certain way

Example: A child has been practicing addition. He answers $3 + 3$ with the number 6. Then he sees $3 - 3$ and writes down 6 for that one, too. It's not that he doesn't know how to do subtraction. But when he sees 3 and 3, he has trouble overriding his tendency to answer based on the first thing that comes to mind.

Executive Functioning and Math

- **Getting lost in the middle of complex math problems**
 - Struggles with working memory and organization

Example: When doing long division, a child forgets that he needs to bring down the remainder after subtracting. He can't remember what to do next and gives up, or comes up with a wrong answer.

They may struggle with organization and scribble information across the paper in a disorganized way, and that can make it hard to move from one step to another with the correct information.

Executive Functioning and Math

- **Not catching mistakes**
 - May not realize an answer doesn't make sense

Example: A child with executive functioning issues finishes his math test early. But he doesn't go back and check his work, even though he has time. He's so confident that he did everything right that he sees no need for a second look.



Executive Functioning and Social & Emotional

Executive Functioning and Social and Emotional

Theory of Mindblindness:

- Understanding that people have thoughts and feelings different from their own.
- Understanding that their behavior can impact the way other people think and feel.



Mind Camera



Thinking about what other people are thinking

Example: If you have a camera when you are looking at other people, other people have a camera also looking back at you. What feelings do you get when you see other people do certain things? What thoughts and feeling are you giving other people when you do certain things? Is this behavior giving people good thought and feelings or weird/uncomfortable thoughts and feeling?"

Social Interaction Instruction

Teaching students how to:

- Ask for help
- Listen to others
- How to handle conflict
- When to interject in a conversation
- Make an appointment
- Interact with others in different situations
- Know what is appropriate to talk about in some situations and not in others



Self-regulation strategies

Effective use of Self-instruction/Self Talk

- What steps are needed to complete this task
- Talking through different procedures throughout the day

Self-Reinforcement

- What is going to reinforce me to want to continue to do a non-preferred and preferred activity?

Self-regulation strategies

GOAL WORKSHEET

DATE: _____

GOAL:

WHY?

STEPS TO TAKE

- _____
- _____
- _____
- _____

NOTES

Goal-setting

- What do I need to do today?
- Do I have something I want to change and improve?

MY SELF MONITORING

Read each statement below. Place a check mark in the box that best match your behavior in the classroom.

	Always	Sometimes	Never
I follow directions.			
I do my best work.			
I cooperate with others.			
I am polite and respectful to others.			
I complete my work on time.			
I listen to the teacher.			
I raise my hand before I answer questions.			
I participate in class discussions.			
I keep my hands and feet to myself.			

Self-monitoring

- Checking in with self about how you are doing with your responsibilities and how you are feeling

Self-regulation strategies

Strategies focused on regulating self



- Consciously attend to breathing-relaxing
- Exercise
- Movement
- Awareness of body sensations
- Attending to care for my body-- nutrition, hydration, and self-care
- Meditation & Prayer
- Go inside with intentional nurturing of self
- Self expression --art, music, dance, writing, etc
- Caring, nurturing self-talk
- Laughing - telling jokes
- Positive self-talk "I can" "I'm sufficient" messages



Instructional Techniques for Executive Skill Deficits

Instructional Strategies

- Break tasks and assignments into chunks
- Teach problem solving to automaticity and provide cues
- Break projects into manageable portions with multiple points for evaluation and feedback
- Minimize amount of information students must hold in working memory
- Use visual, verbal, and physical cues to remind students to use what they know
- Provide instruction in small groups
- Teach students how to take notes
- Teach students how to plan and organize

Compensation and Environmental Strategies

Compensation Strategies

- Notes and self-cueing
- Timer to estimate work time
- Use of planner
- Highlighters to organize priority information with color coding
- Uses voicemail, text messaging or other technology as reminders

Environmental Strategies

- Display strategies and tools on walls
- Organize environment to cue students
- Using visuals that provoke learners to think strategically and exert control over their learning

Instructional Techniques for Reading

The image shows a green-bordered worksheet titled "GOAL WORKSHEET". It has a "DATE:" field with a blank line. Below that is a "GOAL:" section with a large white box. Underneath is a "WHY:" section with a white box. The "STEPS TO TAKE" section contains three bullet points followed by three horizontal lines. The "NOTES" section at the bottom has four horizontal lines.

Strategy Reflection Sheet/Card

- Promoted with incentives for completion
- Include sheet in the grade for the assignment
- Set aside time daily/weekly for strategy share-outs for peers to learn from each other
- Students should personalize strategies for effectiveness

Goal-setting

- Help students to set attainable goals that are well-defined and “doable”
- Teach students to break goals down into smaller steps to identify obstacles to meet these goals and identify ways of overcoming these obstacles

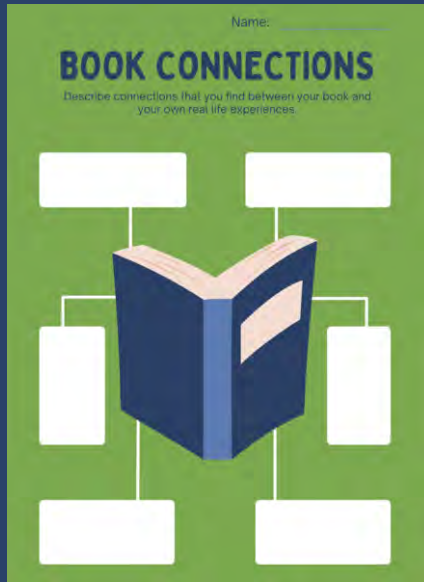
Instructional Techniques for Reading

Shifting/Thinking Flexibly

- Implement 5-minute warm-ups (e.g. jokes, riddles, and puns)
- When reading for meaning, writing summaries, or taking notes, teach students to shift flexibly between “big ideas” and key details
- Teach students to use graphic organizers and three-column note-taking systems
 - Helps them make explicit connections between main ideas and supporting details and to shift fluidly between the two
 - The third column is used to document a strategy for memorizing the information
 - Students can jot down a crazy phrase or mnemonic, or they can draw a cartoon or simple picture to visualize the correct answer

Instructional Techniques for Reading

Prioritizing and Organizing Information/Ideas



To avoid last minute panic, teach students to “divide and conquer” upcoming assignments and projects by:

- Planning to complete larger assignments in steps
- Teaching how to use outlines, graphic organizers, or webs to organize information before writing, summarizing, or mapping out multi-step projects
- Teaching students to use three-column notes when reading or studying

Instructional Techniques for Reading

Accessing Working Memory

- Teach students to create silly sentences, acronyms, or cartoons to remember information so they do not need to hold and juggle information in their minds constantly
- Encourage students to create songs, stories, and acronyms to remember the steps involved in completing and checking written papers

Preview, predict
Read/reread
Identify key idea
Do the question
Evidence underlined

Instructional Techniques for Reading



Self-Monitoring/Self-Checking

- Teach students to develop personalized strategies and checklists for correcting their most common mistakes before handing in their tests
- Require students to check and edit their homework and tests before submitting them
- Require students to develop personalized self-checking cards and mnemonics to help them remember the core ideas in texts they read

Instructional Techniques for Reading

- Practicing the complete act of reading is the most effective intervention
- Rehearsal with Feedback
 - Reading connected text while receiving feedback from an external source





Writing

Instructional Techniques for Writing Difficulties Related to Executive Function Deficits

Opinion Writing

Which season is the best: Summer, Winter, Autumn or Spring?
Give 3 reasons for your opinion and sum it up in the conclusion.



Reason 1

Reason 2

Reason 3

Conclusion

- Executive functioning skills and writing go hand in hand
- The steps of writing, including pre-writing, need to be directly taught through direct instruction, modeling, and independent practice
- Many students with executive functioning deficits do not feel they have enough information to self-start when told to “write a paragraph”

Instructional Techniques for Writing

The image shows a vertical writing template titled "Explanation Writing" in a green box at the top. Below the title are four rounded rectangular boxes, each with a label on the left side: "Title:", "Introduction:", "Description:", and "Conclusion:". The boxes are empty, intended for student input.

- Pre-writing is an essential part of writing
- Thesis sentences lay out the road map of writing
- Teachers need to coach students through the process
 - Set goals once an outline is complete

Writing Process

Preview the writing prompt and determine the task, audience, and purpose (TAP)

Conduct research

Take notes in a graphic organizer

Determine a thesis statement

Draft an outline (using a structured [template](#))

Write a first draft

Ask for feedback

Revise

Self-reflect

Executive Functions

Planning, activation, cognitive flexibility, prioritizing, and working memory

Organization of thoughts, sequential thinking, planning and activation

Sequential thinking, organization of thoughts, and prioritizing

Organization of thoughts and prioritizing

Sequential thinking, organization of thoughts, self-regulation, working memory, planning and activation

Planning, activation, organization of thoughts, working memory, prioritizing and self-regulation

Planning, activation and cognitive flexibility

Sequential thinking, planning and activation

Cognitive flexibility and organization of thoughts

Instructional Techniques for Writing

Teachers need to coach students through the process

- The physical act of writing or typing can create difficulty, so allow students to dictate their thoughts
 - Provides visual support to writing
 - Hearing their work helps students edit/revise work
 - COPS
 - Refer students back to a rubric, directions, and an example

COPS

C - Capitalization

- All sentences begin with a capital letter.
- All proper nouns begin with a capital letter.

O - Organization

- My writing makes sense.
- My words and sentences are in the correct order.

P - Punctuation

- I used the proper punctuation at the end of each sentence.
- I used commas and apostrophes correctly.
- All abbreviations have a period.

S - Spelling

- I used different strategies to spell my words correctly.
- I used the Word Wall for No Excuse Words.





Writing Rubric



Picture has lots of color and details. Picture tells a story.



No Color
No Details

NEEDS IMPROVEMENT



Some Color
Some Details

STILL DEVELOPING



Many Colors
Many Details

DEVELOPED

One sunny day
I played outside
all day. I pretended
a tree was my castle.
It was fun!

Story uses describing words. Story has details.



No letters

NEEDS IMPROVEMENT



Letter Strings
Random Words
Some Labels

STILL DEVELOPING



Looks Like Sentences
Uses Word Wall Words
Use Details

DEVELOPED

Middle School Argumentative Writing Rubric

Element	Needs Improvement 1	Fair 2	Strong 3	Excellent 4
Clear Claim with Reasons	Claim is unclear. No clear reasons are given.	Claim is clear, but the reasons are unclear, absent, or incomplete.	Claim and reasons are clearly stated	Claim is clearly stated and the reasons are strong.
Evidence	Central claim is not supported. No evidence provided.	Attempts to support the central claim and reasons with facts, but information is unclear, inaccurate, or lacks citations.	Supports the central claim and reasons with facts, necessary details, and citations.	Supports the central claim and reasons with strong facts, thorough details, and accurate citations.
Explanation	Contains little to no explanation or analysis of the information presented.	Attempts to explain and analyze the information, but the explanation is unclear or inaccurate.	Clearly explains and analyzes most of the information presented.	Clearly, concisely, and thoroughly explains and analyzes the information presented.
Conclusion	Abrupt or absent ending. No concluding statement.	Ends with a concluding statement that does not clearly relate to the central claim.	Ends with a concluding statement about the central claim.	Ends with a strong or compelling concluding statement that clearly relates to the central claim. –
Formal Tone and Style	Informal language present throughout.	Writing contains some informal elements (e.g., contractions).	Writing attempts to maintain a formal and objective tone.	Writing maintains a formal and objective tone throughout.
Organization & Transitions	Little to no attempt at organization.	Attempts to organize ideas, but transitional language is needed.	Organizes ideas in a logical way. Transitional language used.	Strong organization and transitional language used skillfully throughout.
Mechanics (Spelling & Grammar)	Distracting mechanical errors throughout.	Mechanical errors distract at times.	A few errors present, but they do not distract.	Mechanics reflect careful editing.

Brainstorming Tools

MindMeister



Popplet





Math

Instructional Techniques for Math Difficulties Related to Executive Function Deficits

Attention:


- Provide clear instructions in multiple formats (i.e. written, orally, and with visual supports & models if possible).
 - Keep the written directions with visual supports posted during the activity or provide students with a copy of the directions to reference
- Provide a list of guiding questions to help students determine which pieces of information in the problem are important
 - This is particularly important for word problems
 - Encourage students to highlight or annotate important pieces of information within the problem

Instructional Techniques for Math

ADDITION & SUBTRACTION

WORD PROBLEMS NAME: _____
CLASS: _____

Solve the following addition and subtraction word problems. Show all your working out.


 To get to work, Jeremy walks for 9 minutes and then takes a 17 minute train ride. How long does the whole trip take?

SCRIBBLE SPACE

Kaia had 28 lollies and her friend Patrick had 15. How many more lollies did Kaia have than Patrick?

 In a class there are 32 students. 8 children walk to school and 11 come by bus. The rest arrive by car. How many students come to school by car?

Pratvi saved \$38 in April, \$46 in May & \$60 in June. She then spent \$37 on a new jumper. How much money does Pratvi have left over?



Attention (cont'd):

- Have students in the class model their thinking when selecting which pieces of information are important to attend to
- According to Dr. Mark Mahone, director of the Department of Neuropsychology at Kennedy Krieger Institute, "Emotion is the gatekeeper to attention."
- Help students make personal connections with math problem solving
- These connections can be made by linking problem scenarios familiar to your students, utilizing student generated data sets, or providing manipulatives and physical representations

Instructional Techniques for Math

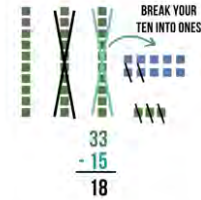
Working Memory:

- Encouraging students to reference their notes
 - This takes a load off of working memory because students do not have to hold procedures for solving problems in their mind
- Modeling methods for highlighting and annotating problems so that less information needs to be remembered at once

SUBTRACTION with regrouping

CHOOSE A STRATEGY THEN SOLVE THE EQUATIONS ON THE NEXT PAGE.

BASE 10 DRAWINGS



TRADITIONAL

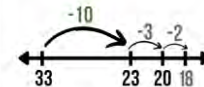
$$\begin{array}{r} 2 \ 13 \\ 33 \\ -15 \\ \hline 18 \end{array}$$

MORE ON THE FLOOR? GO NEXT DOOR AND GET 10 MORE!

ZERO ZAPPER

$$\begin{array}{r} 30 - 16 \\ 30 - 1 = 29 \\ 16 - 1 = 15 \\ \hline 14 \end{array}$$

NUMBER LINE



Instructional Techniques for Math

Multiplication Table

×	1	2	3	4	5	6	7	8	9	10	11	12
1	1	2	3	4	5	6	7	8	9	10	11	12
2	2	4	6	8	10	12	14	16	18	20	22	24
3	3	6	9	12	15	18	21	24	27	30	33	36
4	4	8	12	16	20	24	28	32	36	40	44	46
5	5	10	15	20	25	30	35	40	45	50	55	60
6	6	12	18	24	30	36	42	48	54	60	66	72
7	7	14	21	28	35	42	49	56	63	70	77	84
8	8	16	24	32	40	48	56	64	72	80	88	96
9	9	18	27	36	45	54	63	72	81	90	99	108
10	10	20	30	40	50	60	70	80	90	100	110	120
11	11	22	33	44	55	66	77	88	99	110	121	132
12	12	24	36	46	60	72	84	96	108	120	132	144

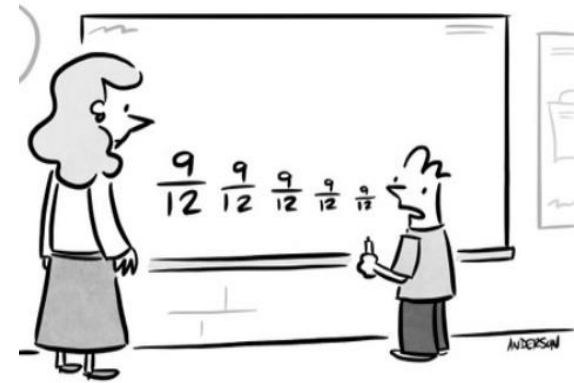
Working Memory (cont'd):

- Scaffold with procedural or task lists, vocabulary sheets of commonly used terms to avoid over-taxing working memory
- For students lacking automaticity with math facts, consider the use of a calculator or multiplication table for higher-order problems so that they are still able to practice problem solving

Instructional Techniques for Math

Mental Flexibility:

- Can learn this skill through mental modeling:
 - Problem solvers think aloud as they go through the steps of a problem and engage in dialogue with others or themselves as they do so
- Co-Teaching pairs can be especially successful with this type of activity
 - One teacher can work through the problem while the other models the types of internal questioning that might occur



"If I reduce it anymore you won't be able to read it."

Instructional Techniques for Math

Mental Flexibility (cont'd):

- Brainstorming problem solving options with groups of students
 - Having students discuss which option is the best fit
- Talking through problems in which an answer was incorrect to make the process of problem solving visible to students



SUBTRACTION with regrouping
CHOOSE A STRATEGY THEN SOLVE THE EQUATIONS ON THE NEXT PAGE.

BASE 10 DRAWINGS <p>BREAK YOUR TEN INTO ONES</p> $\begin{array}{r} 33 \\ -15 \\ \hline 18 \end{array}$	TRADITIONAL $\begin{array}{r} 2 \ 13 \\ 33 \\ -15 \\ \hline 18 \end{array}$ <p>MORE ON THE FLOOR? GO NEXT DOOR AND GET 10 MORE!</p>
ZERO ZAPPER $\begin{array}{r} 30-16 \\ 30-1=29 \\ 16-1=15 \\ \hline 14 \end{array}$	NUMBER LINE <p>$33 \xrightarrow{-10} 23 \xrightarrow{-3} 20 \xrightarrow{-2} 18$</p>

Instructional Techniques for Math Difficulties

Automaticity and Executive Function

- The Automatic Information Processing Theory posits that we only have a certain amount of cognitive capacity at one time.
 - Completing math work relies heavily on working memory
 - If students are not fluent with math facts (still counting on fingers, using a number line), they do not have any additional “cognitive space” to complete any higher-order thinking or problems
 - If students work to build their fluency, they may be better able to devote some of their cognitive load to executive functioning skills



Tools for the Classroom to Support Executive Functioning

- Timer
- Class Calendar
- Student Day Planner
- Color-Coded Workbooks
- Highlighter



- Class Master Binder
- Supply Storage Caddy
- Graphic Organizers
- Large Laminated Folder
- Checklists







Questions/Comments

Executive Functioning for Academic Success

Session Evaluation #1752

August 1, 2023 1:30 - 2:45 p.m.



Executive Functioning for Academic Success

Session Evaluation #1765

August 1, 2023 3:00 - 4:15 p.m.



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