Strengthening Executive Functioning Skills in the Classroom
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Group Norms
Place yourself as a learner
Ask questions as they come up!
Think outside the box
Take care of your needs

Objectives
Understand current research for Executive Functioning Skills;
Identify how to strengthen these skills in General Ed/Special Ed classrooms;
Experience what it “feels like” to have little use of executive functioning skills.

Research: Executive Functioning Skills
21st century learning & student success have been revealed through neuroscience that there is a critical role needed for planning, time management & strategic thinking.
Georgia Bozeday, EdD

What are Executive Functions?
Executive function is an umbrella term for the mental processes that serve a supervisory role in thinking and behavior. It incorporates a number of neurologically based operations that work together to direct and coordinate our efforts to achieve a goal.

(Cooper-Kahn and Foster 2013)

What are Executive Functions?
Organizational processes
Awareness of strengths and weaknesses
Time management activities
Problem solving
Application to social setting
Focusing and maintaining attention
Goal directed behaviors, including initiating behaviors

Executive Function
Educational Implications

Foundational Skills
Goal setting
Managing time
Self-awareness
Organizing materials
Planning
Initiating/Inhibiting

Brain Development
Maturation occurs from back-to-front of the brain.
Brain Development

The brain has the amazing ability to change and improve itself. Peak brain development times occur in the early years (0-3), and again between the ages of twelve and twenty-four. We know that humans also have the ability to continue to improve brain function throughout life. The part of the brain that is key to reasoning, problem solving, comprehension, impulse-control, creativity and perseverance is the prefrontal cortex.

Brain Development

A well-developed prefrontal cortex with strong Executive Functions can improve both academic and life outcomes. Very little sweat need be associated with “exercising” our prefrontal cortex. What it takes is intentional use and practice of the Executive Functions. The fun part is that the workout is most effective when you feel socially supported, happy, relaxed and are physically fit.

10 Exercises for Your Prefrontal Cortex

Put on your rose colored glasses. Create a positive future story; optimism is associated with rising levels of dopamine which engages the brain.

Follow a sleep routine. At the end of the day, choose a pleasant activity that brings your day to a peaceful end.

Deny the drama and avoid getting caught up in gossip. Drama fires up the amygdala that gets the prefrontal cortex off its game.

10 Exercises for Your Prefrontal Cortex

Create silly sentences, acronyms and cartoons to help remember things. These skills call on the prefrontal cortex and Executive Functions to access working memory. Integrating jokes, riddles and puns you can also learn to think flexibly by shifting between different meanings and associations of words.

Play! Make-belief play, in particular strengthens Executive Functions. Frontal lobes are central in executive functioning. Processes depend on many different brain regions that interconnect. Problems within a connection or region can lead to difficulties with executive functions.

The Brain and Executive Function

“It is the natural unfolding of brain development, in combination with instruction and opportunities for practice that leads to the behaviors we know collectively as executive functioning.”
Executive Function Development

Begins in infancy and continues through adulthood.

**Preschool to Early Elementary years**

Developmental emphasis is placed on self-regulation and visual analysis.
(Planning and organizing, goal setting, initiating and inhibiting behavior, and decision making/problem solving are already present)

**Sequence of Development**

Later Elementary through Adolescence
Developmental emphasis placed on complex planning, attention control, processing and verbal fluency.
(Planning, goal setting, and time management are now more sophisticatedly developing)

**Sequence of Development**

Later Adolescence
Strategic thinking skills related to self-monitoring and self-evaluation increasingly develop.

**Sequence of Development**

Entering Adulthood
More developmental emphasis on strategic problem solving and decision making.

Research

Executive Functioning & Sesame Street

**London International Conference on Education**

Study involved a new curriculum that features Cookie Monster and is designed to teach preschoolers these skills!

- Self-control
- Working memory
- Switching gears between activities

“Me Want Research-But Me Wait”

**Deborah Linebarger – Iowa 59 children**

Preschoolers who viewed the Cookie Monster video were able to wait for minutes longer than their peers who watched an un-related Sesame Street video.
They were also better able to control the impulse to shout out character names & to remember and repeat back.

**Executive Functions: Preschool**

Competency in EF is ranked by Kindergarten teachers most important for school readiness.
Competency in EF more strongly correlates with reading and proficiency than IQ.
Ability to use working memory and inhibit unfocused behavior predicts math and reading readiness for elementary school.
Mastery of executive functions is a better predictor of school success than IQ. Poor performance in executive functions is associated with high dropout rates, drug use, and crime. Self-regulation skills predict development across all domains, emotional and academic.

Executive Functioning
Everyone uses executive function skills:
- Solve problems
- Evaluate decisions
Thinking processes that allow students to:
- Plan, organize, make decisions, pay attention and regulate behavior.

Activity

Organization Ideas
Children & Executive Functioning Skills

Backpack organization
Explicit instruction with planning tools
Homework, projects, calendars
Provide examples when learning breaks down
Observe cues
Behavior redirection

(AMANDA MORIN, UNDERSTOOD: FOR LEARNING & ATTENTION ISSUES)

How can you help?

Travel

Organization helps when traveling.
Your team has one minute to list 20 reasons why it helps!

Technology & Executive Functioning Skills

Notepads on phones can help information stay organized
Apps such as Evernote keep information in one spot, A-Note has a section for simple note-taking as well as calendars that can sync with calendars in email accounts.

° Calendars on Smartphones help to ensure your child stays organized.
° Apps such as Wunderlist and Remember the Milk are created to send reminders about upcoming events.

(AMANDA MORIN, UNDERSTOOD: FOR LEARNING & ATTENTION ISSUES)

4 Smart-Phone Solutions

What do you use your cell phone for?
Write top 3 things on separate post-it notes & then post it in applicable areas on chart paper throughout the room

Examining Executive Functioning Skills of Automaticity & Interdependence

Scaffolding for understanding, planning and coordinating the use of learning strategies
Independent Learning

How do you promote independent learning in your students?

Key Elements of Independent Learning

The key is a shift of responsibility for the learning process from the teacher to the student.

Students should acquire an understanding of their learning, being motivated to learn and collaborating with teachers to structure their learning environment.

Independent learning does not merely involve students working alone; teachers have a key part to play in enabling and supporting independent learning (such as structuring of group work).

(Bill Meyer, Naomi Haywood, Darshan Sachdev and Sally Farada, 2008)

The Four-Quadrant Model of Facilitated Learning

Quadrant 1

Task specific, highly directive strategies
Helps students experience guided success after failure
Lower-order questioning about knowledge/understanding

Examples:
Deliberate calendar or planner use
Showing how to put items into or organize a backpack
Modeling process of going to cafeteria, lining up, etc.

Quadrant 2

Indirect facilitator-initiated strategies
Designed to bring students to next level of independence
Higher-order questioning (application, analysis, evaluation and creation)

Examples are guided by external teacher prompts:
“What will you need to do with your planner now that you have your assignment?”
“We have ten minutes before the bell rings, what do you need to put in your backpack for tonight?”
“Before we leave the classroom right now, explain the steps we’ll take to get there and what we do after we’re done eating?”

Quadrant 3

Direct Learner-Initiated Strategies
Prompting turns to strategies that rehearse learned procedures
Early forms of self-regulation are:
Learner-initiated self-prompting
Examples are when a student is able to self-regulate without prompting:

- Procedural (steps)
- Outcome-focused (goal)
- Strategy based (tactics)

  Mnemonic devices/visual reminders

**Quadrant 4**

Indirect Learner-Initiated Strategies

**Think of a student in your class!**

**Where do they fall on the quadrant?**

**Think of a student in your class!**

**What level can you visualize next month for them?**

Problems of Practice & Executive Functioning Disorders

Lost Instructional Time

**Students have a hard time starting the day?**

Simply telling them, does that work?

**Try this!**

- Walk student through expected routine without other students around
- Re-teach expectations as a whole group every-day for a few days depending on age
- Positive reinforcement chart for those who need it

**Build Working Memory**

Some types are limited and decay rapidly

- Sensory memory
- Short-term memory

(http://dyslexiahelp.umich.edu/)

To properly encode a memory, the first step is to pay attention. It is impossible to pay attention to everything so most of what is encountered every day is simply filtered out, and only a few stimuli pass into conscious awareness.

What scientists aren't sure about is whether stimuli are screened out during the sensory input stage or only after the brain processes its significance.

What we do know is that paying attention to information may be the most important factor in how much of it is actually remembered.

Important information is gradually transferred from short-term memory into long-term memory.

The more the information is repeated or used, the more likely it is to eventually end up in long-term memory, or to be "retained." (That's why studying helps people perform better on tests.)

Long-term memory can store unlimited amounts of information indefinitely.

When students need to remember a series of steps or events, it may be
helpful for them to:
- draw diagrams
- flow charts of the steps/events.
Paired associations as well as most other information is remembered better when it is rehearsed using multiple sensory modalities.

Basic math facts a problem?
- Walk a number line as they say the math facts.

Many students are great with videogames! How to help retain basic skills?
- "Reading Blaster"
- "Math Blaster"
- "Academic Skills"

**Importance of Steps**

Use procedural texts to show examples of steps

**Cookbooks**

- Have students create compositions of “How-To” do something

**Tinker Toy Activity**

**Inferring**

Little evidence
No evidence
Irrelevant evidence

How does the inferring skill happen?
When do you think kids are able to infer?
The ability to infer reality status from evidence develops incrementally between ages 4 and 6.
Children perform better when their evaluation is free from bias.

(Tullos & Wolley 2011)

**Flexible Thinking**

What’s a fixed mind-set?
Perspective Taking

**Balloon Group Activity**

**How do I get them to pay attention?**

When children’s brains perceive threat (punishment or embarrassment in front of classmates for not doing homework, fear that they will be picked last for a kickball game, or anxiety that they will make an obvious error because they are not fluent in English)

(Judy Willis, psychology today)

**Draw It! Activity**

Flight, fight or freeze is perceived & is relevant to the threat.
Unless the perception of threat is reduced, the brain persists in doing its primary job—protecting the human or animal from harm.
The neural activity on scans during fear, sadness, anger or other stressful emotions is evident in the lower brain. In this stressed state "attention" is not under our control and the brain activity on scans drops way down
in the prefrontal cortex. That higher, reflective, cognitive region of the brain does not receive the sensory input determined irrelevant to survival. The day's lesson does fall on deaf ears.

**Children Are Paying Attention, Just Not to the Boring Things in Class**

Getting into the brain is like getting into an exclusive nightclub where only the glamorous few are selected. Once inside, another gatekeeper, stress, determines what makes the cut to enter the upper VIP lounge in the prefrontal cortex—that valuable 13% of cerebral architecture where our highest cognition and emotional reflection takes place.

**Nine Apps and Tools That Build Better Working Memory**

1. **ELEVATE** (*iOS and Android*) — an app that personalizes a training regimen for each user, depending on his or her goals. The user can play 30-plus games that boost memory skills, focus, and processing speed. The games are designed in collaboration with experts in neuroscience and cognitive learning.

2. **FLASHCARDS+** (*iOS*) — an engaging and fast-paced app to bolster the studying process and exercise working memory. Users can choose subjects and categories from a user-curated bank of topics or create their own flashcards. The app also allows you to track your results and your speed.

3. **STACKING** (*PC*) — a puzzle video game that requires players to use working-memory skills. You start as a small stacking doll and you must “stack” into larger dolls of the same variety to solve the puzzle. Players must recall where they discovered those dolls in each level.

4. **BRAIN AGE** (*Nintendo 3DS*) — a fun set of games and exercises to challenge the brain. There are three different versions of the game, all of which challenge working-memory skills, using math and logic activities. In “Head Count,” a player sees a house in which stick figures enter from the left and exit from the right. The task is to count the people as they move in and out, figuring out how many people are in the house at the end of the game.

5. **SUDOKU** (*Android, iOS, Nintendo 3DS, and online*) — a popular game, available as an app, on consoles, and online that requires players to make informed choices, trying different combinations of numbers to narrow down the possible answers. Players have to retain information as they continue solving the puzzle.
6. SIMON SAYS CLASSIC AND EXTREME (iOS) — a video game with working memory exercises that require players to memorize an ever-increasing sequence of colors and sounds. It can be played in a four-color mode, or the more challenging nine-color mode.

Eight Apps and Tools That Build Better Working Memory

7. DUAL N-BACK GAME (iOS and Android) — A classic working-memory training app with solid research to back up the benefits. In general, N-Back tasks present an ongoing sequence of stimuli (in this case, pictures), and the player’s job is to indicate when the picture he sees matches a picture that was seen “n” steps earlier in the sequence. One study suggests that playing N-Back games can result in long-term working-memory improvement.

Eight Apps and Tools That Build Better Working Memory

8. MEMORY BIRDS N-BACK GAME (iOS and Android) — a fun memory-based video game directed at younger kids that exercises visual-spatial working memory. Players are given a sequence of birds to remember and then asked to recall a step in that sequence. As questions are answered, the sequence gets longer. When a player answers all of the questions correctly, he earns stars.

Technology and Executive Functioning Skills

Executive Functioning Deficits & Adults

Take out your electronics!
Follow these directions:
Go to www.bsocrative.com
Login as a student to room # r5CDiSeqp
Answer all of the questions
Wait for next instructions

Technology and EFS

Try out these sites!
B.socrative.com
  Free site that lets you create quizzes and exit tickets
Educannon.com
  Use Video to Differentiate & Engage
  Promote Self-Paced Learning with Pause & Rewind
  Prevent Skipping Content Not Yet Watched
Purposegames.com
  Free site that has games with a purpose by content area

Assistive Technology & EFS

Visual Schedules for planning
Checklists
Self-Monitoring
Working Memory
We don’t want kids to become dependent on us either.

Key Elements of Independent Learning
The key is a shift of responsibility for the learning process from the teacher to the student. Students should acquire an understanding of their learning, being motivated to learn and collaborating with teachers to structure their learning environment. Independent learning does not merely involve students working alone; teachers have a key part to play in enabling and supporting independent learning (such as structuring of group work).

(Bill Meyer, Naomi Haywood, Darshan Sachdev and Sally Farada 2008)

**Impulse Control and Executive Functioning Skills**

**Impulse and Emotional Control**
What can we learn from **marshmallows**!
Students struggled to wait for 15 minutes

**Support for Impulses**
Provide external structure.
Offer support (like visual cues) to help with the “stop” function.
Plan in advance to prevent loss of control.
Ensure safety! If physical harm may occur, forget teaching!

**Irritating Behavior**
Provide external structures by teaching the rules that can be applied at various situations.

“It’s rude to grab things off a serving plate. If you want a cookie, ask someone to pass the plate and you can gently take one.”

**Curriculum Content and Executive Functions**
As with all new approaches, students may need guided practice when using these alternatives in place of traditional note-taking, particularly when the information includes important content knowledge and critical foundational information.

Models,
Frequent formative assessment,
and guiding feedback.

(Willis 2012)

Should benefit from minimal explicit teaching
RTI... 80 percent should not need the one-on-one.
Promote memory and executive function across the curriculum, such as fractions, patterns in science cycles, or historical and literature time/event progressions.
Creating art, instrumental music, dance moves or skits can be strong strategies to teach with engagement.

(Willis, 2012)

Making diagrams, mind maps and other symbolic representations will focus active listening and the greater likelihood of memory links.

(Willis 2012)

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