

**EXECUTIVE FUNCTIONING:
THEORY INTO APPLICATION
SEVEN STRATEGIES TO TEACH
EXECUTIVE FUNCTIONING SKILLS:
PART 1**

**Washington State Association of School Psychologists
Laurie Harrison, Ph.D.
Snohomish School District**

VARIABLES THAT IMPACT STUDENT SUCCESS: EVOLUTION

- Over millions of years our brains have evolved to address the basic needs for survival.
 - Food
 - Shelter
 - Access to Mates
 - Children who survive
- Our ancestors were very effective at these, how do we know? We exist today.



EVOLUTION

- Over time human beings developed the ability to engage in cooperation, most moving out of the Hunters and Gathers phase to building immense civilizations.
- We developed and reinforced our ability to:
 - Verbally communicate
 - Engage in higher level reasoning skills
- The stronger our abilities in thinking and communication, the better we did.
- Males and Females brains evolved differently, complimenting each other and strengthening our ability to survive and evolve.



SCIENTISTS GENERALLY STUDY FOUR PRIMARY AREAS OF DIFFERENCE IN MALE AND FEMALE BRAINS:

- Processing
- Chemistry
- Structure
- Activity

The differences between male and female brains in these areas show up all over the world



VARIABLES THAT IMPACT STUDENT SUCCESS: GENDER DIFFERENCES

- These four, natural design differences listed above are just a sample of how males and females think differently. Scientists have discovered approximately 100 gender differences in the brain, and the importance of these differences cannot be overstated. Understanding gender differences from a neurological perspective not only opens the door to greater appreciation of the different genders, it also calls into question how we parent, educate, and support our children from a young age.



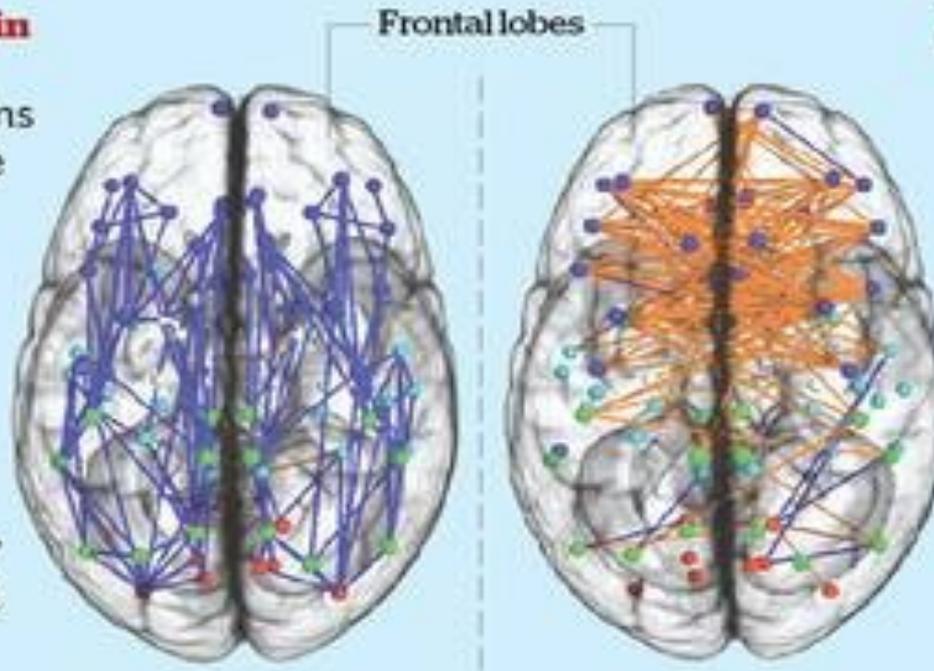
VARIABLES THAT IMPACT STUDENT SUCCESS: GENDER DIFFERENCES

The male and female brain

A new way of showing the connectivity of the brain – called “connectome” maps – reveals significant differences between men and women

Typical male brain (top view)

Most connections run between the front and back parts of the same brain hemisphere, which could account for the better spatial skills and motor (muscle) control in men



Typical female brain (top view)

Many more neural connections go from side to side across the left and right hemispheres of the brain. Scientists say this could account for women's better verbal skills and intuitive abilities

GENDER DIFFERENCES: PROCESSING

Researchers, using brain imaging technology that captures blood flow to "working" parts of the brain, analyzed how men and women process language. All subjects listened to a novel. When males listened, only the left hemisphere of their brains was activated. The brains of female subjects, however, showed activity on both the left and right hemispheres.

This activity across both hemispheres of the brain may result in the strong language skills typically displayed by females. "If there's more area dedicated to a set of skills, it follows that the skills will be more refined," says David Geary, Ph.D.

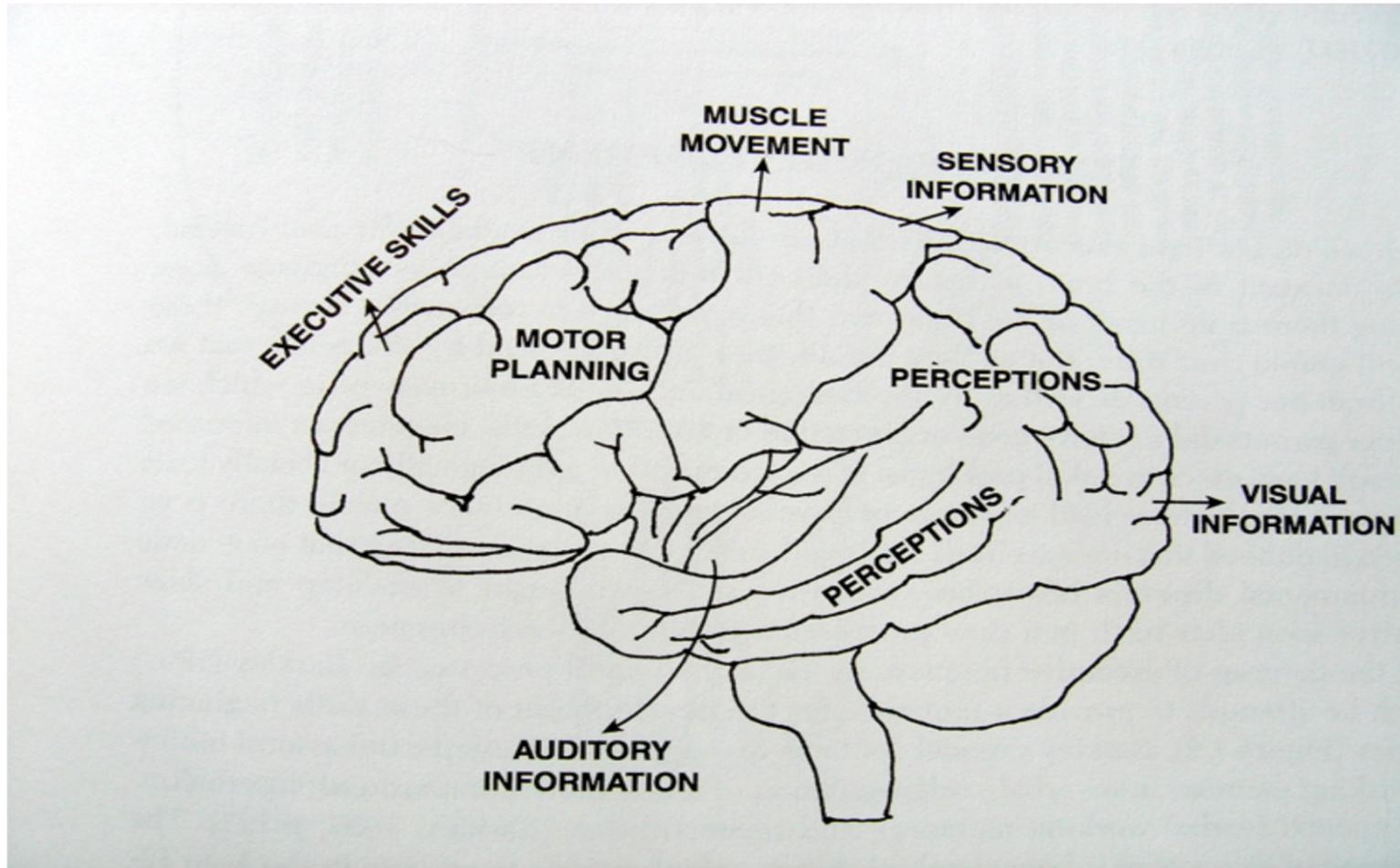


GENDER DIFFERENCES: MATURATION

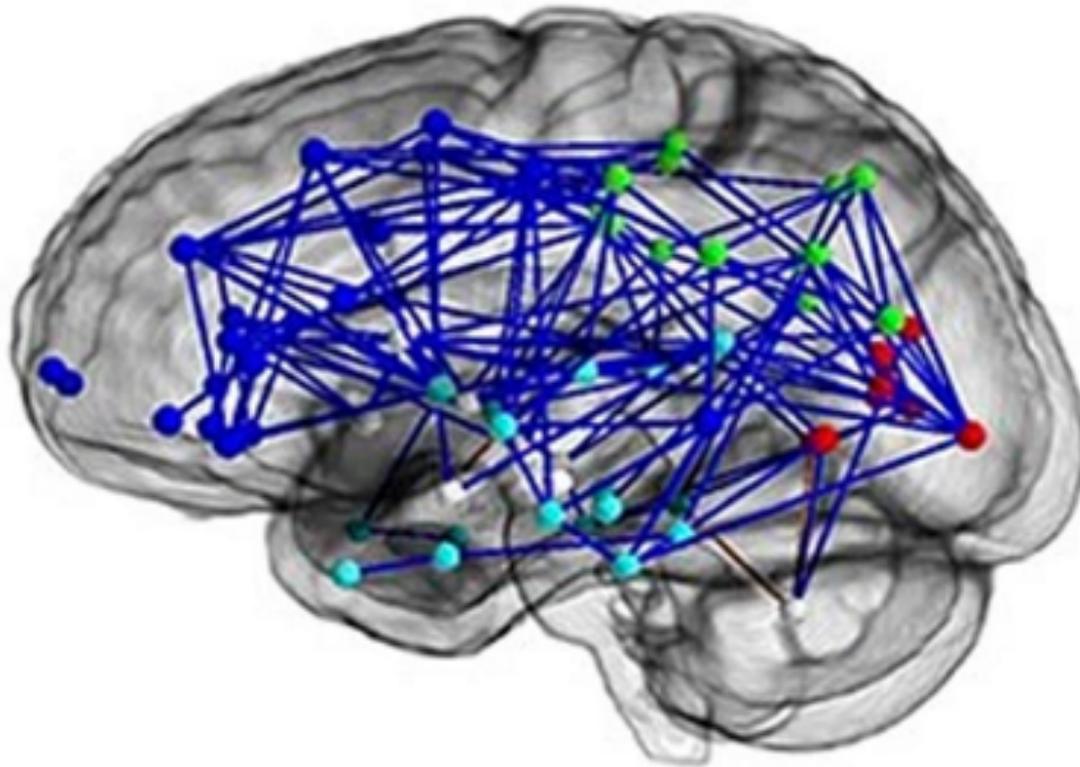
- The halfway point in brain development in Girls is reached just before age 11 years; boys do not reach the halfway point until just before age 15 years. A young woman reaches full maturity, in terms of brain development, between 21 and 22 years of age. A young man does not reach full maturity, in terms of brain development, until nearly 30 years of age.
- (Although in the UK they just finished a study indicating Females = 32 & Males = 43.)



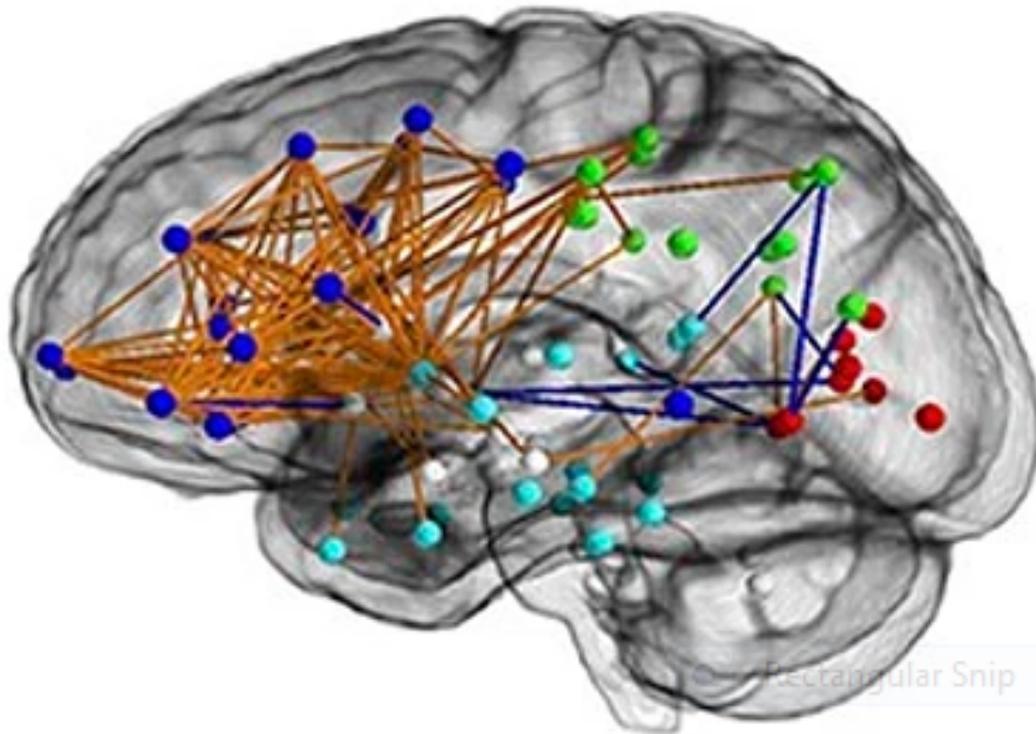
EXECUTIVE FUNCTIONING SKILLS ARE LOCATED IN THE FRONTAL LOBES



MEN'S BRAINS APPARENTLY WIRED MORE FOR PERCEPTION AND COORDINATED ACTIONS



FEMALE BRAINS ARE WIRED FOR SOCIAL SKILLS, MEMORY, AND BETTER EQUIPPED TO MULTI-TASK.



GENDER DIFFERENCES

A recent study by Israeli researchers that examined male and female brains found distinct differences in the developing fetus at just 26 weeks of pregnancy. The disparities could be seen when using an ultrasound scanner. The corpus callosum -- the bridge of nerve tissue that connects the right and left sides of the brain -- had a thicker measurement in female fetuses than in male fetuses.

Observations of adult brains show that this area may remain stronger in females. "Females seem to have language functioning in both sides of the brain," says Martha Bridge Denckla, PhD, a research scientist at Kennedy Krieger Institute.



GENDER DIFFERENCES: STRUCTURAL

Females often have a larger hippocampus, our human memory center. Females also often have a higher density of neural connections into the hippocampus. As a result, girls and women tend to input or absorb more sensorial and emotive information than males do. By “sensorial” we mean information to and from all five senses. If you note your observations over the next months of boys and girls and women and men, you will find that females tend to sense a lot more of what is going on around them throughout the day, and they retain that sensorial information more than men.



GENDER DIFFERENCES: STRUCTURAL

- Additionally, before boys or girls are born, their brains developed with different hemispheric divisions of labor. The right and left hemispheres of the male and female brains are not set up exactly the same way. For instance, females tend to have verbal centers on both sides of the brain, while males tend to have verbal centers on only the left hemisphere. This is a significant difference. Girls tend to use more words when discussing or describing incidence, story, person, object, feeling, or place. Males not only have fewer verbal centers in general but also, often, have less connectivity between their word centers and their memories or feelings. When it comes to discussing feelings and emotions and senses together, girls tend to have an advantage, and they tend to have more interest in talking about these things.



GENDER DIFFERENCES - VERBAL

- **Verbal Skills**
- The average 20-month old little girl has twice the vocabulary of the average 20-month old boy. Because toddler girls begin to talk sooner and more clearly than boys & they have more practice.
- A little girl will want to TELL you about something she is excited about, whereas some boys may prefer to SHOW you what they are excited about.





GENDER DIFFERENCE: PROCESSING

- Male brains utilize nearly seven times more *gray matter* for activity while female brains utilize nearly ten times more *white matter*. What does this mean?
- Gray matter areas of the brain are localized. They are information- and action-processing centers in specific splotches in a specific area of the brain. This can translate to a kind of tunnel vision when they are doing something. Once they are deeply engaged in a task or game, they may not demonstrate much sensitivity to other people or their surroundings.



GENDER DIFFERENCES: PROCESSING

- White matter is the networking grid that connects the brain's gray matter and other processing centers with one another. This profound brain-processing difference is probably one reason you may have noticed that girls tend to more quickly transition between tasks than boys do. The gray-white matter difference may explain why, in adulthood, females are great multi-taskers, while men excel in highly task-focused projects.



GENDER DIFFERENCES: CHEMISTRY

Male and female brains process the same neurochemicals but to different degrees and through gender-specific body-brain connections. Some dominant neurochemicals are *serotonin*, which, among other things, helps us sit still; *testosterone*, our sex and aggression chemical; *estrogen*, a female growth and reproductive chemical; and *oxytocin*, a bonding-relationship chemical.



GENDER DIFFERENCES: CHEMISTRY

In part, because of differences in processing these chemicals, males on average tend to be less inclined to sit still for as long as females and tend to be more physically impulsive and aggressive. Additionally, males process less of the bonding chemical oxytocin than females.

Overall, a major takeaway of chemistry differences is to realize that our boys at times need different strategies for stress release than our girls.





VARIABLES THAT IMPACT STUDENT SUCCESS: DEVELOPMENTAL EXPECTATIONS

[http://www.nytimes.com/interactive/2008/09/15/health/
20080915-brain-development.html](http://www.nytimes.com/interactive/2008/09/15/health/20080915-brain-development.html)



ARE MALES MORE DISABLED THAN FEMALES?

- As a whole, girls outperform boys in the use of language and fine motor skills until puberty, notes Denckla. Boys also fall prey to learning disabilities more frequently than girls. "Clinics see a preponderance of boys with dyslexia," Denckla tells WebMD. ADHD also strikes more boys than girls. The symptoms displayed by girls and boys with ADHD differ, too. Girls with ADHD usually exhibit inattention, while affected boys are prone to lack of impulse control.

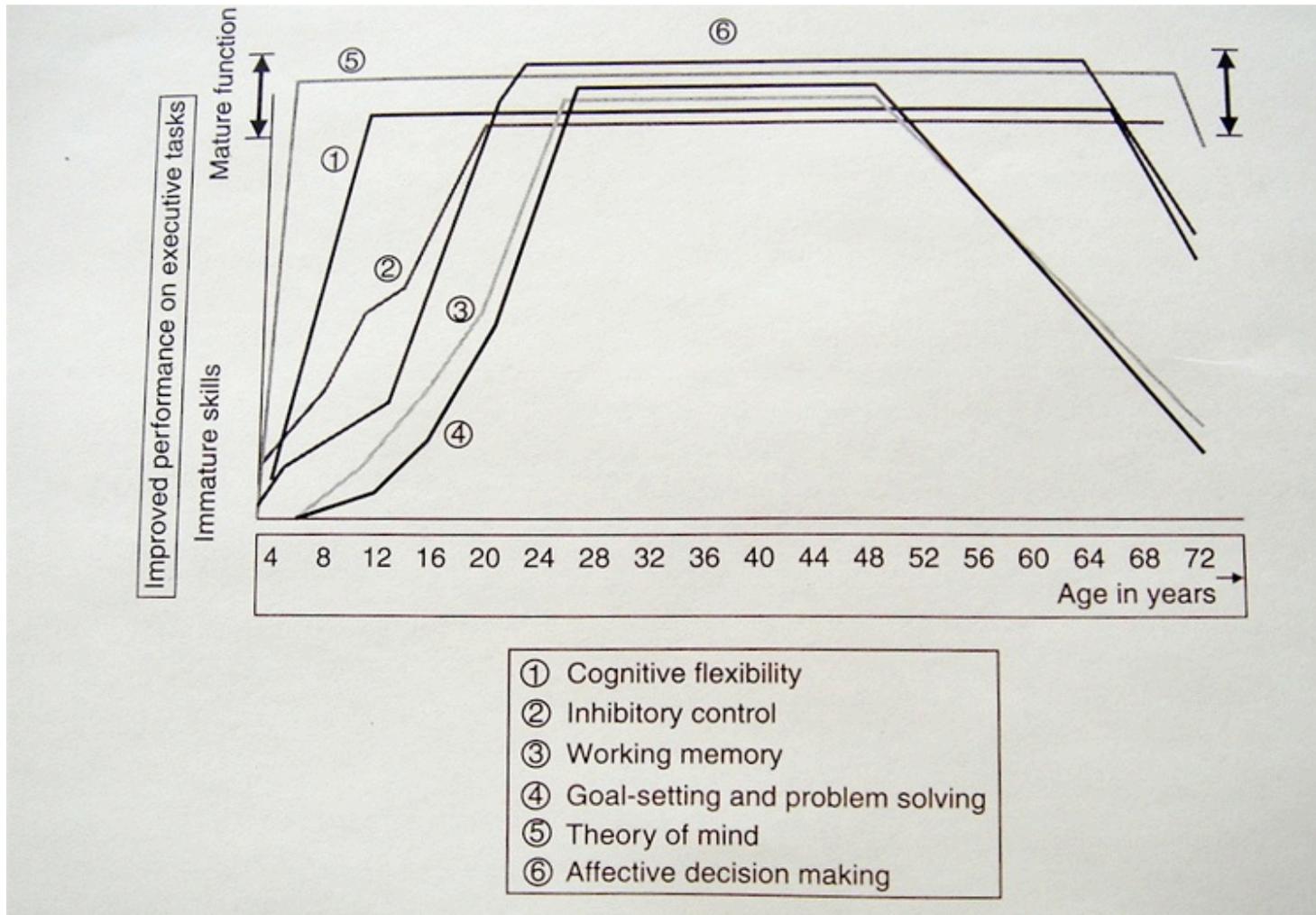




"Ignore my kid brother... his operating system is buggy."



FRONTAL LOBES TAKE TIME TO DEVELOP...



VARIABLES THAT IMPACT STUDENT SUCCESS: POVERTY

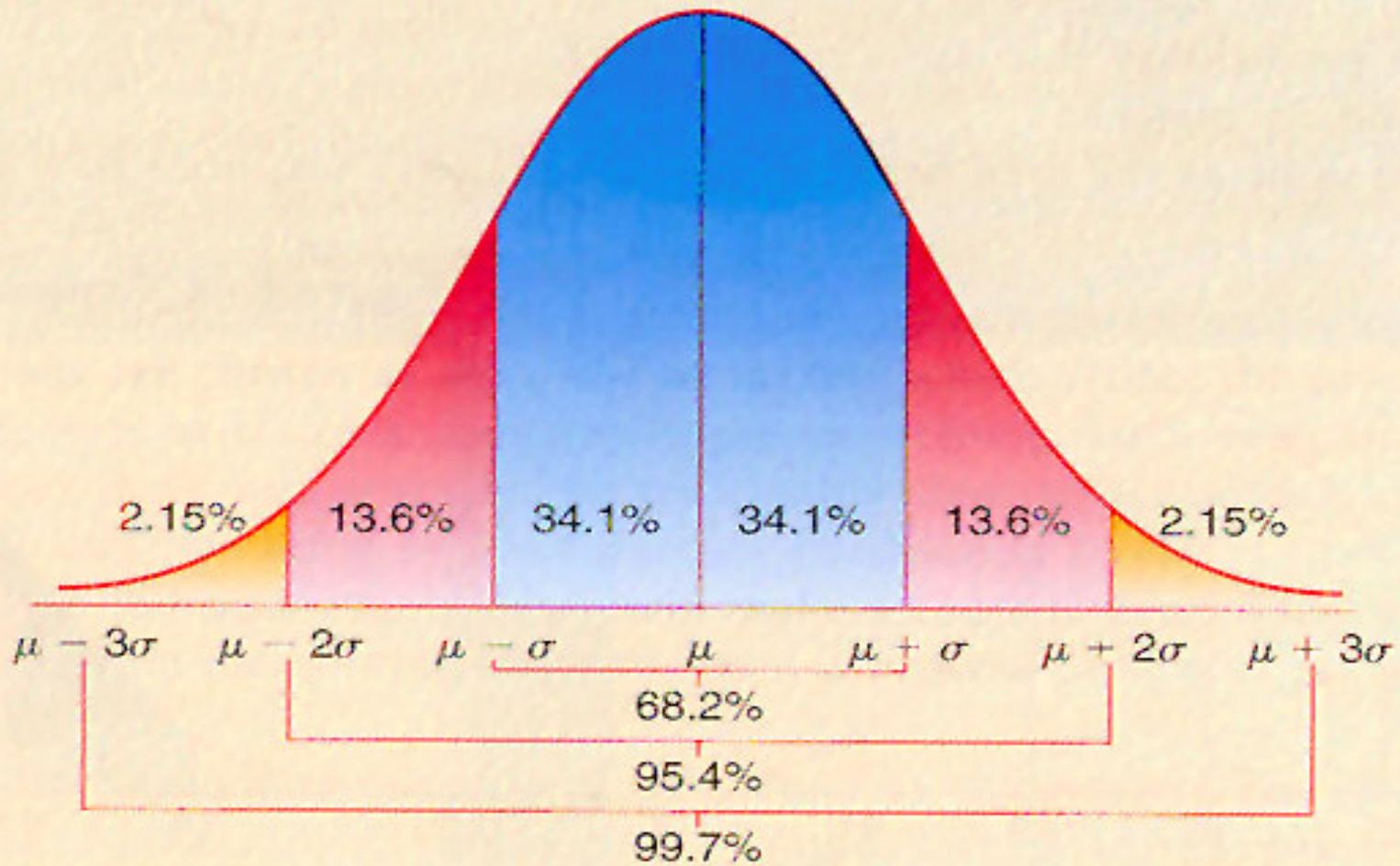
- Poverty: Lack of Resources, Intense Stress, vulnerability
 - One of the things that deprived childhood causes is problems with prefrontal cortex function, so somebody who has had an unstable home life is more likely to have trouble with planning and organizing behavior and with inhibiting impulses than somebody who has had a stable life.





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TYPICAL DEVELOPMENT

K - 2

- Can follow 2 – 3 step directions
- Perform simple chores, self-help tasks with reminders.
- Bring papers to and from school
- Can work on a class assignment (20 min. max)
- Inhibit Behavior: Follow safety rules, keeps hands to self, raise hand before speaking.



TYPICAL DEVELOPMENT

3RD — 5TH

Behave when teacher is out of the classroom

Refrain from rude comments, temper tantrums, bad manners.

Keep track of changing daily schedule.

Plan simple school project such as book reports (select book, read book, write report).

Keep track of classroom materials, backpack, coat

Bring books, papers, assignments home and take them back to school.

Perform tasks that take 15-30 minutes.

Delay fun to do work.



TYPICAL DEVELOPMENT

6TH — 8TH GRADE

- Use system for organizing schoolwork, including agenda, due dates.
- Inhibit rule breaking in the absence of an authority.
- Plan and carry out long-term projects, including tasks to be accomplished and reasonable timeline to follow. May require planning multiple large projects simultaneously.
- Follow complex school schedule involving changing teachers.



Executive Functioning Graph SHS Special Education Teachers 2014-15

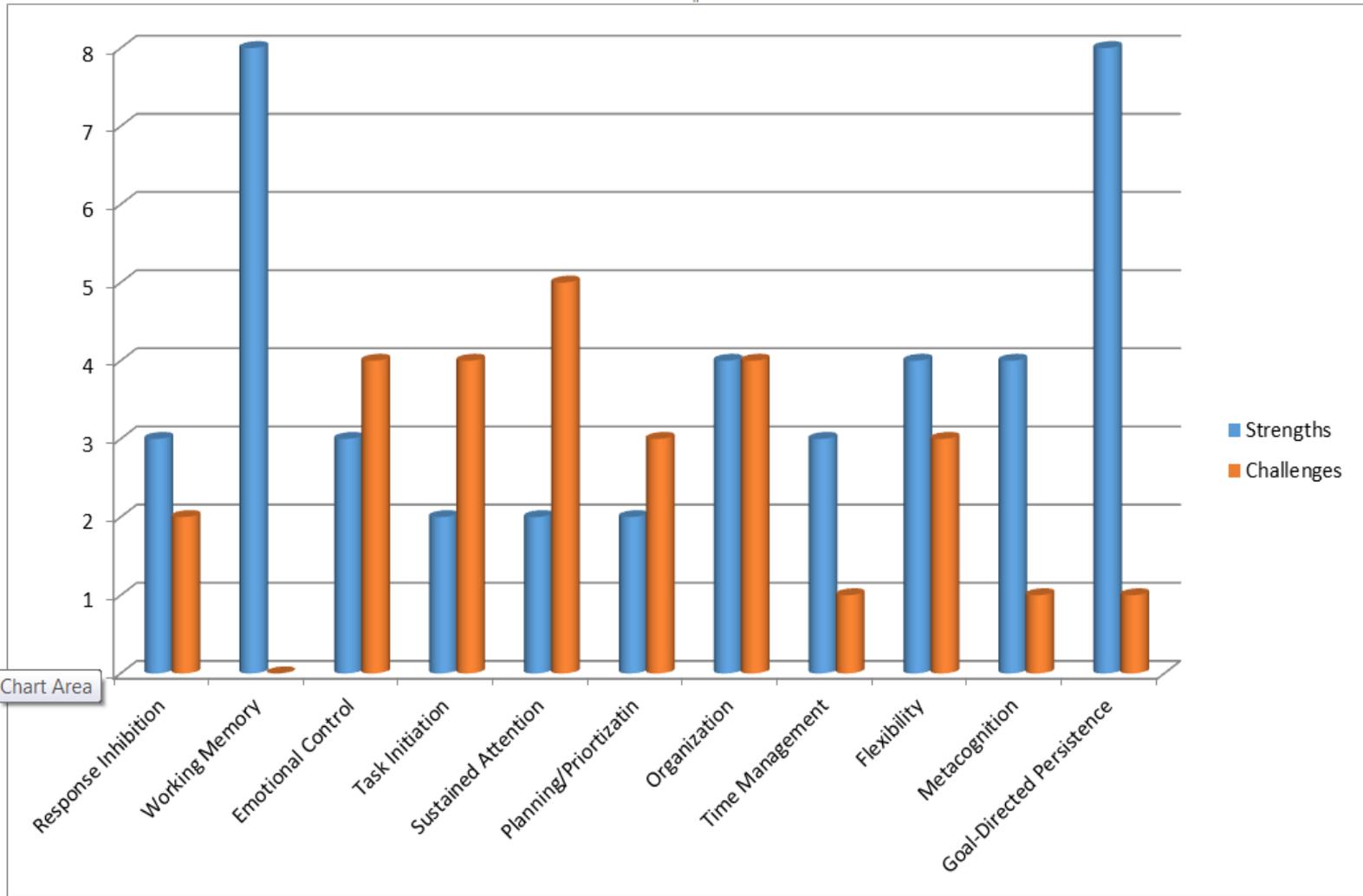


Chart Area



EXECUTIVE FUNCTION

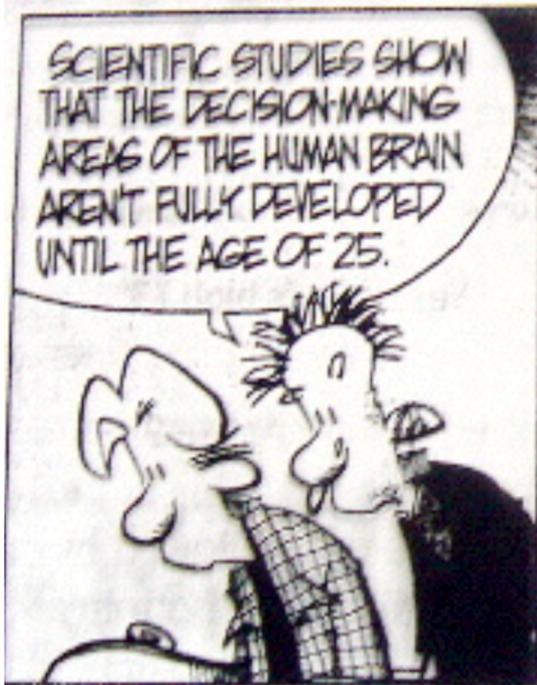
WHEN WE FACE NEW CHALLENGES OR RESOLVE TO PURSUE A GOAL, WE NEED THE FOLLOWING:

- **Response Inhibition:** The capacity to think before you act – this ability to resist the urge to say or do something allows us the time to evaluate a situation and how our behavior might impact it.
- **Sustained Attention:** The capacity to maintain attention to a situation or task in spite of distractibility, fatigue, or boredom.
- **Emotional Control:** The ability to manage emotions in order to achieve goals, complete tasks, or control and direct behavior.



Frontal lobes take time to develop...

ZITS by Jerry Scott and Jim Borgman



EXECUTIVE FUNCTION

WHEN WE FACE NEW CHALLENGES OR RESOLVE TO PURSUE GOAL, WE NEED THE FOLLOWING:

- **Task Initiation:** The ability to begin projects without undue procrastination, in an efficient or timely fashion.
- **Flexibility:** The ability to revise plans in the face of obstacles, setbacks, new information or mistakes. It relates to an adaptability to changing conditions.
- **Goal-directed persistence:** The capacity to have a goal, follow through to the completion of the goal and not be put off or distracted by competing interests.



*EXECUTIVE FUNCTIONS: THESE HELP US TO
CREATE A PICTURE OF A GOAL, A PATH TO THAT
GOAL AND RESOURCES WE NEED ALONG THE WAY.*

- **Planning**: The ability to create a roadmap to reach a goal or to complete a task. It also involves being able to make decisions about what's important to focus on and what's not important.
- **Organization**: The ability to create and maintain systems to keep track of information or materials.
- **Time Management**: The capacity to estimate how much time one has, how to allocate it, and how to stay within time limits and deadlines. It also involves a sense that time is important.



EXECUTIVE FUNCTIONS

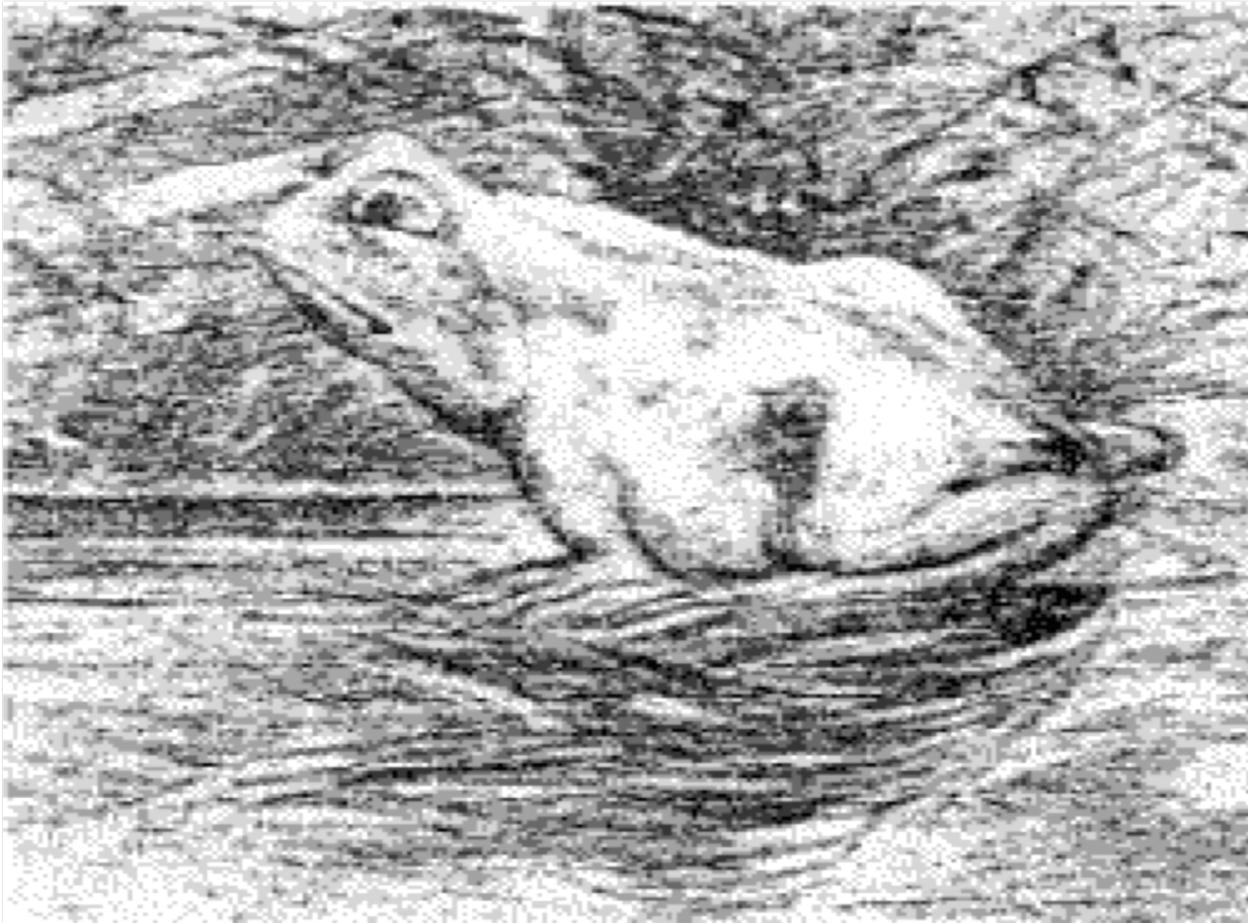
THESE HELP US TO CREATE A PICTURE OF A GOAL, A PATH TO THAT GOAL AND RESOURCES WE NEED ALONG THE WAY.

- **Working Memory**: The ability to hold information in memory while performing complex tasks. It incorporates the ability to draw on past learning or experience to apply to the situation at hand or to project into the future.
- **Metacognition**: The ability to stand back and take a birds-eye view of oneself in a situation. It is an ability to observe how you problem solve. It also includes self-monitoring and self-evaluative skills (e.g., asking yourself, “How am I doing? or How did I do?”).



CAN YOU TELL THE DIFFERENCE BETWEEN A HORSE AND A FROG?

Watch closely...

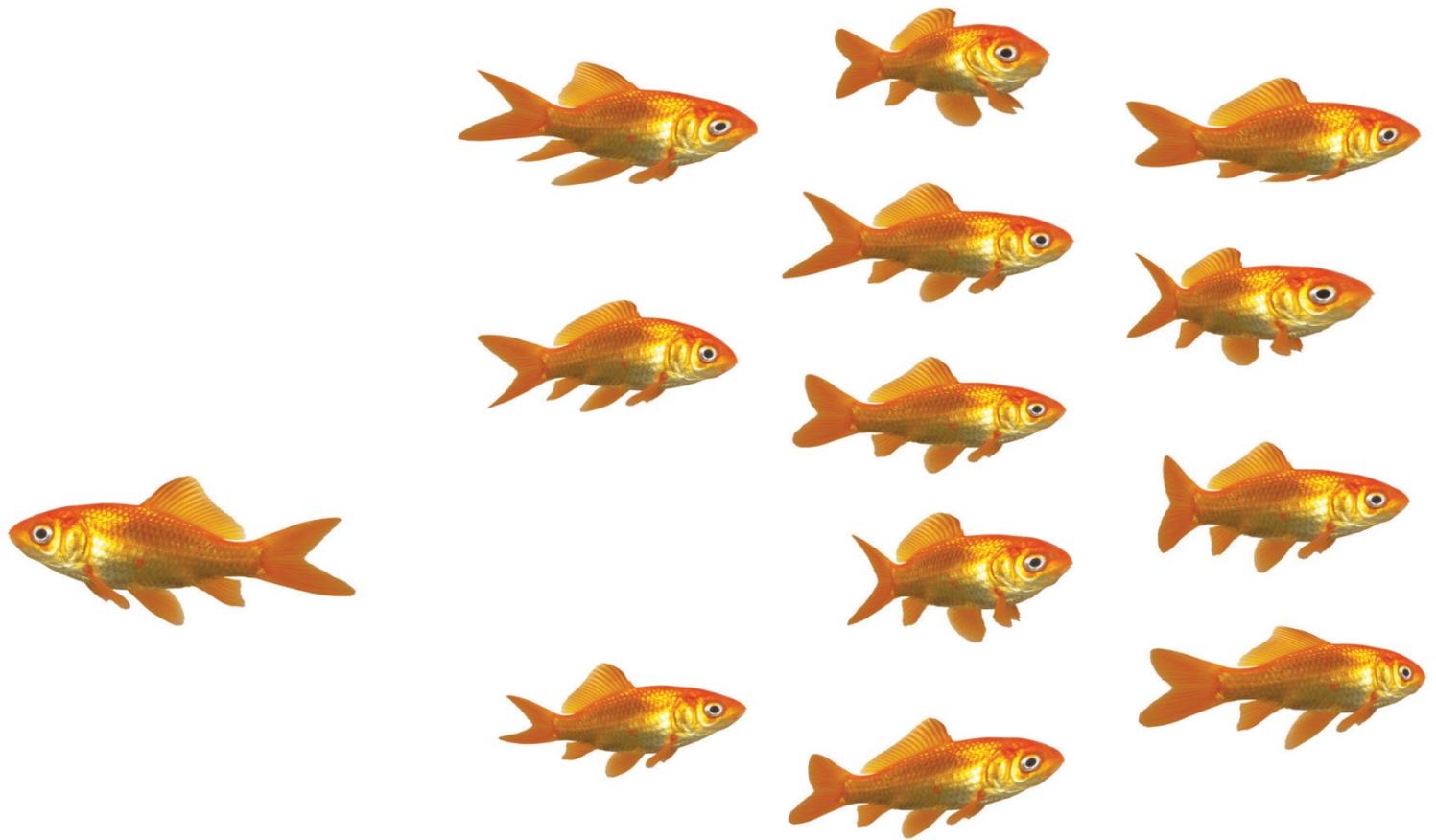




EXECUTIVE FUNCTIONING CHALLENGES: ACADEMICS

- Doesn't bother to write down assignment
- Forgets directions
- Forgets to bring materials home
- Keeps putting off homework
- Runs out of steam before finishing work
- Chooses “fun stuff” Over homework or chores
- Passive study methods (or doesn't study)
-
- Forgets homework/forgets to pass it in
- Leaves long-term assignments or chores until last minute
- Can't break down long-term assignments
- Sloppy work
- Messy notebooks
- Loses or misplaces things (books, papers, notebooks, mittens, keys, cell phones, etc.)
- Can't find things in backpack





EXECUTIVE FUNCTIONING CHALLENGES: BEHAVIORS

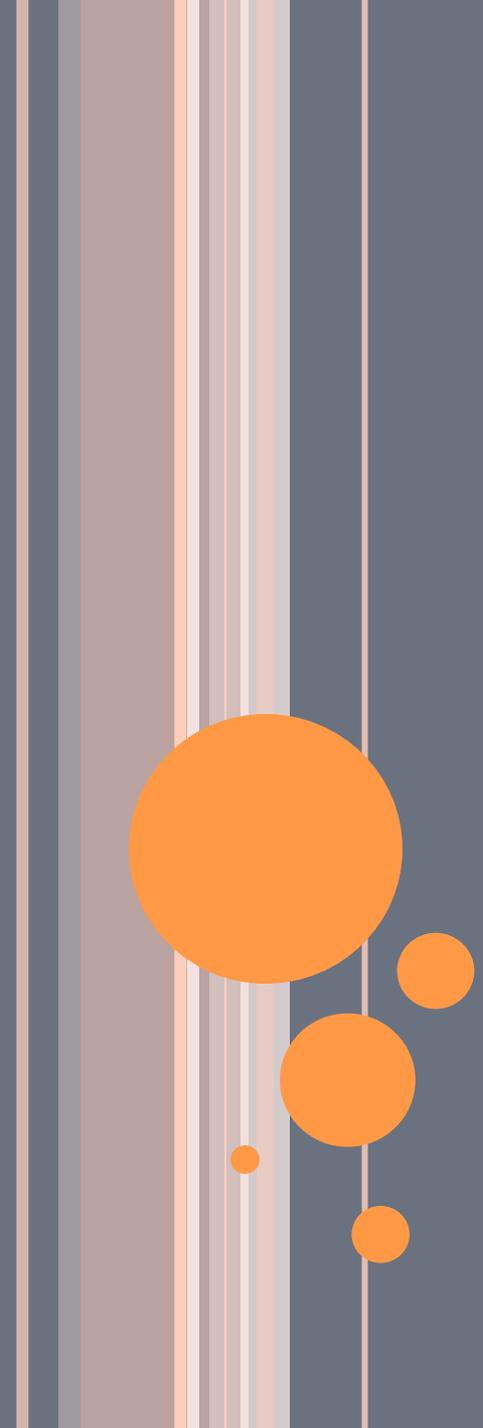
- Acts without thinking
- Interrupts others
- Overreacts to small problems
- Upset by changes in plans
- Overwhelmed by large assignments
- Talks or plays too loudly
- Resists change of routine
- Doesn't notice impact of behavior on others
- Don't see their behavior as part of the issue
- Easily overstimulated and has trouble calming down
- Gets stuck on one topic or activity
- Gets overly upset about "little things"
- Out of control more than peers
- Can't come up with more than one way to solve a problem
- Low tolerance for frustration
- Acts wild or out of control
-





FRUSTRATION
When what you need exceeds your reach.





TRUTH ABOUT EXECUTIVE FUNCTIONING

Children will behave differently in different classrooms based on the Executive Functioning support given to them.

MISTAKES ADULTS MAKE

Unexpected Triggers for misbehavior

- You are a smart student you can figure it out.
- Everyone else working
- How many times do I have to tell you...
- Why do you always...

Student's interpretation

- If I can't figure it out I must be stupid.
- I'm worthless
- What is wrong with me
- I will never be a good student
- My teacher hates me



WHAT STUDENTS WITH WORKING MEMORY DEFICITS MIGHT SAY

- 
- I read it, but I don't really understand it because I keep forgetting it.
 - Everything you are saying is too much and it is making my head hurt.

- 
- I know what I want to write, but when I try to write it down it keeps flying out of my head and I can't remember it.
- 

WHEN CHILDREN ARE MOST LIKELY TO EVINCE EXECUTIVE FUNCTIONING WEAKNESS

- The brain works the hardest when presented with task situations that are unfamiliar and challenging.



TEACH DEFICIENT SKILLS

Don't expect the child to acquire executive skills through observation or osmosis.



7 CORE STRATEGIES: STRATEGY 1

- 1. Provide Children with Executive Function Weakness the “Surrogate Prefrontal Lobe” support they need to survive.
 - Insisting or expecting that children with EF weaknesses perform at the same levels of independence as their peers will generally backfire.
 - Children need adults to task analyze, sequence steps, scaffold learning.



7 CORE STRATEGIES: STRATEGY 1

EXAMPLES

- Visual reminders posted prominently in a student's immediate learning environment such as a laminated prompt taped to the student's desk on reading comprehension, writing, or behavioral strategies.
- Frequent adult monitoring of a child's attention during reading group, with attentional prompts (via an agreed upon nonverbal or verbal prompt) whenever a child goes off-task.
- Individualized support with brainstorming and thought organization/sequencing aspects of writing.
- Review of pro-social strategies prior to student going out to recess.



7 CORE STRATEGIES: STRATEGY 2

- 2. Teach New Skills and Content Systematically & Explicitly.
 - Teachers can minimize confusion when students are confronted with new information or skills by teaching it in Highly Explicit, Step-By-Step ways that clearly link the unfamiliar to the familiar.
 - Clear and Repeated Modeling followed by Extended Opportunities for students to practice the skills with frequent and direct teacher feedback.
 - Kinesthetic learning opportunities such as role playing.



7 CORE STRATEGIES: STRATEGY 2

EXAMPLES

- Demonstrating a specific type of writing on the Smart Board, using the same template each time. Using the template, practice with the entire class.
- Teach new vocabulary by acting out the words and using student volunteers to “perform” the words for the class, and then dividing the students into small groups and having them act out the words in different ways.
- Providing students with the comprehension questions to be answered before they read a passage as a class, then stopping to explicitly discuss the answers to the questions (and their importance) as they are revealed by the text.



7 CORE STRATEGIES: STRATEGY 3

- 3. Teach Strategies and Explicitly Demonstrate the Manner in Which They Should be Applied in Real-Life Contexts.
 - Students with Executive Functioning weaknesses are more often defeated by the HOW of learning and production process rather than the WHAT.
 - Lacking the ability to arrive at effective learning and production strategies on their own, they tend to benefit from explicit teaching strategies that can be applied across a range of academic situations. For instance, systematic note taking, studying for tests, organizing/sequencing thoughts for writing assignment.



7 CORE STRATEGIES: STRATEGY 3

EXAMPLES

- Explicitly Teaching/Modeling the use of pre-reading strategies to build comprehension skills prior to children reading an article.
- Explicitly Teaching/Modeling Note-Taking Strategies.
- Explicitly Teaching/Modeling the structured Prewriting (thought organization), and then requiring all students to demonstrate their use of the strategy as they engage in writing.



7 CORE STRATEGIES: STRATEGY 4

- 4. Minimize Demands on Working Memory(Limit Simultaneous Processing Load)
 - Students are expected to follow directions, while simultaneously “holding onto” the steps of task requires understanding what is needed from their memories, then retrieving the memories and applying them to the task at hand.
 - Students with working memory deficits are especially vulnerable to in the areas of Reading Comprehension, Math Reasoning, and Written Language



7 CORE STRATEGIES: STRATEGY 4

EXAMPLES

- Clearly separating the stages of the writing process, with students only being required to complete one portion of the process each day: On the 1st day, the students analyze the prompt and choose a topic; on the 2nd, they brainstorm ideas and jot them down in an abbreviated form in any order. On the 3rd day, they sequence the ideas and arrange them into paragraph groupings; on the 4th & 5th days, they write. On the 6th day, they edit, and on the 7th day they “publish”.



7 CORE STRATEGIES: STRATEGY 4

EXAMPLES

- Separating the note-taking and listening comprehension elements of classroom instruction/discussion by pausing at regular intervals to allow students to take notes and providing and providing clear indications how what they should be writing during these periods.
- Minimize the amount of factual information students must hold in WM as they write by “downloading” this information into their immediate instructional environment in the form of word walls, punctuation boards, and sequential graphic organizers that clearly reflect the sequence of ideas.



7 CORE STRATEGIES: STRATEGY 5

- 5. Provide Many Opportunities for Guided, Extended Practice
 - While practice may not actually make perfect, it does build fluency. When students are able to use skills with fluency and automatically recall facts and other elements of content, the load on the prefrontal cortex drops considerably.
 - Some research that teachers' assumption about the amount of time needed to grasp new skills are contributing factors to the lack of practice available to the students.



7 CORE STRATEGIES: STRATEGY 5

EXAMPLES

- Explicitly modeling the use of specific writing templates, and then requiring students to use the templates on numerous occasions over the course of the school year in forming and sequencing ideas associated with a range of writing assignments.
- Explicitly teach the classroom rules/expectations at the start of the school year, and continuing to practice (via role playing and demonstrations) a rule each week through the end of the year to make sure they stay fresh in the students' mind.



7 CORE STRATEGIES: STRATEGY 6

- 6. Keep things as Predictable and Consistent as Possible.
 - At the beginning of the year educators across the grade levels should be teaching behavioral expectations with organizational routines to be used over the school year.
 - This decreases the stress levels for students, and will engage them in the process of learning.



7 CORE STRATEGIES: STRATEGY 6 EXAMPLES

Requiring students to use the same or similar graphic organizers and templates to complete the prewriting elements of essays/reports across the school year, as the repeated practice of carefully sequenced prewriting activities benefits all students especially with EF weaknesses.

Develop clear classroom-wide organizational systems and **ADHERE** to them religiously over the course of the school year.



7 CORE STRATEGIES: STRATEGY 7

- 7. Anticipate the Aspects of Tasks and Situations Students Might Find Threatening or Frustrating, and Model Strategies to Manage These Challenges when they Occur.
 - Your ability to engage the executive skills necessary for learning are dependent upon the amount of fear and frustration you are experiencing at the moment.
 - Explicitly show students the parts of task that might be frustrating and then model ways to manage the difficulty. By doing this, teachers both normalize the negative emotions students might feel in a given academic context.



7 CORE STRATEGIES: STRATEGY 7

EXAMPLES

- Tell the class that if they become confused at any point while reading the article, they should place a question mark in the margin next to the sentences they find difficult; then after everyone is finished reading, the article discussion will begin an opportunity to ask questions about their “question mark” sentences.
- Before asking student to begin working at their seats on a series of workbook pages, read through all the pages with the class and point out the sections that students might find confusing, which both clarifies the directions of this section and demonstrates the best way of managing any additional confusion.



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