



UNDERSTANDING EXECUTIVE FUNCTIONS AND INTERVENTIONS

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WHAT ARE THE EXECUTIVE FUNCTIONS?

- Interrelated skills necessary for purposeful, goal directed activity
- Capacities that enable a person to engage successfully in independent, purposeful behavior
- The orchestration of the basic cognitive processes during goal-oriented problem solving
- The brain's front lobe is the conductor of the orchestra, the CEO of the corporation, the general of the army, the captain of the ship.

CRITICAL FEATURES OF EXECUTIVE CONTROL FUNCTIONS (DENCKLA 1995)

- Provide for delayed responding
- Future oriented
- Strategic action selection
- Intentionality
- Anticipatory set
- Freedom from interference

POSITIVE OUTCOMES OF EXECUTIVE FUNCTION

- Purposeful, goal directed activity
- Multi-step problem solving and multi-tasking
- Self-control
- Independence
- Reliability and consistency
- Internal locus of control
- Intentional action selection

COMPONENTS OF EXECUTIVE FUNCTION

Eight general components of executive function that impact school performance:

- **Working memory and recall** (holding facts in mind while manipulating information; accessing facts stored in long-term memory; includes an impaired sense of time.)
- **Activation, arousal, and effort** (getting started; paying attention; finishing work)
- **Controlling emotions** (ability to tolerate frustration; thinking before acting or speaking)
- **Internalizing language** (using "self-talk" to control one's behavior and direct future actions)

COMPONENTS OF EXECUTIVE FUNCTION

Eight general components of executive function that impact school performance:

- **Taking an issue apart, analyzing the pieces, reconstituting and organizing it into new ideas** (complex problem solving).
- **Shifting, inhibiting** (changing activities, stopping existing activity, stopping and thinking before acting or speaking)
- **Organizing/planning ahead** (organizing time, projects, materials, and possessions)
- **Monitoring** (self-monitoring and prompting)

EXECUTIVE FUNCTIONS (CEFI):

- Focusing and Sustaining Attention
- Organizing and Prioritizing
- Initiating and Activating Work Tasks
- Sustaining Alertness and Effort
- Managing Frustration and Modulating Affect
- Utilizing Working Memory and Accessing Recall
- Processing Speed and Work Completion
- Inhibiting and Regulating Verbal and Motoric Action

EXECUTIVE FUNCTIONS (BRIEF-2)

- Emotion Regulation – regulate emotional responses
- Inhibitory Control – stop an action or not react to impulse
- Organization – establish and maintain order
- Planning – anticipate future events and develop steps
- Flexibility – Shift and move from one task to another
- Self-Monitoring – attend to behavior/output and revise
- Attention – focus concentration on a task at hand
- Initiation – begin a task, activity, attend
- Working Memory – hold information actively in mind

DEFINING EXECUTIVE FUNCTIONS:

- **Emotion Regulation** refers to controlling and managing emotions, including staying calm when handling small problems and reacting with the right level of emotion.
- **Inhibitory Control** refers to controlling behavior or impulses, including thinking about consequences before acting, maintaining self-control, and keeping commitments e.g. behaviors such as waiting one's turn, waiting to get what one wants, completing a task that takes a long time and controlling her actions.
- **Organization** refers to managing personal effects, work, or multiple tasks. Behaviors such as appearing organized, putting thoughts together well and completing homework or tasks on time.

DEFINING EXECUTIVE FUNCTIONS:

- **Planning** refers to developing and implementing strategies to accomplish tasks, including planning ahead and making good decisions. Behaviors such as preparing for school or work, doing things in the right order and finding a strategy that works.
- **Flexibility** refers to adjusting behavior to meet circumstances, including coming up with different ways to solve problems, having many ideas about how to do things, and being able to solve problems using different approaches or coming up with a new way to reach a goal and using a different strategy when another doesn't work.
- **Self-Monitoring** refers to evaluating one's own behavior in order to determine when a different approach is necessary, including noticing and fixing mistakes, knowing when help is required, and understanding when a task is completed. Behaviors such as asking for help when needed, changing a plan that isn't working and learning from past mistakes.

DEFINING EXECUTIVE FUNCTIONS:

- **Attention** refers to avoiding distractions, focusing on tasks, and sustaining attention. Behaviors such as reading with concentration, maintaining concentration and attending to a boring task.
- **Initiation** refers to beginning tasks or projects on one's own, including starting tasks easily, being motivated, and taking the initiative when needed. Behaviors such as beginning something without being asked, cueing herself to get started on things and taking initiative/being a self-starter.
- **Working Memory** refers to keeping information in mind that is important for knowing what to do and how to do it, including remembering important things, instructions, and steps. Behaviors such as taking note of instructions, holding in mind instructions with many steps and having many things in mind at one time

TWO CATEGORIES OF EXECUTIVE FUNCTION DEFICITS:

The practical impact of executive function deficits in two general categories:

- Specific *academic challenges* like writing essays, remembering what is read (comprehension), memorizing information, and completing complex math and
- *Work Study Skills and Habits: Essential related skills* like organization, getting started on and finishing work, remembering tasks and due dates, completing homework and long-term projects in a timely manner, processing information in an efficient and timely manner, having good time awareness and management, using self-talk to direct behavior, using weekly reports, and planning ahead for the future.

POOR WORKING MEMORY AND RECALL

- Contrary to conventional wisdom, researchers report that working memory skills are a better predictor of academic achievement than IQ scores. This explains why children with ADHD and high IQs may still struggle in school.
- Deficits in working memory and recall negatively affect these students in several areas:

THE “HERE AND NOW”

- Our children have limited working memory capacity that often impacts their behavior at home and in the classroom:
 - remembering and following instructions.
 - memorizing math facts, spelling words, and dates.
 - performing mental computation such as math in one’s head.
 - completing complex math problems (algebra)
 - remembering one part of an assignment while working on another segment.
 - paraphrasing or summarizing.
 - organizing and writing essays.

SENSE OF PAST EVENTS

Because our students have difficulty recalling the past, they have limited hindsight; in other words, they don't learn easily from past behavior. This may help explain why our children often repeat misbehavior.

SENSE OF TIME

Many students with ADHD also have difficulty holding events in mind and using their sense of time to prepare for upcoming events and the future. Consequently, they have difficulty judging the passage of time accurately. Practically speaking, they don't accurately estimate how much time it will take to finish a task, thus they may not allow enough time to complete the work.

SENSE OF SELF-AWARENESS

As a result of their diminished self-awareness, these students don't easily examine or change their own behavior. Perhaps this explains why they often are unaware of behaviors that may alienate friends.

ADHD AND EXECUTIVE FUNCTION GO HAND IN HAND

- Unfortunately students with ADHD are often punished for executive function deficits such as lack of organization and memory skills that interfere with their ability to bring home the correct homework assignments and books. Hopefully, after reading this article, teachers and parents will develop more innovative intervention strategies. Having homework posted on a website plus keeping an extra set of books at home for subjects with frequent homework assignments can be very helpful.

GENERAL DEVELOPMENTAL ISSUES

- A child's developmental level should be taken into account when planning intervention strategies.
- Utilize intervention strategies that initially include external controls, prompts and cues to help the child learn and develop new skills.
- Gradually remove external controls to promote internalization of new behaviors and explicitly encourage children to develop and use their own strategies.
- Encourage the child by explicitly communicating that change is possible with effort and motivation to achieve.
- Carefully consider strategies to enhance generalization of new skills, across tasks, time, and settings.

EXTERNAL SUPPORT

- Structure the environment (e.g., cues, prompts), including the child's schedule (e.g., create a consistent routine with breaks and extra time for tasks) until internal control of behavior is mastered.
- Provide lists and charts that give specific suggestions for how to accomplish tasks and activities.
- Encourage children to develop their own solutions to getting things done.

MOTIVATION

- Make use of natural motivations to encourage desired behavior.
- Promote positive behavior through reward and encouragement.

INTERNALIZATION

- Provide feedback on the child's performance and encourage self-monitoring.
- Teach awareness strategies (e.g., training in self-management and self-monitoring skills; the technique of "self-talk").

SKILL BUILDING

- Build a child's vocabulary and language skills to help him/her gain control over successful expression of his/her emotions and thoughts.
- Develop verbal mediation skills (e.g., verbal cues, questions, and discussion) to guide thinking and social processes.
- Provide meditation techniques to help improve self-control over attention, affect, and behavior.
- Model behaviors that illustrate strategic problem solving, self-reflection, and thoughtful approaches to work.

SO WHAT SHOULD PARENTS AND TEACHERS DO WITH THIS NEW INFORMATION?

- Identify the student's specific learning problems (e.g. written expression or math) and
- Identify their executive function deficits (e.g. working memory, disorganization, forgetfulness, or impaired sense of time) and
- ***Provide accommodations in both areas!***

SENSE OF THE FUTURE

Most students with a working memory deficit focus on the here and now and are less likely to talk about time or **plan** for the future. Thus, they have limited foresight; in other words, they have difficulty projecting lessons learned in the past, forward into the future. Not surprisingly, they have difficulty preparing for the future.

FOOD FOR THOUGHT:

- ***“Succeeding in school is one of the most therapeutic things that can happen to a child!! So do whatever it takes to help your child succeed in school.”***

INTERVENTIONS:

- Externalize important information at key points of performance
 - Sticky notes
 - Agenda books
 - Lists
 - File cards
 - Cell phones notes, pics
 - Watches

INTERVENTIONS

- Externalize time and time periods related to tasks and important deadlines
 - Timers
 - Clocks
 - Calendars
 - Counters

INTERVENTIONS

- Break up lengthy tasks or ones spanning long periods of time into many small steps
 - Complete a portion of a project each day toward the goal

INTERVENTIONS

- Externalize sources of motivation:
 - Identify tasks and settings in which consequences/rewards are too delayed/non-existent; put artificial consequences (tokens, points, prizes, privileges) into these large gaps and increase accountability (check-ins) with others to see that the goals are being met

INTERVENTIONS

- Externalize mental problem-solving
 - Use marbles, numbers, timelines, calculators for math, paper
 - Word processing programs for text

REPLENISH RESOURCE POOL

- Routine physical exercise
- Visualize/talk about future rewards before beginning a task
- Three minutes of relaxation
- Ten minute breaks between tasks
- Provide encouragement and positive reinforcement (7 positive statements for every negative)