Executive Function Capacities:

“It’s not not knowing what to do; it’s knowing to do what you know.”

Lisa A. Perkins, Psy. D.
Westport Public Schools
Questions about Your Executive Function Capacities?

• How did you get here today on time?
• How did you know how to get here?
• What would have happened if North Ave. was closed due to construction?
• How did you know when to leave?
• Your family wants to eat dinner at 7 and you’re the cook: How do you get the food on the table in time?
• Someone cuts you off in a traffic lane: What keeps you from yelling “#**#!%#!!!”?
• The clock is ticking loudly in the den where you are reading a book, but you don’t hear it. Why?
• You walk into a funeral service and immediately begin speaking in a whisper. Why?
• You accidentally bump into someone and apologize. Why?
What are Executive Functions?

- Directive capacities of the mind
- Multiple in nature, not a single capacity
- Part of neural circuits that are routed through the frontal lobes
- Cue the use of other mental abilities
- Direct and control perceptions, thoughts, actions, and, to some degree, emotions
- *Most needed when the routine for the task is not well developed.*
Cognitive Task Performed During PET Scan

• Naïve – first time task, no previous exposure to the experience.
• Practiced task (after 15 minutes of initial exposure).
• Novel—similar task, but has novel elements to it.
Disorder Du Jour?

• Understanding of executive functions have been advanced by technology

• Knowledge of control processes existed for some time: Story of Phineas Gage

• Educators have struggled with conceptualizing executive function difficulties:
  – Minimal Brain Dysfunction
  – “Fallen through the cracks” children
  – Dysexecutive syndrome (DSM-V?)
Executive Functions are not a Unitary Trait

• Frequently referred to as “the CEO of the Brain” or the “Conductor of the Orchestra”
• These metaphors
  • hint at the nature of EFs, but are far too general for effective understanding of the concept
  • create the impression of a central control center or a singular control capacity
More Appropriate Conceptualization of Executive Functions

Appropriate Metaphors for Executive Functions:

• A Team of Conductors and Co-Conductors of a Mental Ability Orchestra, or

• The Coaching Staff of a Mental Ability Football Team
Co-Conductors in a Holarchical Model of EF

=Domains Of Functioning

=Executive Function Capacity

Perception  Emotion  Cognition  Action
V. Trans-self Integration

Sense of source, Cosmic consciousness

IV. Self Generation

Mind-Body Integration, Sense of Spirit

III. Self Control:

Self Realization

Self Awareness

Self Determination

Goal Generation

Long-Term Foresight/Planning

II. Self Control: Self Regulation

I. Self Control: Self Activation

Awaken, Attend

Mind-Body Integration, Sense of Spirit
Self-Activation

• Initiation and “ramping up” of basic executive functions related to an awakened state of mind and to overcoming sleep inertia.

• Adolescents normally do not ramp up well!
Self Regulation

– A set of control capacities that cue and direct functioning across the domains of sensation/perception, emotion, cognition, and action

– The current model posits 29 self-regulation executive functions

– These self-regulation capacities are the source of efficient and well-regulated task production, behaviors, and emotions.
29 Self-Regulation EFs

- Perceive
- Initiate
- Inhibit
- Modulate/Adjust
- Gauge
- Focus Attn
- Focus Effort
- Sustain Attn
- Sustain Effort
- Stop/Interrupt
- Flexible
- Shift
- Hold
- Manipulate
- Organize
- Anticipate
- Plan
- Generate
- Associate
- Choose
- Balance
- Store
- Retrieve
- Pace
- Time Sense
- Time Mgt
- Execute
- Monitor
- Correct
Self Realization


– Cues cognitive processes to access accumulated information about self and apply it in specific situations to initiate, sustain, or alter behavior.
Self Determination

— Foresight/Long-Term Planning and Goal Generation
— Directs the use of cognitive processes to construct visions of the future and plans for action over longer periods of time. Directs reflection on the past for purposes of improving or altering behavior and thinking in the future.
Executive Function Variability

• Executive control is highly dissociable; it can vary greatly depending on the specific domain/subdomain of functioning that is being directed: sensation/perception, emotion, cognition, or action.

• Good executive control in one domain does not guarantee good executive control in the other domains; Poor control in one domain does not guarantee poor control in the other domains.
Arenas of Involvement

• Executive control also varies depending on the Arena of Involvement

• The Four Arenas of Involvement are:
  – Intrapersonal  (Control in relation to the self)
  – Interpersonal  (Control in relation to others)
  – Environment    (Control in relation to the natural and man-made environment)
  – Symbol System  (Control in relation to human made symbol and communication systems)
Executive Function Development

• Self-regulation executive functions are developing from the first years of life on throughout a person’s entire lifetime.

• Large developmental shifts are noticeable, especially around adolescence.

• Because EFs are developmental in nature, natural maturational delays and lags are observed.
Executive Function Development

- Intraindividually, all EFs do not develop evenly. For any given individual, one EF can be more or less developed than any other EF at any given point in time.
- Interindividually, there is also great variation relative to chronological age. At the same age, different individuals will naturally vary considerably in their level of development of various EFs.
Executive Function Development and School

- Cultural change points (e.g., educational transitions to preschool, kindergarten, 1st grade, 4th grade, middle s., senior h.s., college, graduate school, and workplace entry) can serve to highlight EF developmental delays or significant deficiencies.
Executive Function Development and School

- Some EF-based clinical syndromes, such as ADHD, demonstrate clear patterns of delayed developmental progression. Barkley (1998) estimates developmental delays of about 30% associated with various EF processes such as Focus Attention and Focus Effort, Select, Sustain Attention and Effort, Inhibit, and Modulate.
Executive Functions and Clinical Diagnoses

- A sampling of conditions involving EF deficits:
  - Autism/Asperger’s Syndrome
  - ADHD and ADD
  - Conduct Disorder
  - Oppositional Defiant Disorder
  - Depression and/or Anxiety
  - Obsessive-Compulsive Disorder
  - Fetal Alcohol Syndrome
  - Bipolar Disorder
Executive Functions and ADHD

• EF and ADHD are not synonymous terms; rather ADHD is a condition involving EF deficits in:
  — Focus, Select, Sustain, Inhibit, Modulate

• Nearly all persons with ADHD also have additional self-regulation difficulties; the nature of these additional difficulties is what makes ADHD so variable from one person to the next and what causes confusion in diagnosis.
Executive Functions and ADHD

• Pharmacological treatment of ADHD usually only addresses the problems associated with the EFs specific to ADHD (Inhibit, Modulate, Focus, Select, Sustain)

• Most persons with ADHD will require additional interventions to assist with the additional self-regulation difficulties that persist even when medication is being used effectively to treat the primary ADHD problems.
Executive Functions and Learning Disabilities

• An educational classification of learning disabilities is not an indicator of executive function difficulties.
• A student with learning disabilities may or may not have executive function deficits.
• It is important to determine whether a child is not performing because they do not have the skills or they are not employing the skills they have.
Executive Functions and School

• Although executive functions are used to guide cognitive processing involved in new learning, many new learning situations are structured in ways that reduce the need for strong executive direction.

• In contrast, demonstrating what has been learned usually requires significant involvement of executive control processes.
Executive Function Development

• The neural circuits for executive function activation are routed differently depending on whether the activation is based on an internally driven desire or command versus an external demand.
Executive Functions and School

• Because internally driven production is much easier to accomplish than externally demanded production for children with “producing difficulties” their lack of production on demand often stands in stark contrast to their seemingly effortless production “when the spirit moves them.”
Executive Functions and School

• The on-demand deficiencies observed by others are often attributed to negative personal characteristics such as lack of responsibility, apathy, passive aggressive stance, or oppositional defiance.
A General Model for Conceptualizing Learning and Producing Difficulties

- Learning Difficulties Only
  - May not be identified if producing difficulties are not severe.
- Learning Difficulties And Producing Difficulties
  - Recognized fairly quickly as a Learning Disability
- Producing Difficulties Only
  - When severe, typically attributed to lack of motivation, character flaws, or behavior/personality problems
Executive Functions and Schools

• The production of all academic skills require multiple executive function capacities.
• The production of social skills require executive function capacities.
• The production of motor skills require executive function capacities.
• The more complex the task and the fewer routines the student have to complete the task, the more execuddy demanding it is.
Executive Function Intervention

Intervention efforts will vary along a continuum from imposing external control to encouraging internal self control.
EF Intervention Continuum

External Guidance and/or Control
(How much the parent structures behavior.)

Internal Guidance and Control
(How self-sufficient the child is.)
Development of Interventions for EF Difficulties

• Requires keeping in mind:
  – The need for a balance between teaching internal self-regulation strategies with providing external controls for support and management so that teaching can take place.
  – The environment in which intervention is happening: Requires those close to child to have reasonable EF capacities and be able to model those capacities.
Development of Interventions for EF Difficulties

• EF Self-regulation skills eventually need to be just that—Self-regulated.

• In the classroom as well as at home, it is necessary to find the balance between providing enough EF SR cueing to help students function, but not too much to prevent EF skill-development.

• It is easy to underestimate the multiplicity of Efs required and focus only on those related to attention and organization.
Strategies for Providing External Guidance

- Provide predictable, consistent structure to home environments and routines:
  - Post and discuss rules and schedules
  - Review and rehearse routines
  - Maintain a problem-solving mode
Supporting Development of Self-Regulation Capacities

• When working with your own child, it is helpful to do at least an informal assessment of capacities.

• Answer questions relative to these 29 self-regulation executive functions.

• Support student engagement in reasonable self-care practices.

• Teach missing or deficient self-regulation capacities as skill routines.
Supporting Development of Self-Regulation Capacities

• Develop a common vocabulary and/or visual signals for use of needed self-regulation capacities.

“Read the room” “What’s your plan?”
“Start” “Stop” “Time to make a shift”
“Check and correct” “Would you like a do-over?”
“How much time do you need to get this done?”
Supporting Development of Self-Regulation Capacities

• Model and encourage the use of internalized “self-talk” for task initiation, planning, organization and completion.

• Teach use of self-administered reward routines (“If I get my math homework done in 30 minutes, I will treat myself to ....”)

• Use behavior reward plans—only if the skills are in place to demonstrate. The plan won’t be effective if the child does not have the executive skills you are trying to reinforce.
Supporting Development of Self-Regulation Capacities

• Develop a plan of action with your child around focusing on the EF deficits that you have identified.
• Teach to the routine so that it becomes routinized.
• Follow the routines of your child’s program manager to eliminate confusion over different approaches (avoids frustration due to EF SR deficit of Flexible and Shift!)
• Make sure your child learns to use Blackboard—a great executive function support!
• Homework completion and organization examples:
### Monday

<table>
<thead>
<tr>
<th>Student’s Behavioral Responsibilities</th>
<th>Completed</th>
<th>Not Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Recorded homework in assignment book.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Had each assignment signed by teacher.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Completed homework.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Had parent sign-off at the bottom of the appropriate day in assignment book indicating that homework was completed.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Placed all homework, binders, books, and assignment in backpack.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Implemented: (circle one)</td>
<td>Rewards</td>
<td>Consequences</td>
</tr>
</tbody>
</table>

### Tuesday

<table>
<thead>
<tr>
<th>Student’s Behavioral Responsibilities</th>
<th>Completed</th>
<th>Not Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Recorded homework in assignment book.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Had each assignment signed by teacher.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Completed homework.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Had parent sign-off at the bottom of the appropriate day in assignment book indicating that homework was completed.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Homework Checklist

<table>
<thead>
<tr>
<th>What to do...</th>
<th>Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Had snack for energy.</td>
<td></td>
</tr>
<tr>
<td>2. Started HW after a 30 min break. <em>(Do not wait until after dinner to do your HW)</em></td>
<td></td>
</tr>
<tr>
<td>3. Record start time of HW:</td>
<td></td>
</tr>
<tr>
<td>4. Take out assignment book and look at what HW you have.</td>
<td></td>
</tr>
<tr>
<td>5. Pick the assignment that is the hardest or will take the longest time to complete.</td>
<td></td>
</tr>
<tr>
<td>6. Review directions for that assignment. If you have a question or you are just having a hard time getting started, ask a sibling or a parent for help rather than just spending too much time trying to figure it out on your own.</td>
<td></td>
</tr>
<tr>
<td>7. Complete the assignment.</td>
<td></td>
</tr>
<tr>
<td>MONDAY</td>
<td>TUESDAY</td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>BRIDGE PROJECT BEGINS</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>17</td>
</tr>
<tr>
<td>Quick Center Field Trip</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>LAB PRACTICAL</td>
<td>LAB PRACTICAL</td>
</tr>
</tbody>
</table>
Questions about Your Executive Function Capacities?

- How did you get here today on time? (perceive, plan, initiate, execute, pace, manage time)
- How did you know how to get here? (retrieve)
- What would have happened if North Ave. was closed due to construction? (shift, flexible, retrieve, choose, initiate)
- How did you know when to leave? (gauge, time manage)
- Your family wants to eat dinner at 7 and you’re the cook: How do you get the food on the table in time? (perceive, plan, choose, gauge, initiate, execute, pace, manage time)
- Someone cuts you off in a traffic lane: What keeps you from yelling “#**#!%#!!!!”? (inhibit)
- The clock is ticking loudly in the den where you are reading a book, but you don’t hear it. Why? (focus, sustain)
- You walk into a funeral service and immediately begin speaking in a whisper. Why? (perceive, modulate)
- You accidentally bump into someone and apologize. Why? (perceive, check, correct)