Executive Functioning: Concepts, educational impact, and intervention strategies.
Core functional systems
- Right Hemisphere
- Left Hemisphere
- Limbic/Midbrain
- Frontal/Pre-frontal
Significance of executive processing in educational setting:

- Critical set of skills for both typical and atypical learners.
- Curriculum and teaching style should incorporate developmentally appropriate supports and opportunities to help develop executive skills.
- High incidence problem for several subtypes of students with special needs.
  - ADHD
  - ASD
What determines efficiency of frontal/executive functioning?

- Genetics
- Environmental experience
- TBI
- Developmental disorders
  - ADHD
    - PET scan’s indicating hypo-frontality
    - Thinner cerebral cortex (outer portion of cerebrum)
  - ASD
    - More diffuse brain differences
    - Different areas of brain used during tasks
    - Atypical cortical connectivity in frontal cortex
Definitions:

Executive function involves a complex set of neurocognitive skills related to:

- **Planning:**
  - Selecting the goal.

- **Organizing:**
  - Arranging sequence of steps to meet goal.

- **Time awareness:**
  - Time management, setting priorities, appreciating saliency.

- **Working Memory:**
  - Holding plan/steps in mind while acting.
  - Thinking forwards and backwards.
Executive function involves a complex set of neurocognitive skills related to:

- **Meta-cognition:**
  - Self-monitoring/evaluation.
  - “Observing ego”
- **Response inhibition:**
  - Thinking before you act.
  - Managing impulses.
- **Regulation of affect:**
  - Management of emotions.
  - Establishing appropriate arousal level.
- **Initiation:**
  - Ability to start a series of behaviors
Definitions:

- Executive function involves a complex set of neurocognitive skills related to:
  - Flexibility:
    - Shifting of attention and mental set.
    - Changing of cognition/behavior as needed.
    - Ability to see problem/solutions from different viewpoints.
  - Persistence:
    - Capacity to maintain drive to follow through to completion of goal.
    - Capacity to inhibit responding to distractions mid task.
Developmental issues:

- Child’s brain is a “work in progress”
  - 13 ounces in infancy to 3 pounds in adolescent.
  - Structure is present, but connectivity and efficiency of brain pathways develops dramatically.
  - Synaptic pruning – 86 billion at birth, 17 billion at adulthood.

- Frontal cortex is latest developing area of brain.

- Development of frontal cortex influenced by interaction with environment.
  - Experience/learning physically changes brain.
  - Highlights importance of early intervention and practicing skills.
Assessment of executive skills:

- **Informal observation:**
  - Can the child plan and organize to developmental expectations?
  - Does the child need constant cueing/supervision to stay on task?
  - Does the child need constant encouragement to persist?
  - Can the child learn to follow routines?
  - Can the child generalize and be flexible about routines?
  - Can the child manage materials?
Assessment:

- Standardized behavioral rating scales:
  - Behavior Rating Inventory of Executive Function (BRIEF)
    - Allows for normative comparison.
    - Allows for categorization of areas of executive difficulties.
    - Allows for easy assessment of skills across settings.
  - See example:
Direct Psychological Assessment:

- **Attentional focus and persistence**
  - Continuous Performance Test.

- **Planning:**
  - NEPSY or D/K Tower Test.

- **Response inhibition:**
  - Stroop Procedure.

- **Flexible Thinking:**
  - Wisconsin Card Sorting Test.

- **Complex planning and organization:**
  - Rey Complex Figure.
Performance Test - Letter Cancellation

From The File ...... ray
Name ................ ray
Test Date ..........
Education .......... Large
Date Of Birth ..... 5 Minutes
Character Size ..... 5 Minutes
Test Duration ...... 5 Minutes
Remarks .............

N Q A F A R D C A S E E A 0 J H P A W A K X A R O B A A Z U 1
I A Y M A L Z G A B A E U R A A W C A P B T E A Z A M L X A 1
B A R H T A E A O A L C S G A V M A A W F D A X L P A Z A I 1
Q A N A Y K U G A W J A A X M Q A E A P B A S I O A L A Z C 1
A R D T A F A V H N U A K Y A E R A A G O H A W A M Z A X J 1
Y K A D A Q A P V N F A L U A I T A A S C R A H A T B A Z P 1
G A M X A O A E B W N A S K A A F Q D A Y V A J A U C L A I 1

Right .......... ( 1 ) 81
Wrong .......... ( 5 )
Missed .......... ( 19 )
Absolute Percent Correct ...... 81.00 %
Relative Percent Correct ...... 94.19 %

S/N: 8538
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Rule:
Name the ink color.

red blue green blue green
red blue red green red
blue green blue red blue red blue red
blue green blue green red green blue red blue green
red green red blue green red green red blue green
blue green blue red green blue red green red green
green blue red blue green red blue green red blue
13 year old, 78 VIQ, 89 PIQ
13 year old, 92 VIQ, 63 PIQ
Linking Assessment to Intervention:

- Assessment should guide intervention, both at home and at school
  - Why is the problem occurring?
  - What skills need to be addressed?
  - What modification are needed?
  - Is the intervention succeeding?
Intervention

Method:
- Collect data.
- Define the problem in operational terms.
- Use theoretical model and assessment to understand the problem at a processing level.
- Develop intervention strategy:
  - At environmental level (teaching/classroom modifications).
  - At student level (teaching strategies/skills).
  - At motivation level (reinforcement for practicing/using skills).
  - Across settings (home/school/community)
Intervention

- Evaluate effectiveness
  - Was strategy implemented consistently?
  - How effective?
  - Shift approach of needed
  - Implement fading of cues/prompts
    - Does the child “own” the skill and use it independently?
Environmental Modifications:

- Modify the setting
- Modify the task
- Provide cues/prompts
Student Intervention:

- **Skills development**
  - Teach the executive skill directly.
  - Guide the student in using the skill over and over until it becomes part of the student’s repertoire.
  - Fade prompts systematically/incrementally until student is able to complete skill independently.
  - Provide incentive/contingencies to motivate use of skill/strategy in day to day activities.
    - See example
Creating a Behavior Contract

- Consider developmental levels
- Pick 1-3 behaviors to work on
- State behaviors positively
- Take baseline data to set goals
- Include the child in designing the contract
- Incorporate a reward, range of options
- Create for free
Specific skills:

- **Working memory:**
  - Modifications:
    - Provide external representation of information
    - Agenda books
    - Outlines
    - Visual prompts
    - To-do lists
    - Notes to view while listening
  - Skills development:
    - Mental rehearsal
    - Visualization
Specific skills:

- **Regulation of affect:**
  - **Modifications:**
    - Reduce stimulation in classroom
    - Maximize routine/predictability
    - Emotional previewing
      - This might be hard, what is your plan if you get frustrated?
    - Make goals easily accomplished
    - Intervene early in cycle of escalation
    - Model calm affect in response to child
  - **Skills Development:**
    - Teach child to use feeling words
    - Teach use of positive self-statements
    - Teach child to visualize coping under stress
    - Use social stories
    - Teach “cool down” technique
Specific skills:

- **Sustained attention:**
  - **Modifications:**
    - Reduce distractions in classroom
    - Preferential seating
    - Break tasks into short segments
    - Provide incentives for sustained attention
    - Silent timer
    - Use orienting cues
    - Use “secret cue”
    - Use high interest multi-sensory materials
    - Incorporate students’ interests
    - Include student frequently
    - Provide movement breaks
    - Provide opportunity to learn in distraction reduced environment with more intensive teacher interaction
Specific skills:

- **Sustained attention**
  - **Skills development:**
    - Teach attentional self-monitoring
      - Self-ratings and self short term attentional goals
      - Attentional scans
    - Teach self-help skills
      - What are my strategies to focusing?
      - Teach student to set up study plan based on awareness of attentional profile.
Specific skills:

- **Task initiation:**
  - **Modifications:**
    - Predictable routines
    - Start easy, then increase difficulty (behavior momentum)
    - Pair with another student with strong initiation skills
    - Establish short term goals for longer assignments/projects
    - Set up time lines
    - Use check lists
    - Allow some choice points
    - Start homework during school day.
  - **Skill Development:**
    - Help child establish a study routine
    - Break studying up into short segments with built in incentives (Premack).
Specific skills:

- **Planning and Organization:**
  - **Modifications:**
    - Provide clear/explicit directions
    - Provide rubric/model
    - Chunk task into shorter segments with check points to monitor progress
    - Provide task check list in sequential order
      - Written
      - Pictures
    - Use long-term planning sheet (see example).
    - Build in organization check-in at key time of day.

- **Skill Development:**
  - Teach strategies for materials management and include as part of task rubric
  - Teach child to verbalize plan aloud
  - Teach child to visual steps
  - Teach child to outline or diagram steps
  - Guide establishment of organizational habits.
Specific skills:

- **Time management:**
- **Modifications:**
  - Provide schedule to follow
  - Use routine check list with time limits
  - Use silent timer
  - Give time parameters (i.e. amount of time per assignment.
  - Provide incentive/contingency to instill urgency
  - Use Premack principle to motivate time urgency
- **Skill Development:**
  - Teach time estimation skills
    - What does task involve?
    - How long will each step take?
    - What road block might occur?
    - Compare predicted time to actual time after task.
Specific skills:

- **Persistence:**
- **Modifications:**
  - Easily accomplished short-term goals
  - Selective reduction in output expectations
  - Make goal explicit and meaningful
  - Make goal close-ended
    - What will add to meaningfulness?
      - Praise
      - Incentive/contingency
      - Engaging material
    - Add social element by working in groups
  - Skill Development:
    - Teach student to set up short term goals and self administered contingencies.
Specific skills:

• **Flexibility:**
  ○ **Modifications:**
    - Reduce novelty/unexpected changes
    - Provide ample warning before transitions
    - Provide “dry runs” for new activities
    - Provide systematic gradual exposure to new tasks
    - Provide pre-teaching for new concepts
    - Increase level of support for tasks requiring flexibility.
  ○ **Skills Development:**
    - Define and label issue of flexibility
    - Use social stories to help explain/frame concept
    - Cue child to “switch gears” when stuck
    - Teach adaptive self-statement that promote flexibility.
Specific skills:

• Meta-cognition:
  - Build meta-cognitive thinking skills into curriculum
  - Teach problem solving skills
    - What is to goal?
    - What is my plan?
    - Is this the best plan?
    - Am I following my plan?
    - How did I do?
    - What would I do differently next time?
References:

- Executive Skills in Children and Adolescents, by Peg Dawson and Richard Guare.

- ADHD and the Nature of Self-Control, by Russell Barkley.