A Five Dimensional Model of Executive Function: Cognition, Behavior, Social-Emotional, Academics, & Impairment!

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Resources and Disclosures
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- General information
- Copies of presentations, research and book chapters
- To ask a question

My Background

- Interest in intelligence and instruction
- Experiences at UGA
- Test development
- Need for science to support practice
- Psychometrics
- My personal perspective on being a researcher and test developer
- Evidence based interpretation
- My experience being tested...
Today’s Session

➢ Introduce yourself to your neighbors
  • We will be discussing various topics today and you need to know who your talking to
    • Name (write it down so you remember)
    • What they do
    • Share a something about yourself relative to EF

➢ Group Members
  • Spokesperson
  • Timer
  • Organizer

Presentation Outline

Comprehensive Model of EF
  • Historical Perspective
  • Definitions of Executive Function

➢ EF as Behavior
➢ EF as an Ability (an intelligence)
➢ EF as Social Emotional Skills
➢ Impairment and EF
➢ Research about EF as ability, behavior, and SE
➢ Think Smart! -- EF Skills in the Classroom or Clinic
  • More lesson plans for improving components of EF
  • Conclusions
EF Lesson on Saturday Night Live

➢ We will begin by learning about how EF can be taught to students, using one of the lessons in the project I’m working on
➢ The lessons teach aspects of EF and are structured as follows:
  • STEP 1 – View the video
  • STEP 2 – Discuss the video with the person sitting next to you.
  • STEP 3 – Share your ideas with everyone
EF Lesson on Saturday Night Live

- STEP 1 – View the video
- STEP 2 – Discussion of the video with someone sitting next to you.
- STEP 3 – Share your ideas with everyone

Time to Think and Talk

- Task: Talk with your partner(s)
- What was the main point?
- Was the goal achieved?
- Why was it so hard to get the students to think?
- Your own questions and thoughts...

START

4 minutes left
History Class: Saturday Night Live

- **STEP 1** – View the video
- **STEP 2** – Discussion of the video with someone sitting next to you.
  - Consider:
    - What was the main point?
    - Was the goal achieved?
    - What did the teacher do wrong?
    - Your own questions and thoughts..

- **STEP 3** – Share your ideas with everyone

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History Class: SNL

**Metacognition**

The ability to think about your thinking

**Phrase of the week:** Are you thinking about thinking?

Watch Seinfeld History Lesson Video:

http://www.schooltube.com/video/30747e2e060f4e4efc5b/

1. Why was the teacher frustrated in the video?
2. What could the students in the video have done differently?
3. Why was it so hard for the students to think about history?
4. Do you think about how you’re doing your work while you are actually doing it?

**Wrap-Up:**

This week whenever you are stuck, you must describe to the teacher what you did. How you got to where you are? This is an example of being aware of what you’re thinking, sometimes called “self-monitoring”. Write in your notebook how you think this could benefit you.
History Class: Student Comments

- ‘The teacher was frustrated because the students weren’t thinking about what he was saying’
- ‘They should have paused before responding so that they could think’
- ‘When you feel pressure you’ll say anything if you don’t know the answer’

History Class: Student Comments

- ‘The way teachers run the class stops you from thinking because they tell you there is only one way to do something – but it’s a fact that there is more than one way to solve a problem’
- ‘That’s what I like about this class, there are different ways to solve the problems’
- ‘We need to know why the teacher is getting us to learn history’
History Class: Saturday Night Live

- Teach students to think not just remember
- How to learn is just as important as what to learn
- This is what Executive Function is all about
- This is the theme of today’s workshop

Meltzer (2010)

- ‘Classroom instruction generally focuses on content (or the what to know), rather than on the how to do or learn...and does not address metacognitive strategies that teach students to think about how they think and learn’.
Why this Workshop on EF?

- Executive Function (EF) is the most important ability we have, because it provides us a way to decide how to do what we choose to do to achieve a goal.
- The best news is that EF can be taught.
- Instruction that improves EF will affect children’s ability to learn, their behavior, and their social skills.
- Improving EF will change a student’s life.

Executive Function Goals

- Today we will be thinking about thinking.
- I will be teaching you how to help people learn to do the things they want to do.
- The goal is to help students learn more by encouraging them consider how they do what they decide to do.
- The goal is to engage the frontal lobes.
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  • Historical Perspective
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    • More lesson plans for improving components of EF
    • Conclusions

The Curious Story of Phineas Gage

John Fleischman’s book “Phineas Gage: A Gruesome but True Story About Brain Science” is an excellent source of information about this person, his life, and how this event impacted our understanding of how the brain works; and particularly the frontal lobes.
The Curious Story of Phineas Gage

- September 13, 1848 26 year old Phineas Gage was in charge of a railroad track construction crew blasting granite bedrock near Cavendish, Vermont
- The job Phineas has is to use a “tamping iron” to set explosives
- The tamping iron is a rod about 3 ½ feet long weighing 13 ½ lbs pointed at one end

Fleishman (2002, p 70)

- From Damasio (1994) article in *Science*
- The rod passed through the left frontal lobe, between the two hemispheres, then to left hemisphere
- The damage was to the front of the frontal cortex more than the back, and the underside more than the top
Before . . . & . . . After

- **Before** the accident: ‘he possessed a well-balanced mind, was seen as a shrewd, smart business man, very energetic and persistent in executing all his plans of operation’ (p 59)

- **After** the accident: his ability to direct others was gone, he had considerable trouble with decision making, control of impulses and interpersonal relationships – management of intellect, behavior and emotion

A Bit of EF Neuroanatomy

- The case of Phineas Gage led to a better understanding of the frontal lobes; in particular the pre-frontal cortex.
- Rich cortical, sub-cortical and brain stem connections.
The dorsolateral prefrontal cortex is involved with the ability to plan, shift set, organize, remember and solve novel problems.

That is: planning and decision making, self monitoring, self correction, especially when responses are not well-rehearsed or contain novel sequences of actions.

The Curious Story of Phineas Gage

The Skull of Phineas Gage is at Harvard’s Warren Anatomical Museum
Frontal Lobes and Executive Function(s)

What do we mean by the term Executive Function(s)?

Executive Function (s)

- In 1966 Luria first wrote and defined the concept of Executive Function (EF)
- He credited Bianchi (1895) and Bekhterev (1905) with the initial definition of the process
Executive Functions

- Elkhonon Goldberg provides a valuable review of what the frontal lobes do
- Describes EF as the orchestra leader

Goldberg (2009, p. 4)

- “The frontal lobes ... are liked to intentionality, purposefulness, and complex decision making.”
- They make us human, and as Luria stated, are “the organ of civilization”
- Frontal lobes are about ... “leadership, motivation, drive, vision, self-awareness, and awareness of others, success, creativity, sex differences, social maturity, cognitive development and learning...”
What is Executive Function(s)

There is no formal excepted definition of EF

• We typically find a vague general statement of EF (e.g., goal-directed action, cognitive control, top-down inhibition, effortful processing, etc.).

• Or a listing of the constructs such as
  - Inhibition,
  - Working Memory,
  - Planning,
  - Problem-Solving,
  - Goal-Directed Activity,
  - Strategy Development and Execution,
  - Emotional Self-Regulation,
  - Self-Motivation

Goldstein, Naglieri, Princiotta, & Otero (2013)

➢ Executive function(s) has come to be an umbrella term used for many different “abilities”-- planning, working memory, attention, inhibition, self-monitoring, self-regulation and initiation -- carried out by pre-frontal lobes.

➢ We found more than 30 definitions of EF(s)
Executive Function(s)

- EF has is a **unitary** construct (Duncan & Miller, 2002; Duncan & Owen, 2000).
- EF is **unidimensional** in early childhood not adulthood.
- Both views are supported by some research (Miyake et al., 2000) EF is a **unitary construct** ... but with partially different components.

Executive Functions

- EF has **three components**: inhibitory control, set shifting (flexibility), and working memory (e.g., Davidson, et al., 2006).
- Executive Functions is a **multidimensional** model (Friedman et al., 2006) with independent abilities (Wiebe, Espy, & Charak, 2008).

**Executive Function(s)**

- Given all these definitions of EF(s) we wanted to address the question...
  
  Executive Functions ... or Executive Function?

- One way to answer the question is to research the factor structure of EF behaviors

- Factor structure of the Comprehensive Executive Function Inventory (CEFI)
CEFI  (Naglieri & Goldstein, 2012)

CEFI Full Scale (100 items)

1. Attention  
2. Emotion Regulation  
3. Flexibility  
4. Inhibitory Control  
5. Initiation  
6. Organization  
7. Planning  
8. Self-Monitoring  
9. Working Memory

CEFI Parent Rating Scale  
(Ages 5-18)  

CEFI Teacher Rating Scale  
(Ages 5-18)  

CEFI Self-Rating Scale  
(Ages 12-18)  

1. Consistency Index  
2. Negative Impression  
3. Positive Impression
**EXPLORATORY FACTOR ANALYSES**

- The normative samples for parents, teacher, and self ratings were randomly split into two samples and EFA conducted using
  - the item raw scores
  - nine scales’ raw scores

- The sample ...

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**CEFI Standardization Samples**

- Sample was stratified by
  - Sex, age, race/ethnicity, parental education level (PEL; for cases rated by parents), geographic region
  - Race/ethnicity of the child (Asian/Pacific Islander, Black/African American/African Canadian, Hispanic, White/Caucasian, Multi-racial by the rater
  - Parent (N=1,400), Teacher (N=1,400) and Self (N=700) ratings were obtained
EXPLORATORY FACTOR ANALYSES

90 Items: factor analysis clearly indicated that one factor was the best solution.

Nine item groups: Attention, Emotion Regulation, Flexibility, Inhibitory Control, Initiation, Organization, Planning, Self-Monitoring, and Working Memory scales form one factor.

Table 8.6. Consistency of Factor Loadings Across Groups

<table>
<thead>
<tr>
<th>Grouping Factor</th>
<th>CFI Form</th>
<th>Coefficient of Congruence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Parent</td>
<td>.999</td>
</tr>
<tr>
<td></td>
<td>Teacher</td>
<td>.999</td>
</tr>
<tr>
<td></td>
<td>Self-Report</td>
<td>.992</td>
</tr>
<tr>
<td>Race/Ethnic Group</td>
<td>Parent</td>
<td>.996</td>
</tr>
<tr>
<td></td>
<td>Teacher</td>
<td>.999</td>
</tr>
<tr>
<td></td>
<td>Self-Report</td>
<td>.995</td>
</tr>
<tr>
<td>Age</td>
<td>Parent</td>
<td>.999</td>
</tr>
<tr>
<td></td>
<td>Teacher</td>
<td>.999</td>
</tr>
<tr>
<td></td>
<td>Self-Report</td>
<td>.995</td>
</tr>
<tr>
<td>Clinical/Educational</td>
<td>Parent</td>
<td>.993</td>
</tr>
<tr>
<td></td>
<td>Teacher</td>
<td>.994</td>
</tr>
<tr>
<td></td>
<td>Self-Report</td>
<td>.976</td>
</tr>
</tbody>
</table>

Nearly identical factor solutions (ALL ONE FACTOR) by Gender, Race/Ethnic, Age and Clinical/typical status.
Adult CEFI Normative Samples

- Self and Observer results: 1 factor

![Graphs showing factor analysis results]

**EXPLORATORY FACTOR ANALYSES**

**Conclusions**
- CEFI: Parent (N=1,400), Teacher (N=1,400) and Self (N=700),
- CEFI Adult: Self (N = 1,600) and Observer (N = 1,600) ratings
- From nationally representative samples aged 5 to 80 years (N = 6,700) indicates .. Executive Function best describes the concept
EF and its components

- Abilities, cognitive processes, and behaviors

**Executive Function**
- Working Memory
- Flexibility
- Planning
- Attention
- Impulse Control
- Self-Control
- Emotion Regulation
- Self-Monitoring
- Inhibition
- Organization
- Initiation
- And more?

Naglieri & Goldstein, 2012

- Executive Function is: *how you do what you decide to do.*
Does a 13 month old have EF?

Age 19 months: Knowledge & EF
EF’s Learning Curves (Naglieri & Otero, 2017)

- Learning depends upon instruction and EF
- At first, EF plays a major role in learning
- When a new task is learned and practiced it becomes a skill and execution requires less EF

Executive Function Involves

“**How you decide what to do**” demands...

- **Initiation** to achieve a goal, **planning** and **organizing** parts of a task, **attending** to details to notice success of the solution, keeping information in **memory**, having **flexibility** to modify the solution as information from **self-monitoring** is received and demonstrating **emotion regulation** (which also demands **inhibitory control**) to ensure clear thinking so that the task is completed successfully.
Which Lemming has good EF?

EF: ability, behavior, social-emotional skill?

All are reflections of FRONTAL LOBE activity
Brain, Cognition, & Behavior

- **EF ability** is provided by the Frontal Lobes of the brain (an intelligence)
- **EF behaviors** are the result of experiences that influence likelihood that a person is strategic when doing things
- **EF Emotions** are the result of learning
- It is very important to measure **EF Behaviors** and **EF Ability** and **Emotion** because they may be different

Presentation Outline

- Comprehensive Model of EF
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- Conclusions
A look at some EF Rating Scales

From Handbook of Executive Function (Goldstein & Naglieri, 2014)

Review of Rating Scales

Assessment of Executive Function Using Rating Scales: Psychometric Considerations

Jack A. Naglieri and Sam Goldstein

Introduction

In any field of scientific study the information we obtain from research is directly related to the quality of the information we obtain from the tools we use. The better the tool, the more accurate and reliable the information that is obtained. Ultimately, the validity of the tools used in science will be proportionate to the quality of the concepts being evaluated. Ultimately, better tools are more effective for researchers and clinicians. The better the tools used in research and clinical practice, the more valid and reliable the decisions will be; the useful information obtained will be and ultimately, psychometric issues have for the assessment and the implications for interpretation of results will be emphasized. Special attention will be paid to scale development procedures, particularly methods used to develop derived scores. The second section of this chapter will focus on rating scales used to assess behaviors considered indicative of executive function. The overall aim is to provide an examination of the relevant psychometric issues and the extent to which researchers and clinicians can have confidence in the tools they may use to assess executive function.

Reliability
Five published rating scales were compared

- Delis-Rating of Executive Function (D-REF)
  Author: Delis C. Delis
  A quick measure of an individual's behaviors related to executive function difficulties

- Barkley Deficits in Executive Functioning Scale—Children and Adolescents (BDEFS-CA)
  Author: Russell A. Barkley

Comprehensive Executive Function Inventory (CEFI)

Jack A. Naglieri
Sam Goldstein

A rating scale designed to measure behaviors association with Executive Function for ages 5-18 years rated by a parent, teacher, or the child/youth.
CEFI Characteristics

- CEFI is a *strength based* measure of EF
- Items are positively worded
- Higher scores = more good behaviors related to EF
- Calibrated using mean of 100 SD of 15

CEFI Normative Samples

- 1,400 ratings by Parents for children aged 5-18 years
- 1,400 ratings by Teachers for children aged 5-18 years
- 700 ratings from the self-report form for those aged 12-18 years
- There were equal numbers of ratings of or by males and females
- Stratified according to the 2009 US Census by race/ethnicity, parental education, region, age, and sex
CEFI Administration & Scoring

CEFI Administration
& Scoring Methods

Paper and Pencil
Administration

Hand Scoring Using
CEFI Record Form

Examiner enters
responses in MHS
Online Assessment
Center: Automated
scoring and report

Online
Administration

Examiner enters
responses into CEFI
Scoring Software
Program: Automated
scoring and report

CEFI Forms

- The Comprehensive Executive Function Inventory (CEFI) measures behaviors associated with Executive Function (EF) for ages 5 to 18 years.
- The CEFI is completed by a parent, teacher, or the child/youth.
- Each form yields a Full Scale score and 9 separate content scales

CEFI Scales

- Attention
- Emotion Regulation
- Flexibility
- Inhibitory Control
- Initiation
- Organization
- Planning
- Self-Monitoring
- Working Memory
CEFI Items by Scale

Table C.4. Attention (12 items)

<table>
<thead>
<tr>
<th>Item #</th>
<th>Parent/Teacher Item</th>
<th>Self-Report Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>During the past 4 weeks, how often did the child...</td>
<td>During the past 4 weeks, how often did you...</td>
</tr>
<tr>
<td>3.</td>
<td>finish a boring task?</td>
<td>finish a boring task?</td>
</tr>
<tr>
<td>11.</td>
<td>work well in a noisy environment?</td>
<td>work well in a noisy environment?</td>
</tr>
<tr>
<td>21.</td>
<td>work well for a long time?</td>
<td>work well for a long time?</td>
</tr>
</tbody>
</table>

Table C.5. Emotion Regulation (9 items)

<table>
<thead>
<tr>
<th>Item #</th>
<th>Parent/Teacher Item</th>
<th>Self-Report Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>During the past 4 weeks, how often did the child...</td>
<td>During the past 4 weeks, how often did you...</td>
</tr>
<tr>
<td>10.</td>
<td>control emotions when under stress?</td>
<td>control emotions when under stress?</td>
</tr>
<tr>
<td>12.</td>
<td>stay calm when handling small problems?</td>
<td>stay calm when handling small problems?</td>
</tr>
<tr>
<td>42.</td>
<td>find it hard to control his/her emotions? (R)</td>
<td>find it hard to control your emotions? (R)</td>
</tr>
</tbody>
</table>

Table C.6. Flexibility (7 items)

<table>
<thead>
<tr>
<th>Item #</th>
<th>Parent/Teacher Item</th>
<th>Self-Report Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>During the past 4 weeks, how often did the child...</td>
<td>During the past 4 weeks, how often did you...</td>
</tr>
<tr>
<td>7.</td>
<td>come up with a new way to reach a goal?</td>
<td>come up with a new way to reach a goal?</td>
</tr>
<tr>
<td>41.</td>
<td>come up with different ways to solve problems?</td>
<td>come up with different ways to solve problems?</td>
</tr>
<tr>
<td>45.</td>
<td>have many ideas about how to do things?</td>
<td>have many ideas about how to do things?</td>
</tr>
</tbody>
</table>

Table C.7. Inhibitory Control (10 items)

<table>
<thead>
<tr>
<th>Item #</th>
<th>Parent/Teacher Item</th>
<th>Self-Report Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>During the past 4 weeks, how often did the child...</td>
<td>During the past 4 weeks, how often did you...</td>
</tr>
<tr>
<td>1.</td>
<td>think before acting?</td>
<td>think before acting?</td>
</tr>
<tr>
<td>10.</td>
<td>find it hard to control his/her actions? (R)</td>
<td>find it hard to control your actions? (R)</td>
</tr>
<tr>
<td>32.</td>
<td>think of the consequences before acting?</td>
<td>think of the consequences before acting?</td>
</tr>
</tbody>
</table>

Table C.8. Initiation (10 items)

<table>
<thead>
<tr>
<th>Item #</th>
<th>Parent/Teacher Item</th>
<th>Self-Report Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>During the past 4 weeks, how often did the child...</td>
<td>During the past 4 weeks, how often did you...</td>
</tr>
<tr>
<td>16.</td>
<td>start something without being asked?</td>
<td>start something without being asked?</td>
</tr>
<tr>
<td>30.</td>
<td>start conversations?</td>
<td>start conversations?</td>
</tr>
<tr>
<td>39.</td>
<td>take on new projects?</td>
<td>take on new projects?</td>
</tr>
</tbody>
</table>

Table C.9. Organization (10 items)

<table>
<thead>
<tr>
<th>Item #</th>
<th>Parent/Teacher Item</th>
<th>Self-Report Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>During the past 4 weeks, how often did the child...</td>
<td>During the past 4 weeks, how often did you...</td>
</tr>
<tr>
<td>5.</td>
<td>complete one task before starting a new one?</td>
<td>complete one task before starting a new one?</td>
</tr>
<tr>
<td>13.</td>
<td>organize his/her thoughts well?</td>
<td>organize your thoughts well?</td>
</tr>
<tr>
<td>18.</td>
<td>appear disorganized? (R)</td>
<td>appear disorganized? (R)</td>
</tr>
</tbody>
</table>

conclusions
One Factor and 9 Scales?

- NOTE: EF is a unidimensional concept
- Use the Full Scale to answer the question “Is the child poor in EF or not?”
- Use the 9 scales to identify the specific groups of items that represent 9 different types of behaviors that can be addressed by Intervention
CEFI Characteristics

- Automated scoring and reporting includes intervention suggestions
- Scores are based on nationally representative normative sample that is representative of the US

CEFI Normative Samples

- 1,400 ratings by Parents for children aged 5-18 years
- 1,400 ratings by Teachers for children aged 5-18 years
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- There were equal numbers of ratings of or by males and females
- Stratified according to the 2009 US Census by race/ethnicity, parental education, region, age, and sex
CEFI Administration & Scoring

CEFI Administration & Scoring Methods

Paper and Pencil Administration

Hand Scoring Using CEFI Record Form

Examiner enters responses in MHS Online Assessment Center: Automated scoring and report

Online Administration

Examiner enters responses into CEFI Scoring Software Program: Automated scoring and report

CEFI Full Scale (100 items)

1. Attention
2. Emotion Regulation
3. Flexibility
4. Inhibitory Control
5. Initiation
6. Organization
7. Planning
8. Self-Monitoring
9. Working Memory

1. Consistency Index
2. Negative Impression
3. Positive Impression

CEFI Parent Rating Scale (Ages 5-18)
CEFI Teacher Rating Scale (Ages 5-18)
CEFI Self-Rating Scale (Ages 12-18)
One Factor and 9 Scales?

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CEFI Scales
- Attention
- Emotion Regulation
- Flexibility
- Inhibitory Control
- Initiation
- Organization
- Planning
- Self-Monitoring
- Working Memory

CEFI Full Scale and Treatment Scores

Figure 4.1. Illustration of Executive Function Weakness and Strengths on the CEFI (5–18 Years) Teacher Form

<table>
<thead>
<tr>
<th>CEFI Scales</th>
<th>Standard Score</th>
<th>Difference From Youth's Average</th>
<th>Statistically Significant? (Yes/No)</th>
<th>Executive Function Strength/Weakness</th>
<th>99%/95% (circle) Confidence Interval</th>
<th>Percentile Rank</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ar4ention (AT)</td>
<td>95</td>
<td>-6.7</td>
<td>Yes</td>
<td>—</td>
<td>90 to 100</td>
<td>37</td>
<td>Average</td>
</tr>
<tr>
<td>Emotion Regulation (ER)</td>
<td>82</td>
<td>-16.7</td>
<td>Yes</td>
<td>77 to 82</td>
<td>12 Low Average</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexibility (FX)</td>
<td>112</td>
<td>10.3</td>
<td>Yes</td>
<td>Strength</td>
<td>103 to 118</td>
<td>79 High Average</td>
<td></td>
</tr>
<tr>
<td>Inhibitory Control (IC)</td>
<td>99</td>
<td>-2.7</td>
<td>No</td>
<td>92 to 105</td>
<td>47 Average</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initiation (IT)</td>
<td>120</td>
<td>18.3</td>
<td>Yes</td>
<td>Strength</td>
<td>112 to 125</td>
<td>91 Superior</td>
<td></td>
</tr>
<tr>
<td>Organization (OG)</td>
<td>99</td>
<td>-2.7</td>
<td>No</td>
<td>93 to 105</td>
<td>47 Average</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning (PL)</td>
<td>101</td>
<td>3.3</td>
<td>No</td>
<td>95 to 109</td>
<td>55 Average</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Monitoring (SM)</td>
<td>102</td>
<td>-0.7</td>
<td>No</td>
<td>98 to 105</td>
<td>53 Average</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working Memory (WM)</td>
<td>105</td>
<td>0.3</td>
<td>No</td>
<td>99 to 111</td>
<td>63 Average</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum of Standard Scores</td>
<td>915</td>
<td>101.7</td>
<td>Youth's Average</td>
<td>915 Youth's Average</td>
<td>63 Average</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: Differences from the Child’s Youth’s Average are significant at p < .10.
Free Use of CEFI: http://info.mhs.com/cefi

Free Use of CEFI: mhs.com/cefi
CEFI Interpretive Report

Youth's Name/ID: Brittany Ambers

Age: 12 years
Gender: Female
Birth Date: November 18, 1999
Check: 6
School: K.H.S.
Parent's Name/ID: Mrs. Z.
Relationship to Youth: Mother
Administration Date: May 19, 2012
Examiner: CM
Data Entered By: MG

Overview of Results for Brittany Ambers
Scores in Relation to the Norm
Brittany Ambers' results are provided in the graph below:

- Youth's Average
- Full Scale
- Attention
- Emotion Regulation
- Flexibility
- Inhibitory Control
- Initiation
- Organization
- Planning
- Self-Monitoring
- Working Memory

Standard Score Percentile Rank

Well Below Average: 75
Below Average: 79
Low Average: 84
Average: 90
High Average: 96
Superior: 102
Very Superior: 108

CEFI Interpretive Report
CEFI Interpretive Report

CEFI Results

Brittany Amber’s Full Scale standard score of 75 falls in the Below Average range and is ranked at the 9th percentile. This means that her score is equal to, or greater than, 5% of those obtained by youth her age in the standardization group. There is a 90% probability that Brittany Amber’s true Full Scale standard score is within the range of 73 to 78. The CEFI Full Scale score is made up of items that belong on separate scales called Attention, Emotion Regula­tion, Flexibility, Inhibitory Control, Initiation, Organization, Planning, Self-Monitoring, and Working Memory. There was no significant variation among the CEFI Scales. This indicates that Brittany Amber obtained similar scores on the separate scales. This also means that the Full Scale is a good description of her executive function behaviors.

Brittany Amber’s Initiation scale score describes how she begins tasks or projects on her own, including starting tasks easily, being motivated, and taking the initiative when needed. Her standard score of 84 falls in the Low Average range and is ranked at the 14th percentile. There is a 90% probability that her true initiation standard score is within the range of 78 to 93. Item score variability suggests that ratings for Brittany Amber were low on, for example, initiating conversations and putting plans into action.

Brittany Amber’s Flexibility scale score describes how she adjusts her 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. Her standard score of 80 falls in the Low Average range and is ranked at the 9th percentile. There is a 90% probability that her true flexibility standard score is within the range of 74 to 92. Ratings for Brittany Amber were low on, for example, using a different strategy when another doesn’t work.

Brittany Amber’s Attention scale score reflects how well she can avoid distractions, concentrate on tasks, and sustain attention. Her standard score of 75 falls in the Below Average range and is ranked at the 9th percentile. There is a 90% probability that her true Attention standard score is within the range of 74 to 97. Variability in item scores indicates that ratings for Brittany Amber were low on, for example, finishing a boring task, avoiding distraction and noticing details. (See the CEFI Items by Scale section of this report for additional low item scores.)

Intervention Strategies are provided for each of the 9 CEFI scales
Time to Think and Talk

(Task:
Discuss in your groups
• EF as a single concept
• Other ideas
• Your own questions and thoughts..
• Report to the audience)

Presentation Outline

- Comprehensive Model of EF
  • Historical Perspective
  • Definitions of Executive Function
- EF as Behavior
- EF as an Ability (an intelligence)
- EF as Social Emotional Skills
- Impairment and EF
- Research about EF as ability, behavior, and SE
- Think Smart! -- EF Skills in the Classroom
  • More lesson plans for improving components of EF
- Conclusions
EF is a Brain-Based Ability

- EF is an ability by virtue of its relationship to the brain
- Because there is a relationship between BRAIN FUNCTION and BEHAVIOR, behaviors tell us about the ABILITY (sometimes...)
- EF skills are the result of EF Ability and well practiced behaviors that reflect EF
  - Not all abilities and not all behaviors involve EF

A Theory of Learning

Cognitive Assessment System: Redefining Intelligence From a Neuropsychological Perspective

Jack A. Naglieri and Tulio M. Otero
Brain, Cognition, & Behavior

- The brain is the seat of abilities called PASS
- These abilities comprise what has been described as a modern view of intelligence (Naglieri & Otero, 2011)


IQ defined by BRAIN function

- PASS theory is a modern way to define ‘ability’ (AKA – intelligence)
- Planning = THINKING ABOUT THINKING
- Attention = BEING ALERT
- Simultaneous = GETTING THE BIG PICTURE
- Successive = FOLLOWING A SEQUENCE
The Brain and Intelligence as PASS

PASS: A neuropsychological approach to intelligence based on three Functional Units described by A. R. Luria (1972)

100 Years of Intelligence and IQ

http://www.jacknaglieri.com/cas2.html
CAS2 (Ages 5-18 yrs.)

- CAS2 Yields PASS and Full Scale score but ALSO
- Executive Function which is the combination of a Planning and Attention subtests
- Also: Working Memory, Verbal, Nonverbal and a Visual and Auditory comparison
PASS Theory: Planning

Planning is a neurocognitive ability that a person uses to determine, select, and use efficient solutions to problems
- problem solving
- developing plans and using strategies
- retrieval of knowledge
- impulse control and self-control
- control of processing

Planned Codes 1
Math Strategies

Note to the Teacher: When we teach children skills by helping them use strategies and plans for learning, we are teaching both knowledge and processing. Both are important.

PASS Theory: Planning

Planning
- Evaluate a task
- Select or develop a strategy to approach a task
- Monitor progress during the task
- Develop new strategies when necessary

Examples of classroom problems related to Planning
- Using the same strategy even if it is not effective
- Struggling with how to complete tasks
- Not monitoring progress during a task
- Misinterpretation of what is read

POOR PLANNING

Efintheclassroom.net

Planning Lesson

Phrase of the week: What is your plan?

http://www.youtube.com/watch?v=bQLCZOG20zk

1. What had to happen so that the people could dance together in this video?
2. What are the parts of a good plan?
3. How do you know if a plan is any good?
4. What should you do if a plan isn't working?
5. How do we use planning in this class?

Go to student learning log and create a plan for the week.
Antwerp Train Station (2009)

Planning Lesson Student responses

Q: What would you have to plan out?
- They had to learn the dance steps (knowledge)
- Someone had to start dancing (initiation)
- Permission from train station (planning)

Q: What are the parts of a good plan?
- Think of possible problems (strategy generation)
- Organize the dance (organization)
- Practice the dance steps (initiation)
- Have a good idea of what to do (knowledge)
Planning Lesson Student responses

Q3: How do you know if a plan is any good?
   • Put the plan in action and see if it works (self-monitoring)
   • Give it a try (perhaps learn by failing)

1. Q4: What should you do if a plan isn’t working?
   1. Fix it. (self-correction)
   2. Go home! (a bad plan)

Planning Lesson Student responses

Q5: How do you use planning in this class?
   1. We don’t plan in this class
   2. Mrs. XXX does all the planning in this class so you don’t have to think about planning

How might students react to being told that now they have to think and planning?
   Like the Seinfeld video
This Planning Lesson

- This lesson brings to light the important distinction between planning over a long time (what was just shown) and real time planning.

EF Instruction

- We use posters like this one to remind the students of the importance of PLANNING.
Encourage Planning

  By Jack A. Naglieri, Ph.D., & Eric B. Pickering, Ph.D.,
- Spanish handouts by Tulio Otero, Ph.D., & Mary Moreno, Ph.D.

Step 1 – Talk with Students

**How to Be Smart: Planning**

When we say people are smart, we usually mean that they know a lot of information. But being smart also means that someone has a lot of ability to learn new things. Being smart at learning new things includes knowing and using your thinking abilities. There are ways you can use your abilities better when you are learning.

**What Does Being Smart Mean?**

One ability that is very important is called *Planning*. The ability to *plan* helps you figure out *how to do things*. When you don’t know how to solve a problem, using Planning ability will help you figure out how to do it. This ability also helps you control what you think and do. It helps you to stop before doing something you shouldn’t do. Planning ability is what helps you wait until the time is right to act. It also helps you make good decisions about what to say and what to do.
Step 1 – Talk with Students

How Can You Be Smarter?

You can be smarter if you PLAN before doing things. Sometimes people say, “Look before you leap,” “Plan your work and work your plan,” or “Stop and think.” These sayings are about using the ability to plan. When you stop and think about how to study, you are using your ability to plan.

You will be able to do more if you remember to use a plan. An easy way to remember to use a plan is to look at the picture “Think smart and use a plan!” (Figure 1). You should always use a plan for reading, vocabulary, spelling, writing, math problem solving, and science.

Do you have a favorite plan for learning spelling words? Do you use flashcards or go on the Internet to learn? Do you ask the teacher or another student for help? You can learn more by using a plan for studying that works best for you.

Think smart and use a plan!

I figured out how to do it!

Use a plan.

It is smart to have a plan for doing all schoolwork. When you read, you should have a plan. One plan is to look at the questions you have to answer about the story first. Then read the story to find the answers. Another plan is to make a picture of what you read so that you can see all the parts of the story. When you write you should also have a plan. Students who are good at writing plan and organize their thoughts first. Then they think about what they are doing as they write. Using a plan is a good way to be smarter about your work!
Attention is a neurocognitive ability that a person uses to selectively attend to some stimuli and ignore others

- selective attention
- focused cognitive activity over time
- resistance to distraction

Attention Test Instructions:
You will see words like **RED**
Your task: say the COLOR (green) not the word (red)

READY?
**Expressive Attention - Italiano**

<table>
<thead>
<tr>
<th>ROSSO</th>
<th>BLU</th>
<th>VERDE</th>
<th>GIALLO</th>
</tr>
</thead>
<tbody>
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<td>BLU</td>
<td>GIALLO</td>
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</tbody>
</table>
Expressive Attention – Korean CAS

- The child says the color not the word

<table>
<thead>
<tr>
<th>노랑</th>
<th>초록</th>
<th>빨강</th>
<th>파랑</th>
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<td>빨강</td>
<td>초록</td>
</tr>
</tbody>
</table>

Attention

This sheet has a strong Attention demands because of the similarity of the options.
PASS Theory: Attention

Attention
- Focus on one thing and ignore others
- Resist distractions in the learning environment

Examples of classroom problems related to Attention
- Trouble focusing on what is important
- Difficulty resisting distractions
- Difficulty working on the same task for very long
- Unable to see all the details
- Providing incomplete or partially wrong answers


Efintheclassroom.net
Attention Lesson
- Start by making students aware of what attention is ...
- View Attention video from Apollo Robbins
- Then provide Discussion
  - What did you learn from this video?
  - How can you attend better?
  - How can you resist distractions better?
- Then an Assignment – Make a list of times when you did well, and not so well, paying attention, noticing details, and resisting distractions.
Efintheclassroom.net
Attention Lesson

Sustained Attention Lesson

Phrase of the week: Where is your focus?
Video: http://www.youtube.com/watch?v=jlKCT-simmBo&noredirect=1

Q1: Why do you think you were tricked by this video?

Q2: How do you decide what to pay attention to, and what not to, in this class?

Q3: What are you biggest distractions in class? What will you have the hardest time ignoring?

Hand out Learning Logs:
Students go to SA section and create a list they (or the class as a whole) will try to ignore this week.

Attention Lesson
Time to Think and Talk

- **Task:**
  - Why do you think you were tricked by this video?
  - How do you decide what to pay attention to, and what not to, in this class?
  - What are your biggest distractions in class?
  - What will you have the hardest time ignoring?
  - Your own questions and thoughts...

---

**EF ability and the brain**

- Planning and Attention have been included in conceptualizations of Executive Function
- The next two abilities are **not** related to EF
  - We will see what they are and ...
  - See how we can improve performance when these abilities are required by using EF (strategies) to improve performance
PASS Theory

- **Simultaneous** is a neurocognitive ability a person uses to integrate stimuli into groups
  - Parts are seen as a whole
  - Each piece of information is related to others
  - Visual spatial tasks like blocks and puzzles on the Wechsler Nonverbal Scale
  - KABC Simultaneous Scale

Progressive Matrices
PASS Theory

- Simultaneous processing is what Gestalt psychology was based on
- Seeing the whole

Verbal-Spatial Relations

Which picture shows a boy behind a girl?
Numbers from 1 to 100

How can EF be brought to this Work sheet?

Use Simultaneous processing to see that patterns

PASS Theory: Simultaneous

Simultaneous Processing

- Relate separate pieces of information into a group
- See how parts related to whole
- Recognize patterns

Examples of classroom problems related to Simultaneous Processing

- Difficulty comprehending text
- Difficulty with math word problems
- Trouble recognizing sight words quickly
- Trouble with spatial tasks
- Often miss the overall idea

Simultaneous ability in action, and no self-correction (EF)

How do you help a child with low simultaneous ability?
Teach students to USE STRATEGIES
What kinds of strategies could you use for tasks that require seeing the whole?
Use EF

Figure 1. One kind of graphic organizer.

Venn Diagram

Figure 2. A Venn diagram used as a graphic organizer.

1. Select information that you need to present to the child (which may be from a story, a chapter, or any concept).
2. Determine the key components that are necessary for the child to learn.
3. Create the graphic representation of the information. The illustration should include the key concepts, concepts the child already knows, and the linkages between the concepts.
4. Present the organizer to the child and discuss it to be sure he or she understands the information and sees the connections.
Successive Processing Ability

- **Successive** processing is a basic cognitive ability which we use to manage stimuli in a specific serial order
  - Stimuli form a chain-like progression
  - Stimuli are not inter-related

Sentence Questions (Ages 8-17)

- The child answers a question read by the examiner

1. The blue is yellow. Who is yellow?

10. The red greened the blue with a yellow. Who used the yellow?

20. The red blues a yellow green of pinks, that are brown in the purple, and then grays the tan. What does the red do first?
Successive

The sequence of the sounds is emphasized in this worksheet.

PASS Theory: Successive

Successive Processing

- Use information in a specific order
- Follow instructions presented in sequence

Examples of classroom problems related to Successive Processing:

- Trouble blending sounds to make words
- Difficulty remembering numbers in order
- Reading decoding problems
- Difficulty remembering math facts when they are taught using rote learning ($4 + 5 = 9$).

Time to Think and Talk

Task:

- How can you bring EF to the tasks that require Simultaneous and Successive Abilities?
- Your own questions and thoughts..

Ben’s Problem with Successive Processing

Ben was an energetic but frustrated third-grade student who liked his teachers, was popular with his peers, and fit in well socially at school. However, Ben said he did not like school at all, particularly schoolwork. Ben was good at turning in all of his work on time, and he worked hard, but he earned poor grades. He appeared to be getting more and more frustrated at school.

In general, Ben struggled to perform well because he had a lot of trouble following directions that were not written down, his writing often did not make sense, and he did not appear to comprehend what he read. Ben’s teachers noticed that when directions for assignments and projects were given orally in class, he often only finished part of the task. Ben’s teacher described an assignment in which students had to collect insects, label them, organize them into a collection, and then give a brief presentation about each insect. Unlike any other student, Ben chose to make the labels for the insects first and then go look for the insects. He found only a few of the insects he had made labels for, and when he put them in the collection, they were not in the order that had been specified. He also had trouble with the spelling of the scientific names of the insects and made many errors in the sequence of letters in the words.
Ben’s Problem with Successive processing Ability

Scores (M = 100, SD = 15)

- EF “Ability” is good but he isn’t using this ability to solve problems

---

**Case of Ben**

- Planning = Strength
- Successive = Weakness and it is < 85; so it can be considered a ‘disorder in basic psychological processes’

<table>
<thead>
<tr>
<th>Ability</th>
<th>Score</th>
<th>Diff</th>
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</thead>
<tbody>
<tr>
<td>Planning</td>
<td>114</td>
<td>14</td>
</tr>
<tr>
<td>Attention</td>
<td>106</td>
<td>6</td>
</tr>
<tr>
<td>Simultaneous</td>
<td>96</td>
<td>-4</td>
</tr>
<tr>
<td>Successive</td>
<td>84</td>
<td>-16</td>
</tr>
<tr>
<td>PASS Mean</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>
Ben’s Problem with Successive Ability

- Ben has difficulty whenever ANY task requires sequencing
  - Academic or ability tests
  - Visual or auditory tests
  - Math or spelling or reading
  - Tasks that require memory of sequences
- How do we help him learn better?

Teach Children about their Abilities

- Helping Children Learn Intervention Handouts for Use in School and at Home, Second Edition
  By Jack A. Naglieri, Ph.D., & Eric B. Pickering, Ph.D.,
- Spanish handouts by Tulio Otero, Ph.D., & Mary Moreno, Ph.D.
Use EF with Sequencing Tasks

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Ben’s Problem with Successive Ability

➢ Teach him to use his strength in Planning

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Ben’s Problem with Successive Ability

➤ Teach him to recognize sequences

How to Teach Successive Processing Ability

1. Teach children that most information is presented in a specific sequence so that it makes sense.
2. Encourage children by asking, “Can you see the sequence of events here?” or “Did you see how all of this is organized into a sequence that must be followed?”
3. Remind the students to think of how information is sequenced in different content areas, such as reading, spelling, and arithmetic, as well as in sports, playing an instrument, driving a car, and so forth.
4. Teach children that the sequence of information is critical for success.
5. Remind students that seeing the sequence requires careful examination of the serial relationships among the parts.

Ben’s Problem with Successive Ability

➤ Teach him to use strategies

Chunking for Reading/Decoding

Segmenting Words for Reading/Decoding and Spelling

Decoding a written word requires the person to make sense out of printed letters to translate letter sequences into sounds. This demands understanding the sounds that represent and how letters work together to make sounds. Sometimes words can be divided into parts for easier and faster reading. The word into is a good example because words that a child may already know: in and to. Segmenting words can be a helpful strategy in reading as well as spelling.

How to Teach Segmenting Words

Segmenting words is an effective strategy to help students read and spell. By dividing
**Take Away Messages**

- CAS Planning and Attention scores tell about Executive Function
  - So CAS *includes* EF as a critical part of ability (aka intelligence)

- Traditional IQ tests do not measure Executive Function
  - So EF is the important ability missed when you look at an IQ score

**Presentation Outline**

- Comprehensive Model of EF
  - Historical Perspective
  - Definitions of Executive Function
- EF as Behavior
- EF as an Ability (an intelligence)
- EF as Social Emotional Skills
- Impairment and EF
- Research about EF as ability, behavior, and SE
- **Think Smart!** -- EF Skills in the Classroom
  - More lesson plans for improving components of EF
- Conclusions
Phineas had Social Emotional deficit

- Phineas had profound social emotional problems after his injury to the frontal lobes
- Phineas is
  - insulting
  - impulsively say things
  - uses vulgar language
  - can’t manage his emotions
  - inconsistent in social situations
  - doesn’t recognize he is offensive
  - looses control in interactions with others

Frontal Lobes and Emotion

- Goldberg (2011, p 116-117)
  - the “emphasis in the classic studies of frontal lobe syndromes was on cognition [intelligence] rather than on affect [social emotional]”
  - ‘very few researchers have attempted to merge cognitive and emotional aspects of frontal lobe dysfunction’
Feiffer & Rattan (2009)

- Provide a collection of paper on the relationship between EF and Emotional Disorders
- See Feifer@comcast.net

Feiffer & Rattan (2009) on EF and Frontal Lobes

The Cerebral Orchestra of Emotions: Cortical Regions

1. Orbitofrontal cortex - region of the brain responsible for ascribing an emotional valence or value judgment to another's feelings. Often triggers an automatic social skills response (Rolls, 2004).
   - Has rich interconnections with the limbic system by way of the uncinate fasciculus.
   - Responsible for emotional executive functioning.
   - Self-regulation of behavior, highest levels of emotional decision making dictated by this brain region.

2. Ventrolateral prefrontal cortex - responsible for response inhibition and emotional regulation.
   - Has rich interconnections with the limbic system.
   - Also involved with emotional executive functioning.
   - Situated adjacent to orbitofrontal cortex and involved in the ability to take another's perspective on an emotional event (theory of mind).
Social Emotional Skills: From Conceptual to Assessment to Instruction

www.casel.org
Research Links SEL to Higher Success

- 23% gain in SE skills
- 9% gain in attitudes about self/others/school
- 9% gain in pro-social behavior
- 11% gain on academic performance via standardized tests (math and reading)

And Reduced Risks for Failure

- 9% difference in problem behaviors
- 10% difference in emotional distress


Skills for Social and Academic Success

Social Emotional Skills

Five key social-emotional skills from CASEL

- Self-awareness—being able to accurately assess one’s feelings, interests, values, and strengths; maintaining a well-grounded sense of self-confidence
- Self-management—being able to regulate one’s emotions to handle stress, control impulses, and persevere in overcoming obstacles; setting and monitoring progress toward personal and academic goals; expressing emotions effectively
- Social awareness—being able to take the perspective of and empathize with others; recognizing and appreciating individual and group similarities and differences; recognizing and using family, school, and community resources
- Relationship skills—being able to establish and maintain healthy and rewarding relationships based on cooperation; resisting inappropriate social pressure; preventing, managing, and resolving interpersonal conflict; seeking help when needed
- Responsible decision-making—being able to make decisions based on consideration of reason, ethical standards, safety concerns, social norms, respect for self and others, and likely consequences of various actions; applying decision-making skills to academic and social situations; contributing to the well-being of one's school and community.
Kong (2013): IQ, SEL & Achievement

- Tiffany Kong studied CogAT, DESSA, and achievement scores for 276 elementary students grades K-8
- All gifted based on scores on verbal, quantitative, or nonverbal test scores at least 97th percentile

Ability, Social Emotional & Skills

![Chart showing IQ, Social Emotional, and SAT scores for Series 1](chart.png)
Kong (2013): IQ, SEL & Achievement

- DESSA Total correlated .44 and CogAT Total correlated .36 with Total Achievement (reading, math, language)
  - A clearer picture of the relationships between IQ (CogAT) and SEL (DESSA) with achievement was obtained from hierarchical regression analysis...

Kong (2013) SEL Predicts Beyond IQ (p. 44)

Relations between Cognitive Ability, Socioemotional Competency, and Achievement Variables

Hierarchical regression analyses were conducted to determine which scales and subtests predicted the most variance in the dependent achievement variables.

Composite CogAT scores were not found to significantly predict composite achievement, $R^2\Delta = .03, F(1, 121) = 3.27, p > .05$, reading, language, or math scores over-and-above the DESSA Total scores (Table 11). On the other hand, the DESSA Total scores significantly predicted composite achievement, $R^2\Delta = .05, F(1, 121) = 6.99, p < .05$; language scores, $R^2\Delta = .03, F(1, 121) = 4.26, p < .05$; and math scores, $R^2\Delta = .05, F(1, 121) = 6.09, p < .05$, over-and-above the composite CogAT scores.
The DESSA Comprehensive System

- Universal screening with an 8-item, strength-based behavior rating scale, the DESSA-mini for universal screening and ongoing progress monitoring
- 72-item DESSA to find specific areas of need

Paul LeBuffe & Valerie Shapiro

http://www.centerforresilientchildren.org/
Assessment of Social Emotional Skills with the DESSA

The DESSA

- Based on resilience theory & SEL principles described by CASEL
  - Identify social-emotional strengths and needs of elementary and middle school children (for K-8th grade)
  - 72 items and 8 scales
  - Completed by parents, teachers, and/or after-school / community program staff
  - Takes 15 minutes to complete
  - On-line administration, scoring and reporting available
DESSA Norms

- 2,475 children, grades K-8
- All 50 states included in sample
- Representative of US Population

### Table 2.1

<table>
<thead>
<tr>
<th>Grade</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
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<td>1st Grade</td>
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<td>3rd Grade</td>
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<td>160</td>
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<td>4th Grade</td>
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<td>5th Grade</td>
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<td>138</td>
<td>276</td>
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<tr>
<td>6th Grade</td>
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<td>7th Grade</td>
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<tr>
<td>8th Grade</td>
<td>46</td>
<td>58</td>
<td>104</td>
</tr>
<tr>
<td>Total</td>
<td>1,256</td>
<td>1,249</td>
<td>2,475</td>
</tr>
</tbody>
</table>

### CASEL and DESSA Scales

**Social Emotional Composite**

- **Self Awareness**
- **Self Management**
- **Social Awareness**
- **Relationship Skills**
- **Decision Making**
- **Goal Directed Behavior**
- **Personal Responsibility**
- **Optimistic Thinking**

1. Self-awareness—being able to accept and understand one’s strengths; maintaining a well-balanced self-image.
2. Self-management—being able to control impulses, and persevere to reach personal and academic goals.
3. Social awareness—being able to understand others; recognizing and appreciating differences, recognizing and using strengths.
4. Relationship skills—being able to establish and maintain healthy and satisfying personal and social relationships based on cooperation, resolving conflict, and respect for others.
5. Responsible decision-making—being able to consider the reasons, ethical and legal implications, and consequences of decisions for self and others, and likely consequences of decision making skills in academic and social contexts.
Interventions for DESSA

Take Away Messages

- Social Emotional Skills are the result of EF and what the person has learned in all aspects of the environment
- Children CAN BE TAUGHT good, or bad, social emotional skills
Presentation Outline

- Comprehensive Model of EF
  - Historical Perspective
  - Definitions of Executive Function
- EF as Behavior
- EF as an Ability (an intelligence)
- EF as Social Emotional Skills

Impairment and EF

- Research about EF as ability, behavior, and SE
- **Think Smart!** -- EF Skills in the Classroom
  - More lesson plans for improving components of EF
- Conclusions

Rating Scale of Impairment & EF

- EF and Impairment ...
Definition of Impairment

➢ “Impairment is a reduced ability to meet the demands of life because of a psychological, physical, or cognitive condition” (Goldstein & Naglieri, 2016, p. 6).
➢ World Health Organization’s International Classification of Functioning, Disability and Health (WHO, 2001) also has guidelines for impairment.

Standardization

➢ RSI Normative Sample:
  • **2800** ratings
    • **800** ratings for each of the RSI (5-12 Years) Parent and Teacher forms
    • **600** ratings for each of the RSI (13-18 Years) Parent and Teacher forms
➢ Within **1% the 2010 U.S. Census** targets on:
  • Race/ethnicity,
  • Region,
  • PEL
➢ Includes **11.6%-11.8%** of clinical cases
Factorial Support for RSI Scales

- Exploratory and confirmatory factor analyses confirm the RSI structure
  - 5 factors: School, Social, Mobility, Domestic, and Family for the RSI (5–12 Years) Parent Form
  - 6 factors: School/Work, Social, Mobility, Domestic, Family, and Self-Care) for the RSI (13–18 Years) Parent Form
  - 3 factors: School, Social, and Mobility) for the RSI (5–12 Years) and RSI (13–18 Years) Teacher Forms.
RSI and EF correlations

<table>
<thead>
<tr>
<th>RSI Total Score</th>
<th>Adaptive Behavior</th>
<th>Symptom Scales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Social-Emotion Competency</td>
<td></td>
</tr>
<tr>
<td>-54</td>
<td>Adaptive Behavior Assessment System-II</td>
<td>.26 Conners CBRS — Content Scales</td>
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<tr>
<td>-71</td>
<td>Devereux Student Strength Assessment</td>
<td>.29 Conners CBRS — Symptom Scales</td>
</tr>
<tr>
<td>-78</td>
<td>Comprehensive Executive Function Inventory</td>
<td>.05 Wechsler Intelligence Scale for Children-IV</td>
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<tr>
<td></td>
<td></td>
<td>-.06 Woodcock Johnson III Achievement</td>
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<tr>
<td></td>
<td></td>
<td>-.03 Cognitive Assessment System</td>
</tr>
</tbody>
</table>

Presentation Outline

- Comprehensive Model of EF
  - Historical Perspective
  - Definitions of Executive Function
- EF as Behavior
- EF as an Ability (an intelligence)
- EF as Social Emotional Skills
- Impairment and EF
- Research about EF as ability, behavior, and SE
- **Think Smart!** -- EF Skills in the Classroom
  - More lesson plans for improving components of EF
- Conclusions
Executive Function Behaviors, Intelligence, and Achievement
test scores

EF and Achievement (Naglieri & Rojahn, 2004)

Construct Validity of the PASS Theory and CAS: Correlations With Achievement

Jack A. Naglieri and Johannes Rojahn
George Mason University

The relationship among Planning, Attention, Simultaneous, and Successive (PASS) processing scores of the Cognitive Assessment System (CAS) and the Woodcock-Johnson Revised Tests of Achievement (WJ-R) were examined with a sample of 1,550 students aged 5–17 years. Participants were part of the CAS standardization sample and closely represented the U.S. population on a number of important demographic variables. Pearson product-moment correlation between CAS Full Scale and the WJ-R Skills cluster was .71 for the Standard and .70 for the Basic CAS Battery scales, providing evidence for the construct validity of the CAS. The CAS correlated with achievement as well if not better than tests of general intelligence. The amount of variance in the WJ-R scores the CAS accounted for increased with age between 5- to 13-year-olds. The 4 PASS scale scores cumulatively accounted for slightly more of the WJ-R variance than the CAS Full Scale score.

There are many ways in which the validity of a theory of cognitive ability may be evaluated. Psychologists often attempt to relate information about a child’s cognitive characteristics to that child’s academic performance. Because cognitive ability and academic achievement share a significant portion of the same com-
EF and Achievement  (Naglieri & Rojahn, 2004)

- Correlation between Executive Function (Planning + Attention) and overall achievement (Skills Cluster) = .51 (N = 1,559; p < .001)
- P&A added significantly to the prediction of achievement after Simultaneous and Successive scores were used in the regression equation

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Fraction Product-Moment Correlations Between the CAS Basic Battery and Standard Battery Full Scale Scores and the WJ III Subscale and Cluster Scores (N = 1,559)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WJ III subscale</td>
<td>CAS Standard Battery subscale</td>
</tr>
<tr>
<td>Planning</td>
<td>Simultaneous</td>
</tr>
<tr>
<td>WJ III subscale</td>
<td>Planning</td>
</tr>
<tr>
<td>Letter-Word Identification</td>
<td>.47</td>
</tr>
<tr>
<td>Passage Comprehension</td>
<td>.43</td>
</tr>
<tr>
<td>Calculation</td>
<td>.50</td>
</tr>
<tr>
<td>Applied Problems</td>
<td>.49</td>
</tr>
<tr>
<td>Dictation</td>
<td>.50</td>
</tr>
<tr>
<td>Word Attack</td>
<td>.41</td>
</tr>
<tr>
<td>Reading Vocabulary</td>
<td>.42</td>
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<tr>
<td>Quantitative Concepts</td>
<td>.51</td>
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<tr>
<td>Proofing</td>
<td>.44</td>
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<tr>
<td>WJ III clusters</td>
<td>Planning</td>
</tr>
<tr>
<td>Broad Reading</td>
<td>.48</td>
</tr>
<tr>
<td>Basic Reading</td>
<td>.47</td>
</tr>
<tr>
<td>Reading Comprehension</td>
<td>.44</td>
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<tr>
<td>Broad Math</td>
<td>.54</td>
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<tr>
<td>Basic Math</td>
<td>.55</td>
</tr>
<tr>
<td>Math Reasoning</td>
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<tr>
<td>Basic Writing</td>
<td>.53</td>
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<tr>
<td>Skills Cluster</td>
<td>.54</td>
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</tbody>
</table>

Note: CAS = Cognitive Assessment System; WJ III = Woodcock-Johnson Revised Tests of Achievement

EF, WISC-IV, CAS, Achievement

- Data from Sam Goldstein’s evaluation center in Salt Lake City, UT
- Children given the WISC-IV (N = 43), CAS (N = 62), and the WJIII achievement (N = 58) as part of the typical test battery

<table>
<thead>
<tr>
<th>Table 8.29. Demographic Characteristics of the CAS, WISC-IV, and WJ III ACH Validity Samples</th>
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</thead>
<tbody>
<tr>
<td><strong>Demographic</strong></td>
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<tr>
<td><strong>Gender</strong></td>
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<td><strong>Race/Ethnic Group</strong></td>
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<td><strong>Parental Education Level</strong></td>
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<td><strong>Educational Group</strong></td>
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<tr>
<td><strong>Mood</strong></td>
</tr>
<tr>
<td><strong>Other</strong></td>
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<tr>
<td><strong>Total</strong></td>
</tr>
<tr>
<td><strong>Mood (ACH)</strong></td>
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### EF Behaviors (CEFI) & CAS

<table>
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<td></td>
<td>FS</td>
<td>Plan</td>
<td>Sim</td>
<td>Att</td>
<td>Suc</td>
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<tr>
<td>CEFI</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Scale</td>
<td>.45</td>
<td>.49</td>
<td>.43</td>
<td>.37</td>
<td>.32</td>
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</table>

<table>
<thead>
<tr>
<th></th>
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<tr>
<td></td>
<td>FS</td>
<td>VC</td>
<td>PR</td>
<td>WM</td>
<td>PS</td>
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<tr>
<td>CEFI</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Full Scale</td>
<td>.39</td>
<td>.44</td>
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<table>
<thead>
<tr>
<th></th>
<th>WJ-III Achievement Tests</th>
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<tbody>
<tr>
<td>CEFI Scales</td>
<td>Total</td>
</tr>
<tr>
<td>Full Scale</td>
<td>.51</td>
</tr>
</tbody>
</table>

### Take Away Messages

- EF behaviors are significantly correlated with scores from a nationally normed test of academic skills (WJ-III)
- EF behaviors are significantly correlated with all four PASS scales
- EF behaviors are mostly correlated with WISC-IV Verbal scale which requires a lot of knowledge
Sex Differences in Executive Function

CEFI Sex Differences: Parent Raters

Girls are Smarter than Boys

<table>
<thead>
<tr>
<th>Parents</th>
<th>N</th>
<th>Mn</th>
<th>SD</th>
<th>N</th>
<th>Mn</th>
<th>SD</th>
<th>ES</th>
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<tbody>
<tr>
<td>Ages 5-18</td>
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<td>98.1</td>
<td>14.9</td>
<td>699</td>
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<tr>
<td>Ages 5-11</td>
<td>350</td>
<td>98.2</td>
<td>14.3</td>
<td>349</td>
<td>101.6</td>
<td>15.6</td>
<td>-0.22</td>
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<tr>
<td>Ages 12-18</td>
<td>350</td>
<td>97.9</td>
<td>15.4</td>
<td>350</td>
<td>102.0</td>
<td>14.4</td>
<td>-0.28</td>
</tr>
</tbody>
</table>

Diagram showing the comparison of male and female scores across different age groups.
CEFI Sex Differences: Teacher Raters

Girls are Smarter than Boys

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mn</th>
<th>SD</th>
<th>N</th>
<th>Mn</th>
<th>SD</th>
<th>ES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages 5-18</td>
<td>700</td>
<td>96.7</td>
<td>14.4</td>
<td>700</td>
<td>103.2</td>
<td>15.0</td>
<td>-0.44</td>
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<tr>
<td>Ages 5-11</td>
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<td>96.4</td>
<td>14.5</td>
<td>350</td>
<td>103.5</td>
<td>14.9</td>
<td>-0.49</td>
</tr>
<tr>
<td>Ages 12-18</td>
<td>350</td>
<td>97.0</td>
<td>14.4</td>
<td>350</td>
<td>102.9</td>
<td>15.0</td>
<td>-0.40</td>
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</tbody>
</table>

Sex Differences: Ability

Gender Differences in Planning, Attention, Simultaneous, and Successive (PASS) Cognitive Processes and Achievement

Jack A. Naglieri  
George Mason University

Johannes Rojahn  
Ohio State University

Gender differences in ability and achievement have been studied for some time and have been conceptualized along verbal, quantitative, and visual-spatial dimensions. Researchers recently have called for a theory-based approach to studying these differences. This study examined 1,100 boys and 1,100 girls who matched the U.S. population using the Planning, Attention, Simultaneous, Successive (PASS) cognitive-processing theory, built on the neuropsychological work of A. R. Luria (1973). Girls outperformed boys on the Planning and Attention scales of the Cognitive Assessment System by about 5 points (d = .30 and .35, respectively). Gender differences were also found for a subsample of 1,200 children on the Woodcock-Johnson Revised Tests of Achievement: Prophling (d = .33), Letter-Word Identification (d = .22), and Dictation (d = .22). The results illustrate that the PASS theory offers a useful way to examine gender differences in cognitive performance.
Sex Differences: Ability

Executive Function

Sex Differences: Social Emotional

TABLE 2.6

Devereux Elementary Student Strength Assessment (DESSA; LeBuffe Shapiro & Naglieri, 2009)
Sex Differences: Social Emotional

Notes:
N = 2,477
DESSA values are T-scores (Mn= 50, SD = 10).

Sex Differences
Developmental Differences in Executive Function

Developmental Changes in EF

Relations between executive function and academic achievement from ages 5 to 17 in a large, representative national sample

John R. Best, Patricia H. Miller, Jack A. Naglieri

Department of Psychology, University of Georgia, Athens, GA 30602-3873, USA
Department of Psychology, San Francisco State University, San Francisco, CA 94132, USA
Department of Psychology, George Mason University, Fairfax, VA 22030, USA

ABSTRACT

This study examined age-related changes in complex executive function (EF) in a large, representative sample (N = 2098) aged 5 to 17 using the Cognitive Assessment System (CAS; Naglieri & Das, 1997a). Relations between complex EF and academic achievement were examined on a sub-sample (N = 1395) given the Woodcock-Johnson Tests of Achievement—Revised (Woodcock & Johnson, 1989). Performance on the three complex EF tasks improved until at least age 15, although improvement slowed with increasing age and varied some across tasks. Moreover, the different developmental patterns in the correlations between completion time and accuracy provide clues to developmental processes. Examination of individual achievement subtasks clarified the specific aspects of academic performance most related to complex EF. Finally, the correlation between complex EF and academic achievement varied across ages, but the developmental pattern of the strength of these correlations was remarkably similar for overall math and reading achievement, suggesting a domain-general relation between complex EF and academic achievement.
Developmental Changes in EF

- Best, et al (2011) reported mean score differences between adjacent age groups of a large (N = 2,036) nationally representative sample (CAS normative group).
- Results showed that EF does **not** develop consistently across the 5 year to 18 year age range.
- Age differences were reported in effect sizes (.2 to .4 = small; .5 to .7 = medium; .8 and above = large).
Developmental Changes in EF

- These developmental data suggest that instruction in EF Skills should be stressed when growth is most rapid, that is, during early elementary and middle school years.
- Students need to be TOLD what EF is and how it can be used to help them learn, especially during the early years when growth in ABILITY is ....so that growth in BEHAVIOR and EMOTION follow.

EF Lessons for High School
Presentation Outline

- Comprehensive Model of EF
  - Historical Perspective
  - Definitions of Executive Function
- EF as Behavior
- EF as an Ability (an intelligence)
- EF as Social Emotional Skills
- Research about EF as ability, behavior, and SE

Think Smart! -- EF Skills in the Classroom
- More lesson plans for improving components of EF
- Conclusions

www.efintheclassroom.net

- Start with Awareness of thinking about thinking
Structure of the lessons

- Each topic is discussed for one week
- Monday – class lesson
- Tues-Thurs reminders
- Friday – class reflection

EF Lesson Plan Themes

- Attention
- Flexibility
- Inhibition
- Initiation
- Self-Monitoring
- Working Memory
- Organization
- Planning
- Emotional Regulation
EF Posters in the Class

Mountain View Alternative HS
Introductory Lesson: “Are you Aware”

- Ask for volunteers to NOT look at the video and report what word they hear
Other Lessons from www.efintheclassroom.net

www.Efintheclassroom.net

Research support?

www.efintheclassroom.net

Planning Lesson

Phrase of the week: What is your plan?

http://www.youtube.com/watch?v=bQLCZOG2O2k

1. What had to happen so that the people could dance together in this video?
2. What are the parts of a good plan?
3. How do you know if a plan is any good?
4. What should you do if a plan isn't working?
5. How do we use planning in this class?

Go to student learning log and create a plan for the week.
Planning

Teaching Students About Planning

How Learning Depends on Planning Ability

The purpose of education is certainly to provide students with knowledge and skills, but re-
search has shown that children also need to learn how to plan. To achieve this goal, we must
teach students to evaluate, apply solutions, self-monitor, and self-correct—in short, to plan.
When we teach our students to become strategic, self-efficacious, and flexible learners, we
are teaching one of a method called Cognitive Strategy Instruction (CSI). CSI, and this is an effective method.

When reading, especially when obtaining meaning from text, the student must use an ap-
proach to examining the information that is provided. This involves applying strategies to separate
the important from the less important part of the text, concentrate on the details, self-monitor,
and self-correct as needed. Students who are good at setting goals before beginning
and reflect and revise during and following production of text. When doing math, students
who are successful evaluate the problem, choose which method to use to solve it, evaluate the
success of that method, change methods if necessary, and check the final answer carefully. This
is also sometimes referred to as metacognition, problem solving, strategic behavior, or self-
related learning skills. When we use cognitive strategy instruction, we are teaching students to
think about what they are doing so that they can be more successful.

How to Teach Planning

Think smart and use a plan!

The first step is teaching children to be-
come strategic, self-monitor, and flexible learners is to teach them what a plan is and how to
write one. In Figure 1 which also appears in the PhD poster on the CD, we provide a list and simple
message: “Think smart and use a plan.”

We should provide cognitive strategies in specific academic areas, such as re-
doing, reading comprehension, vocabulary,
spelling, writing, math problem solving,
and science, so that we

Planning for Math Calculation

Math calculation is a complex activity that involves recalling basic math facts, following pro-
dure, working carefully, and checking one’s work. Math calculation requires a careful (i.e., planned)
approach to follow all of the necessary steps. Children who are good at math calculation can
move on to more difficult math concepts and problem solving with greater ease than those who are
having problems in this area. For children who have trouble with math calculation, a technique
that helps them approach the task thoughtfully is likely to be useful. Planning facilitation is such a
technique.

Planning facilitation helps students develop useful strategies to carefully complete math problems
through discussion and shared discovery. It encourages students to think about how they solve
problems, rather than just think about whether their answers are correct. This helps them develop
careful ways of doing math.

How to Teach Planning Facilitation

Planning facilitation is provided in three 10-minute time periods: 1) 10 minutes of math, 2) 10 min-
utes of discussion, and 3) 10 more minutes of math. These steps can be described in more detail:

Step 1: The teacher should provide math worksheets for the students to complete in the first
10-minute session. This gives the children exposure to the problems and ways to solve them. The
teacher gives each child a worksheet and says, “Here is a math worksheet for you to do. Please
try to get as many of the problems correct as you can. You will have 10 minutes.” Slight variations
on this instruction are okay, but do not give any additional information.
A Cognitive Strategy Instruction to Improve Math Calculation for Children With ADHD and LD: A Randomized Controlled Study

Jackie S. Iserman and Jack A. Naglieri

Abstract
The authors examined the effectiveness of cognitive strategy instruction (Successive) given by special education teachers to students with ADHD. Experimental group were exposed to a brief cognitive strategy instruction development and application of effective planning for mathematical computation. Standardized tests of cognitive processes as students completed math worksheets throughout the experimental period. Johnson Tests of Achievement, Third Edition, Math Fluency and Wechsler Numerical Operations) were administered pre- and postintervention, and follow-up. Large pre–post effect sizes were found for students in the experimental group who completed math worksheets (0.85 and 0.26), Math Fluency (1.17 and 0.09), and Numerical Operations. At 1 year follow-up, the experimental group continued to outperform students with ADHD evidenced greater improvement in math worksheets (which measured the skill of generalizing learned strategies to other situations) when provided the PASS-based cognitive strategy instruction.

Design of the Study

Experimental and Comparison Groups

7 worksheets with Normal Instruction

Experimental Group
19 worksheets with Planning Facilitation

Comparison Group
19 worksheets with Normal Instruction
Instructional Sessions

- Math lessons were organized into “instructional sessions” delivered over 13 consecutive days
- Each instructional session was 30-40 minutes
- Each instructional session was comprised of three segments as shown below

<table>
<thead>
<tr>
<th>10 minutes</th>
<th>10-20 minutes</th>
<th>10 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 minute math worksheet</td>
<td>Planning Facilitation or Normal Instruction</td>
<td>10 minute math worksheet</td>
</tr>
</tbody>
</table>

Normal Instruction and Planning Facilitation Sessions

- Normal Instruction
  - 10 minute math worksheet
  - 10 - 20 of math instruction
  - 10 minute math worksheet

- Planning Facilitation
  - 10 minute math worksheet
  - 10 minutes of planning facilitation
  - 10 minute math worksheet
Planning Strategy Instruction

- Teachers facilitated discussions to help students become more self-reflective about use of strategies.
- Teachers asked questions like:
  - What was your goal?
  - Where did you start the worksheet?
  - What strategies did you use?
  - How did the strategy help you reach your goal?
  - What will you do again next time?
  - What other strategies will you use next time?

Student Plans

- “My goal was to do all of the easy problems on every page first, then do the others.”
- “I do the problems I know, then I check my work.”
- “I do them (the algebra) by figuring out what I can put in for X to make the problem work.”
- “I did all the problems in the brain-dead zone first.”
- “I try not to fall asleep.”
Worksheet Means and Effect Sizes for the Students with ADHD

Raw Scores for Worksheets

- Normal Instruction:
  - Baseline: 32.79
  - Intervention: 37.81
  - ES = 0.6

- Planning Facilitation:
  - Baseline: 29
  - Intervention: 42.66
  - ES = 2.4

Reminder:
- < .2 = no effect
- .2 - .5 = small
- .6 - .8 = medium
- > .8 = large

WJ Math Fluency Means and Effect Sizes for the Students with ADHD

Standard Scores for WJ Math Fluency

- Normal Instruction:
  - Baseline: 75.5
  - Intervention: 79.4
  - ES = 0.1

- Planning Facilitation:
  - Baseline: 60.9
  - Intervention: 86.1
  - ES = 1.3

Reminder:
- < .2 = no effect
- .2 - .5 = small
- .6 - .8 = medium
- > .8 = large
WIAT Numerical Operation Means and Effect Sizes for Students with ADHD

Raw Scores for WIAT

Baseline
Intervention

Normal Instruction
Planning Facilitation

ES = -0.2
ES = 0.4

Reminder
< .2 = no effect
.2 - .5 = small
.6 - .8 = medium
> .8 = large

Iseman (2005)

Baseline Intervention means by PASS profile
Different response to the same intervention
One Year Follow-up

At 1-year follow-up, 27 of the students were retested on the WJ-III ACH Math Fluency subtest as part of the school’s typical yearly evaluation of students. This group included 14 students from the comparison group and 13 students from the experimental group. The results indicated that the improvement of students in the experimental group ($M = 16.08$, $SD = 19$, $d = 0.85$) was significantly greater than the improvement of students in the comparison group ($M = 3.21$, $SD = 18.21$, $d = 0.09$).

Instructional Implications

- Planning Strategy Instruction is easily implemented in the classroom and can be used to improve Executive Functioning
- The method yields substantial results within a minimal of time (10 half-hour sessions over 10 days)
- Planning Strategy Instruction can be applied in math as well as other content areas (e.g., reading comprehension)
EF and Reading Comprehension

PLANNING FACILITATION AND READING COMPREHENSION: INSTRUCTIONAL RELEVANCE OF THE PASS THEORY

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The purpose of this study was to evaluate whether instruction designed to facilitate planning would have differential benefit on reading comprehension depending on the specific Planning, Attention, Simultaneous, and Successive (PASS) cognitive characteristics of each child. A sample of 45 fourth-grade general education children was sorted into three groups based on each PASS scale profile from the Cognitive Assessment System. The instructional level was determined, a cognitive strategy instruction intervention was conducted. The children completed a reading comprehension posttest at their respective instructional levels after the intervention. Results showed that children with a Planning weakness (n = 15) benefited substantially (effect size = 1.52) from the instruction designed to facilitate planning. Children with no weakness (n = 21; effect size = .50) or a

Other Lessons from www.efintheclassroom.net

Working Memory Lesson
Time to Think and Talk

Task:

- Your own questions and thoughts..

Teach Self-reliance

- Students with any kind of learning challenge and many without any limitations need to be self-reliant
- Show the Stuck on the Escalator video
- Discuss what the message is with the students
Low EF and an Enabled Society

Stuck on the Escalator

“A student in 4th period (we are doing the EF lessons in that class) was working in her Chemistry class (that teacher is NOT doing the EF lessons) spontaneously said, “Man, I am stuck on the escalator” (a phrase of the week) even though that phrase is not used in Chem. I took this as evidence that the (cuing) skills being learned in one class are transferring to another. It is encouraging.”
Conclusions

- The concept of EF is evolving
- CEFI results indicate that when measured using observable behaviors the term Executive Function is supported
- CEFI provides a well normed measure of EF that has demonstrated reliability & validity
- There is evidence that children can better use EF and improve achievement and behavior
Conclusions-- on Education

- Benjamin Franklin – Tell me and I forget. Teach me and I remember. Involve me and I learn.
- Teacher’s role is to give only as much help as is necessary, NOT to be the frontal lobes for the student

Conclusions

- The teacher’s role is to give the student knowledge of facts and to encourage the use of Executive Function
- When we give students the responsibility to figure out how to do things we teach them to THINK SMART! and use EF
- This is the gift of smarter thinking
- This is a gift of optimism
- This is a gift for life success
- EF is about LIFE not just school