



## **What is Executive Function... and why is it important?**

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A few years ago, most parents and teachers of students with ADHD didn't have a clue that a child's academic success was contingent upon having strong executive skills. However, today's savvy parents and educators realize that deficits in critical cognitive skills known as executive functions (EF) are slower to mature in many children with ADHD.

In 2007, researchers made a startling discovery: the front part of the brain's of students with ADHD mature five years more slowly than their peers. This helps explain why their executive skills are delayed. Two years later, scientists found that the part of the brain that enables students to work on "boring tasks" such as school work has reduced number of dopamine receptors and transporters. More simply stated the reduced brain chemistry. This key area explains why students can play video games for hours but struggle to complete their homework in a timely manner.

Dr. Russell Barkley, a noted authority on ADHD, reported that most children with ADHD have deficits in executive skills (89-98%). In addition Dr. Barkley explains that students with ADHD experience roughly a thirty percent developmental delay in some skills such as, organizational and social skills. Basically this means our children appear less mature and responsible than their peers. For example, a twelve-year-old's executive skills are often more like those of an eight-year-old. To ensure academic success for these students, parents and teachers must provide more supervision and monitoring than is normally expected for this age group. I refer to this as providing "*developmentally appropriate supervision.*"

**Impact of ADHD and Executive Function Deficits on Learning and Behavior.** Practically speaking, problems with the "brain's CEO" contribute to several problems: disorganization, difficulty getting started and finishing work, remembering homework, plus difficulty memorizing facts, writing essays or reports, working complex math problems, remembering what is read, completing long-term projects, being on time, controlling emotions, and planning for the future.

Before we understood the role of executive functions, parents and teachers were often baffled when students, especially those who were intellectually gifted, teetered on the brink of school failure. Unfortunately, to the uninformed, deficits in executive skills often appeared to be a simple matter of “laziness or lack of motivation”. When a student had trouble getting started and finishing an essay or math work, it was easy to assume that the student *chose* not to do the task.

**Real World Impact.** Although our son Alex successfully struggled through the early school years, he finally hit the proverbial “ADHD brick wall” in middle school. Belatedly I realized that the demands for executive skills increase exponentially in middle school (working independently, organizing oneself, getting started, remembering multiple assignments). As a former teacher and school psychologist, I’m also embarrassed to say I failed for many years to recognize that a high IQ score alone was not enough to make good grades. It wasn’t until Dr. Barkley identified the central role executive function plays in school success, that I finally understood why school was so difficult for my son. Teachers would say, “Alex is very bright; he could make better grades if he would just try harder.” In truth, our children often *do* try harder, but even then, cannot make good grades without proper treatment and academic supports. Bottom line--the executive function deficits were the primary cause of Alex’s academic struggles, not the symptoms of his ADHD.

**Two categories of Executive Function Deficits.** I’ve found it helpful to view the practical impact of executive function deficits in two general categories:

1) **specific academic challenges** like writing essays, remembering what is read (comprehension), memorizing information, and completing complex math and

2) **essential related skills** like organization, getting started on and finishing work, remembering tasks and due dates, completing homework and long-term projects in a timely manner, processing information in an efficient and timely manner, having good time awareness and management, using self-talk to direct behavior, using weekly reports, and planning ahead for the future.

**Essential related skill deficits may be mistaken for laziness.** Since these common academic challenges such as a writing disability are easily recognizable, teachers are more willing to provide necessary accommodations. However, educators may be reluctant to provide needed supports for *essential related executive skill deficits* such as disorganization, getting started, and failure to submit completed homework in a timely manner. Unfortunately, on the surface, this may look like a simple choice was made to be lazy and not

complete the work. Consequently, parents and teachers must always keep in mind that, first and foremost, this is a neurological problem, not laziness.

### **One critical element of executive functions.**

Let's take a more in-depth look at just one element of executive functions – deficits in working memory and recall—and their impact on school work.

#### **Poor Working Memory and Recall**

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

1. **The “here and now”:** Our children have limited working memory capacity that often impacts their behavior at home and in the classroom:

- remembering and following instructions.
- memorizing math facts, spelling words, and dates.
- performing mental computation such as math in one's head.
- completing complex math problems (algebra)
- remembering one part of an assignment while working on another segment.
- paraphrasing or summarizing.
- organizing and writing essays.

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

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

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

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

## **Favorite School Success Strategies**

Over the years I have identified several teaching strategies and accommodations that work well for addressing deficits in executive functions. So here are just a few of my favorite tips:

### **General Teaching Strategies**

- **Make the learning process as concrete and visual as possible.**

#### **Written expression**

- Dictate information to a “scribe” or parents.
- Use graphic organizers to provide visual prompts.
- Use “post-it” notes to brainstorm essay ideas.

#### **Math**

- Use a peer tutor.
- Use paired learning (teacher explains problem, students make up their own examples, swap problems, and discuss answers).  
(After barely passing high school and college algebra, my son made an A in calculus plus had a 100 average on tests when the professor used this strategy.)

#### **Memory**

- Use mnemonics (memory tricks), such as acronyms or acrostics, e.g., HOMES to remember names of the Great Lakes.
- Use “visual posting” of key information on strips of poster board.
- Consider “Times Alive” to assist with memorizing multiplication tables.

- **Modify teaching methods.**

- Use white board to demonstrate how to write an essay. (Parents may simply write on paper or a computer to model this skill.)
- Use color to highlight important information.
- Use graphic organizers to help students organize their thoughts.

- **Modify assignments – reduce written work.**

- Shorten assignments.
- Check time spent on homework, and reduce it if appropriate (when total homework takes longer than roughly 10 minutes per grade as recommended in a PTA/NEA Policy, e.g. 7<sup>th</sup> grader = 70 minutes).
- Write answers only, not the questions (photocopy questions).

- **Modify testing and grading.**

- Give extended time on tests.
- Divide long-term projects into segments with separate due dates and grades.

- Average two grades on essays– one for content and one for grammar.
- **Modify level of support and supervision.**
  - To Appoint “row captains” to check to see that homework assignments are written down and later turned in to the teacher.
  - Increase the amount of supervision and monitoring for these students, if they are struggling.
- **Use technology.**
  - Use a computer as often as possible.
  - Use software to help teach skills.

To ensure academic success for these students, parents and teachers must provide more supervision and monitoring than is normally expected for this age group. I refer to this as providing “*developmentally appropriate supervision.*”

Unfortunately students with ADHD are often punished for executive function deficits such as lack of organizational and memory skills that interfere with their ability to bring home the correct homework assignments and books. Hopefully, after reading this article, teachers and parents will develop more innovative intervention strategies. Having homework posted on a website plus keeping an extra book at home for subjects with frequent homework assignments can be very helpful. In addition, have someone (a friend or teacher aide), meet the student at his locker to get the necessary homework materials together. Ultimately, this process of “*modeling*” and “*shaping*” behavior at the critical “*point of performance*” –the point in time when the students decides which books should be taken home--will help the student master skills or at a minimum, teach him to compensate for deficits.