

## **Executive Function:**

### **What Does It Mean? Why Is It Important? How Can We Help?**

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*The term “executive function” is being used throughout educational circles, from preschool classrooms to university research labs. But what exactly is it and how does it influence school success?*

To complete tasks, reach goals, solve problems, and successfully navigate our social world, we rely on our executive function,<sup>1</sup> a family of mental processes that includes working memory; skills in organization, planning, and time management; and self-control and emotional self-regulation, among others.<sup>2</sup> While we typically see these mental processes discussed separately, they actually work in harmony. In fact, it’s our ability to successfully synchronize these processes that allows us to navigate the world. Experts in the field have used different metaphors to describe this process and its coordination: our brain’s orchestra conductor, air traffic control system, or chief executive officer.

Executive function is getting a great deal of attention lately for good reason. How well it works is an important predictor of who will succeed in school and who will not. And if we can predict problems of executive function, we can prevent them.

#### **Confusing Features**

Students with weak executive function skills can also exhibit exceptional strengths—in their intellect and creativity, for example. This unevenness can be very confusing to parents, teachers, and to the students themselves. These students may excel at doing tasks most would consider difficult and complex, yet struggle at tasks most consider simple, if not automatic.

Even more confusing perhaps is that students with executive function challenges will often know what they’re supposed to do but have difficulty with consistently, predictably, and independently doing what they know.<sup>3</sup> Many parents and teachers—with the best of intentions—treat the problem as one of “knowing”: if we simply teach a child ways to be organized and manage his time, for example, then he will be . . . organized and manage his time. And when the child “knows” but doesn’t “do,” then he must not care, or be lazy, or passive aggressive, or willful—the blaming possibilities go on. But the problem is not one of knowing; it’s a problem of performance, of execution. Helping students who have trouble executing a task goes beyond teaching them what to do. It also requires teaching them to execute what they know through coaching, cuing, prompting, reinforcing, guiding, and reminding in actual situations—sometimes referred to as the “point of performance”—where these skills are required and where students can practice.

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<sup>1</sup> To date, experts in the field have not arrived at a universally accepted definition of executive functioning, nor of the precise number of mental processes under the executive function umbrella. There’s little argument among the experts, however, that these functions do indeed help us to plan, organize, manage, and emotionally regulate our lives.

<sup>2</sup> Researchers have identified other mental processes as well, among them, self-monitoring and mental flexibility.

<sup>3</sup> Goldstein, S. (2001, October). Good days are when bad things don’t happen. Rethinking the care and treatment of children with ADHD. Presented at the 13th Annual CHADD International Conference, Anaheim, CA. And Barkley, R. A. (2010, November). The role of emotion in understanding and managing ADHD. Presented at the 22nd Annual CHADD International Conference, Atlanta, GA.

Further complicating the matter is the fact that features of an executive function challenge are responsive to context. Students with these challenges may, on occasion, execute a certain task successfully and at other times not; but they typically will do far better (and sometimes very well) in situations they find interesting and stimulating. So interest will often trump importance, even with tasks that the student knows are critical—related to earning a passing grade, for example, or getting into college.

While delays in areas involving executive function are frequently associated with ADHD, researchers have identified these challenges among students struggling with other conditions as well, including those related to learning disabilities, autism, mood disorders, and extreme stress.

Whether or not a student has a specifically identified disability, everyone struggles at some point with issues of executive function; and everyone (children and adults) benefits from direct instruction, coaching, and encouragement.

### **A Systems Response**

Efforts to strengthen the processes associated with executive function lend themselves well to a multitiered system of support (MTSS)/response to intervention (RtI) paradigm, with all students benefiting from ongoing coaching of these mental processes at a universal/tier 1 level. Those who show early signs of struggle can benefit from additional coaching, as well as a number of specific programs, practices, and accommodations at tier 2. Those whose executive function challenges are significantly eroding their school performance can benefit from more intensive coaching, programs, practices, and accommodations at the more targeted and intensive tier 3 level.

### **The What, Why, and How**

Once aware of the basic aspects of executive function, teachers and parents can do a great deal to support students and help them strengthen these skills. Working memory, organization, planning, time management, self-control, and emotional self-regulation all directly influence school success. Challenges in each can also be identified early and, once identified, can be improved and accommodated.

Working memory. This involves our ability to keep information in mind long enough to reach a goal or solve a problem. When the demands of a task, academic or otherwise, exceed what we can fit into this “mental workspace,” we don’t have the information we need to successfully complete the task. Working memory involves work (or effort): repeating the numbers 7-4-2-3 involves short-term memory; repeating them in order, from lowest to highest, involves working memory. Teachers and parents will want to look for the following common signs<sup>4</sup> of working memory overload:

- Poor or incomplete recall. A student starts to write a sentence, then forgets the remaining words midway through.
- Problems following instructions, especially those involving several steps.
- Place-keeping errors. The student keeps losing track of steps already completed.
- Task abandonment. The student just stops trying, a common consequence of the previous errors.<sup>5</sup>

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<sup>4</sup> Gathercole, S. & Pakiam Alloway, T. (2007). *Understanding Working Memory: A Classroom Guide*. <http://www.york.ac.uk/res/wml/Classroom%20guide.pdf>

<sup>5</sup> Katz, M. (2011, February). Classroom strategies for improving working memory. *Attention Magazine*, 6–7.

## What Can We Do to Help?

To help students at risk for working memory overload,

- reduce the number of steps necessary to successfully complete a task;
- increase familiarity with the information that needs to remain in the student’s mental workspace (unfamiliar or non-meaningful information is harder to maintain);
- provide visual reminders of the steps needed to complete a task successfully;
- use a variety of memory aids (visual posters, for example, of multiplication tables, or of the correct spelling of commonly used words or of directions);
- read *Understanding Working Memory: A Classroom Guide*, by Susan Gathercole and Tracy Parkiam Alloway (available at no cost by logging onto the Web site <http://www.york.ac.uk/res/wml/> and under the “Information for Parents and Teachers” icon).

**Organization, Time Management, and Planning** (also known as OTMP). Some students have no difficulty organizing the materials they need to complete assignments, find the time to fulfill their obligations, and plan their next day and even week. Others have great difficulty; they misplace materials, rarely if ever get assignments in on time, and don’t seem to be able to think beyond the present moment, let alone plan and complete a complex project.

OTMP problems usually become apparent by the third grade and can grow increasingly more serious in later grades, when OTMP demands increase. Homework can be particularly challenging for students with weak OTMP skills and sometimes a serious source of family stress. Common OTMP difficulties—forgetting to write down homework assignments, misplacing or forgetting to bring home necessary materials, taking an inordinate amount of time to complete homework, and sometimes just simply forgetting to turn in a completed assignment—look entirely willful, which is why they are often such a common source of stress. But they may not be willful. These are common difficulties experienced by students with weak OTMP/executive function skills.

## What Can We Do to Help?

Both teachers and parents can help children with OTMP weaknesses by providing structure: writing things down, color-coding assignments, following daily routines, and providing reminders for work to be done. Modeling effective OTMP skills can be very helpful as well, as is including some component of interest and fun in homework assignments.

The Organizational Skills Training Program, geared toward students in grades three to five who struggle with both ADHD and OTMP, also shows effectiveness for middle school students. See [http://www.aboutourkids.org/families/care\\_at\\_the\\_csc/ADHD/organizational\\_skills](http://www.aboutourkids.org/families/care_at_the_csc/ADHD/organizational_skills).

Behavioral Inhibition (self-control). Children with poor self-control often react on impulse and without thinking through the consequences of their actions. In class, they may begin a task without first reading the instructions, or they may become disruptive if a task is too difficult.

## What Can We Do to Help??

Play the research-proven PAX Good Behavior Game in class regularly with all children during their early grades. <http://goodbehaviorgame.org>

For young school-aged children showing early signs of self-control and/or emotional self-regulation challenges, implement First Step to Success, an early intervention program for young children with challenging behaviors. <http://www.firststeptosuccess.org>

Emotional Self-Regulation. Some students with weak self-regulation skills become upset quickly in response to minor triggers. Others are also prone to angry and explosive outbursts.

Because the majority of mental health conditions are characterized by problems with emotions or emotional regulation,<sup>6</sup> helping children learn to regulate their emotions and control their behavior will have far-reaching positive effects.

Psychologist Russell Barkley sees emotional self-regulation as a two-stage process. The ability to inhibit ourselves from reacting impulsively to emotional upsets (stage one) allows us then to access strategies that help us manage our emotions (stage two). One strategy that helps us divert attention from emotional triggers involves learning to avoid people or situations likely to lead to an emotional over-reaction or provocation.

However, regulating emotions involves more than controlling what upsets us. It's also about accessing the positive emotions that help us cope with and regulate the more negative ones.<sup>7</sup> Positive emotions play an important role in our ability to manage our feelings by giving us moments of relief in situations that may be upsetting or stressful; and positive emotions can potentially over-ride what might otherwise be hard-to-regulate emotions once these emotions are triggered. Accessing positive emotions includes finding ways to calm and soothe ourselves when we find our emotions starting to get out of control, using such strategies as mindfulness practices, for example, or relaxation techniques and physical exercise.

### **What Can We Do to Help?**

Consider implementing Zones of Regulation, a curriculum designed to help K–12 students with lagging self-regulation skills learn how to better regulate themselves at school, at home, and in social situations. Some teachers are now applying the Zones classwide. <http://www.zonesofregulation.com>

The PAX Good Behavior Game (<http://goodbehaviorgame.org>) and First Step to Success (<http://www.firststeptosuccess.org>) can also help to improve emotional self-regulation skills among young school-age children.

### **Replenishing Our Executive Function Fuel Tank**

Some students—and adults—have to work much harder than others to control emotions, stay focused, and remain organized; these individuals risk depletion and exhaustion as they move through their day at school or work. The good news is that their “fuel tank” can be replenished throughout the day.

### **What Can We Do to Help?**

- Give students an opportunity to take breaks from difficult tasks.
- Encourage children to devote short periods of time to relaxing or calming activities.
- Model or promote some form of aerobic exercise, which appears to be particularly effective in replenishing executive function fuel tanks.
- Be careful not to require students to use recess as a time to complete unfinished work. Recess provides an important opportunity for students to re-fuel.

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<sup>6</sup> Werner, K., & Gross, J. J. (2009). Emotion regulation and psychopathology. In A. M. Kring & D. M. Sloan (Eds.), *Emotional regulation and psychopathology: A transdiagnostic approach* (pp. 13–37). New York: Guilford Press.

<sup>7</sup> Fredrickson, B. L., & Losada, M. F. (2005). Positive affect and the complex dynamics of human flourishing. *American Psychologist*, 60, 678–686.

- Learn more about Girls on the Run to see if it's a program you might want to bring to your school or community. The program helps girls ages 8 to 13 learn how to celebrate their strengths, create positive connections, and successfully handle life's challenges. <http://www.girlsontherun.org>

## Final Thoughts

They'll focus for hours on projects they're interested in, but only minutes on those they're not; figure out creative solutions to complex problems, but fail to carry out a simple request; struggle for hours to complete a 15-minute homework assignment, then forget to turn it in. They can seem so responsible and thoughtful one moment, yet so irresponsible and thoughtless the next. And if you happen to be on the other end of a relationship with a person with these challenges, you know better than most just how confusing their behavior can be—confusing and at times infuriating. That's why executive function challenges, when misunderstood, not only prevent individuals from effectively managing their lives. These challenges can also do serious harm to our most important relationships.

But if misunderstanding can seriously harm our relationships, then greater understanding can repair and strengthen them. We now know how to identify executive challenges and how to help those impacted by them—loved ones included—to understand and address them in a new and hopeful light.

## Resources

**Executive Functions in the Classroom:** Teachers at Mountain View High School in Fairfax, Virginia, are instructing all students on ways to strengthen executive function skills. The program, which runs for approximately 12 to 13 weeks, is helping all students, not just those with executive function challenges, learn new ways to manage time, organize materials, remember assignments, regulate emotions, and start and complete projects. All lessons are interactive, and provide students opportunities to learn through different modalities (Katz, 2014b). To learn more, log on to the website: <http://www.efinthe classroom.net>.

**First Step to Success:** Developed under the direction of Hill Walker, Ph.D. and Annemieke Golly, Ph.D. at the University of Oregon's Institute on Violence and Destructive Behavior, *First Step to Success* includes three interconnected modules: a universal screening procedure, a school intervention component, and a parent/caregiver component. As noted, First Step has been shown to be effective in reversing the developmental trajectories of "early starters." Research has also shown the program to be helpful to young school age children struggling with symptoms of ADHD.<sup>8</sup> Those wishing to learn more about First Step to Success are encouraged to log on to the program's website at <http://www.firststeptosuccess.org/>

**The PAX Good Behavior Game (GBG):** The game is easy and fun to play. Children begin by developing their vision of a wonderful classroom. What would they like to see, hear and feel more of and less of. Things they want to see, hear and feel more of are referred to as PAX, which stands for peace, productivity, health and happiness. Things they want to see, hear and feel less of are called Spleems. Spleems are unwanted behaviors. Children are then divided into small teams (usually two to five teams per class) that try to commit as few behavioral errors (Spleems) as possible within a designated period of time, initially measured in minutes. To win the game, teams must commit three or

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<sup>8</sup> Seeley, J. R., Small, J. W., Walker, H. M., Feil, E. G., Severson, H. H., Golly, A. M., & Forness, S.R. (2009). Efficacy of the First Step to Success intervention for students with ADHD. *School Mental Health, 1*, 37–48.

fewer errors. Winning teams earn rewards, usually in the form of brief, fun activities. To make the game fair, children with weaker self-control skills are equally distributed between groups. As children become more familiar with the game, it's then played for longer periods of time. Groups also change throughout the school year so that each child in class has a chance to repeatedly win the game with all of the other children. Children eventually learn to predict what PAX and Spleems are for each activity in real-time, greatly enhancing self-regulation. The use of the special words allows the spread of the strategy to any instructional or classroom activity as well as to assemblies buses, cafeteria, afterschool programs, and many other situations where children must use self-regulation. Within weeks teachers generally notice a significant decrease in impulsive and disruptive behaviors class-wide. They also now observe children actually rooting for each other to control themselves (Katz, 2014c in press). To learn more about the PAX Good Behavior Game, log on to the website <http://www.paxis.org>.

**Zones of Regulation:** Developed by Leah Kuypers, OTR, Zones of Regulation (The Zones for short) is a curriculum designed to help children with lagging self-regulation skills learn how to better regulate themselves at school, at home, and in the company of other children. States of arousal and emotional control are divided into four easily identified color zones: Red, where emotions are running too high and are causing us to feel out of control; Yellow, where emotions are heading toward red but not quite there yet and so we still have time to gain control over them; Green, a place of greater calm, where we feel alert, focused and in control of our emotions, and Blue, where our level of alertness is too low for us to get much work done. Within the course of 18 lessons, children learn how to identify different states of arousal and emotional control, and also strategies they can use to help them stay in Green, a zone children need to be in to function well in class (Katz, 2012). To learn more, log on to <http://www.zonesofregulation.com>.

## Additional Online Resources

**“ADHD and Organizational Skills.** Initial Findings from a Major Multi-year Study.” Howard Abikoff. [http://www.aboutourkids.org/articles/dr\\_howard\\_abikoff\\_adhd\\_organizational\\_skills\\_initial\\_findings\\_major\\_multiyear\\_study](http://www.aboutourkids.org/articles/dr_howard_abikoff_adhd_organizational_skills_initial_findings_major_multiyear_study)

**“Building the Brain’s ‘Air Traffic Control’ System:** How Early Experiences Shape the Development of Executive Function: Working Paper No. 11.” Center on the Developing Child at Harvard University (2011). [http://developingchild.harvard.edu/resources/reports\\_and\\_working\\_papers/working\\_papers/wp11/](http://developingchild.harvard.edu/resources/reports_and_working_papers/working_papers/wp11/)

**Girls on the Run.** Under the supervision of a trained coach, girls meet in groups twice weekly for twelve weeks, where they engage in experiential activities drawn from the program’s 24-lesson curriculum. At the end of each group session girls then participate in a running workout. Running workouts serve to prepare girls for the program’s culminating event, a 5K run/walk. Combining uplifting running workouts with curriculum-based experiential activities, Girls on the Run is proving to be a fun way for girls 8 to 13 to learn how celebrate their strengths, create positive connections and successfully handle life’s challenges both currently and in the years to come. <http://www.girlsontherun.org>

**Sesame Street.** In the fall of 2013, Sesame Street launched Cookie Crumby Pictures, a series of five-minute segments that incorporate strategies for improving self-regulation and self-control. Starring in each segment is Cookie Monster playing different roles, all showing viewers how he’s learning to master these and other executive functions. Children see Cookie Monster modeling different strategies, all proven practices for helping children learn to inhibit behavior, calm down, pay attention and listen to what others are saying. To go along with video segments, Sesame Workshop has also created new interactive games that help children practice these strategies and strengthen executive function skills.

Cookie Monster's strategies are drawn from a self-regulation curriculum designed by Sesame Workshop's Curriculum and Content Department, in collaboration with experts in the field. The curriculum integrates affective, behavior and cognitive components—or the ABC's of self-regulation. Those interested in learning more about this important work are encouraged to log on to the Sesame Street Workshop website at <http://www.sesameworkshop.org/season44/about-the-show/cookies-crumby-pictures/>.

**Understanding Memory Issues.** [http://www.deni.gov.uk/06\\_understanding\\_memory.pdf](http://www.deni.gov.uk/06_understanding_memory.pdf)

## **Books**

Meltzer, L. (2010). *Promoting executive function in the classroom*. New York: Guilford Press.

Cooper-Kahn, J. & Foster, M. (2013). *Boosting executive skills in the classroom: A practical guide for educators*. San Francisco: Jossey-Bass Publishers.

Dawson, O. & Guare, R. (2009). *Smart but scattered: The revolutionary "executive skills" approach to helping kids reach their potential*. New York: Guilford Press.

Dawson, O. & Guare, R. (2012). *Coaching students with executive function deficits*. New York: Guilford Press.

Gallagher, R., Abikoff, H.B., & Spira, E.G. (2014). *Organizational skills training for children with ADHD*. skills training for children with Guilford Press: New York.

Klingberg, T. (2009). *The overflowing brain: Information overload and the limits of working memory*. New York, NY: Oxford University Press.

## **Executive Function Rating Scales**

*Barkley Deficits in Executive Functioning Scale (BDEFS)*: <http://www.russellbarkley.org>

*Comprehensive Executive Function Inventory (CEFI)*: <http://www.samgoldstein.com>

*Brown ADD Scales* (assesses five areas of ADHD-related executive functions): <http://www.drthomasebrown.com>

*Behavior Rating Scale of Executive Function (BRIEF)*: <http://www.parin.com/>