



cerebrate

7 Components of Cerebrate

Executive Function System

1 Assessment

Why is ASSESSMENT important?

Assessment is critical to narrow in on specific student struggles and know exactly what strategies should be used for improvement. Educators are in a key setting for observing and assessing students' areas of greatest need in a realistic context.

What does the research say?

Peg Dawson, Ed.D., NCSP, a staff psychologist at the Center for Learning and Attention Disorders, has written multiple books and articles on executive skills. A few of her thoughts on ASSESSMENT include:

- "The reason for assessing executive skills is to understand the role executive skills may play in academic or behavior problems. In some cases executive skills are the primary reason for the problem at hand, while in other cases these skills are contributing factors."
- "Teaching a skill means operating directly on the behavior of concern..."
- "When designing interventions, understanding the role played by executive skills increases the likelihood that the intervention targets the appropriate behavior, thereby increasing the likelihood that the intervention will be successful."

All from Dr. Peg Dawson, 04/10/13, "Best Practices in Assessing and Improving Executive Skills," in Best Practices in School Psychology, The Charleston Group, Wakefield.

Gerard A. Giroia, PhD, et al. discuss the importance of ASSESSMENT with highlights from Dr. Mark Ylvisaker, a noted researcher in brain injury rehabilitation:

- “Mark Ylvisaker, has taught that ‘assessment that captures a child’s everyday functioning in the context of real-world demands is often more informative than traditional neuropsychological measures alone...’ Ylvisaker was a part of the movement that drove assessment and intervention out of the laboratory/clinic and into the real world.”
- “...identifying the key executive control behavioral strengths and challenges in the home and school contexts and measuring changes through intervention are essential.”
- “Assessment is an ongoing part of intervention. It provides feedback to the system regarding effectiveness of the intervention.”

All from Dr. Peg Dawson, 04/10/13, “Best Practices in Assessing and Improving Executive Skills,” in *Best Practices in School Psychology*, The Charleston Group, Wakefield.

Lynn Meltzer, PhD, President and Director of the Institutes for Learning and Development in Lexington, Massachusetts, and colleagues write on specific goals for ASSESSMENT:

- “The goals for assessment... are twofold: identification (or description) and prescription. The identification goal is focused on discovering and explaining what the student knows and can do, how the student learns and processes information, and why learning may be delayed (Meltzer, 2010)... The prescriptive goal of assessment is to provide specific recommendations for teaching strategies that closely match the student’s profile of strengths and weaknesses.”

From Lynn Meltzer, Julie Dunstan-Brewer, and Kalyani Krishnan, “Learning Differences in Executive Function: Understandings and Misunderstandings,” in *Executive Function in Education: From Theory to Practice*, 2018.

How does Cerebrate incorporate ASSESSMENT?

The Cerebrate platform provides multiple opportunities for assessing skill development. Educators and students can complete evaluations to determine areas for growth and subsequent follow-up evaluations to monitor progress. Assessments can also be completed on individual lessons to determine levels of mastery for specific skill objectives.

2 Motivation

Why is MOTIVATION important?

A student's desire and drive to improve are vital for success. Motivation can come from external rewards or even obligation. However, intrinsic motivators like enjoyment or pride in accomplishment prove to help students with long-term learning and application of skills. Whether intrinsic or extrinsic in nature, motivation serves as an essential tool to captivate a student's ability to grow.

What does the research say?

Richard M. Ryan, a clinical psychologist and professor at the Institute for Positive Psychology and Education at the Australian Catholic University, and Edward L. Deci, a Professor of Psychology at the University of Rochester, are co-founders of Self-Determination Theory (SDT), a motivational theory, assert this regarding MOTIVATION:

- SDT places its emphasis on people's inherent motivational propensities for learning and growing, and how they can be supported. Three needs are seen as particularly fundamental: [autonomy, competence and relatedness....] Autonomy concerns a sense of initiative and ownership in one's actions.... Competence concerns the feeling of mastery, a sense that one can succeed and grow.... [R]elatedness concerns a sense of belonging and connection."
- "...psychological variables such as interest and value play a significant role in engagement and learning."

Both from Richard M. Ryan and Edward L. Deci, "Intrinsic and Extrinsic Motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions," in *Contemporary Educational Psychology*, 04/08/2020, <https://doi.org/10.1016/j.cedpsych.2020.101860>.

Tim Klein, project lead for the True North Project at Boston College and an award winning urban educator, clinical therapist, school counselor and writer summarizes the work of Ryan and Deci, specifically related to intrinsic MOTIVATION:

- “Decades of research, led by Richard Ryan and Edward Deci, have shown that students work harder, learn more and are much more likely to thrive in school when they are intrinsically motivated and self-determined.”

From Tim Klein, “Grades Fail at Motivating Students. Intrinsic Motivation Works Better.” 5/21/20, on edsurg.com/news.

Lynn Meltzer, PhD, and colleagues propose guiding principles “critical for students with learning differences who display weaknesses in EF processes,” and have this to say about MOTIVATION:

- “Address students’ motivation and willingness to use strategies so that generalization of strategy use occurs across tasks and settings.”

From Lynn Meltzer, Julie Dunstan-Brewer, and Kalyani Krishnan, “Learning Differences in Executive Function: Understandings and Misunderstandings,” in *Executive Function in Education: From Theory to Practice*, 2018.

Peg Dawson, Ed.D., NCSP, from the Center for Learning and Attention Disorders, has written multiple books and articles on executive skills. On MOTIVATION, she declares:

- “...the child must be targeted directly, either by teaching the child the weak skill or providing motivation for the child to practice the weak skill to make it stronger.”

From Dr. Peg Dawson, 04/10/13, “Best Practices in Assessing and Improving Executive Skills,” in *Best Practices in School Psychology*, The Charleston Group, Wakefield.

Harriet Greenstone, a psychologist and director of a multidisciplinary care center in Montreal, touches on some of the reasons MOTIVATION can be so important to keep in mind:

- “It is critically important for students to (a) understand their own strengths and weaknesses, and (b) see that these strategies will lead to improved grades. Without either component, they are unlikely to use them. Step (a) can be challenging, when dealing with a student who has experienced years of failure and frustration and might be emotionally fragile. It is best accomplished in private discussions, with equal emphasis on both strengths and weaknesses, delivered in a clearly supportive, non-judgmental manner. A good approach to Step (b) would be to break down tasks or assignments into small, accomplishable units, so the students can experience successes and build on them.”

From Harriet Greenstone, “Executive Function in the Classroom: Neurological Implications for Classroom Intervention,” *LEARNing Landscapes*, Vol. 5, No. 1, Autumn 2011.

How does Cerebrate incorporate MOTIVATION?

Our lessons encourage students to be invested in their development while recognizing their accomplishments and growth. We direct students to consider their individual strengths as they develop targeted skills while also providing challenges and opportunities to persist, so students feel and see their work’s inherent value.

3 Collaboration

Why is COLLABORATION important?

Strong habits are built when students actively listen, ask questions, and think critically to evaluate their progress during goal-orientated processes. When addressing executive function struggles, collaboration is not only helpful but necessary for students to develop self-awareness and problem-solving skills as they work toward improvement.

What does the research say?

Dr. Ross W. Greene, a clinical child psychologist, developed the Collaborative & Proactive Solutions (CPS) intervention model that is a “compassionate, productive, effective, approach to understanding and helping behaviorally challenged kids.”* With widely published research, Dr. Greene has focused on collaborative problem-solving with children, teens, and adults. As an expert on using COLLABORATION, he has had this to say:

- “Kids do respect adults who have reasonable expectations, listen to their concerns, treat them with mutual respect, and work toward finding mutually satisfactory solutions.”

Both from Richard M. Ryan and Edward L. Deci, “Intrinsic and Extrinsic Motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions,” in *Contemporary Educational Psychology*, 04/08/2020, <https://doi.org/10.1016/j.cedpsych.2020.101860>.

- Elizabeth Keller, a student at the University of Dayton, cited the work of Dr. Peg Dawson, a staff psychologist at the Center for Learning and Attention Disorders, and Dr. Richard Guare, Director of the Center for Learning and Attention Disorders, speaking of COLLABORATION in their coaching model:
- “Peg Dawson and Richard Guare (2013) developed a ‘coaching’ model, in which students are ‘coached’ in order to learn executive skills. They compare teaching these skills to the way a team coach works with athletes. Coaching allows the clients to manage their attention, hyperactivity, and impulsivity through a collaborative, goal-oriented process (Ahmann et al., 2017). The coach works with the student to identify potential obstacles and how to overcome them. The coach will help the student identify specific EF deficits, and explain how to practice these skills daily.”

From Elizabeth Keller, “Executive Functioning Intervention for Middle School Students with Attention-Deficit/Hyperactivity Disorder,” 08/2019, University of Dayton, copyright 2019.

How does Cerebrate incorporate COLLABORATION?

The Cerebrate curriculum empowers students to develop awareness and confidence as they learn. Every lesson includes a separate and unique opportunity for students to expand their learning, build connections, and find commonality by collaborating either as a whole class, in a small group, with partners, or with the educator.

4 Engagement

Why is ENGAGEMENT important?

Engagement helps students make abstract concepts more concrete by providing a variety of activities, questions, and opportunities to express themselves. It also allows students to maintain focus, think critically, stay motivated, and invest in significant learning experiences.

What does the research say?

Research from experts in neuroscience and executive functioning, **Drs. Zelazo, Blair and Willoughby**, offers details on how ENGAGEMENT is significant in obtaining EF skills:

- “Like other skills, EF skills are acquired largely as a function of experience, or practice: the repeated engagement and use of EF skills in problem solving strengthens these skills, increases the efficiency of the corresponding neural circuitry, and increases the likelihood that the skills will be activated in the future...”
- “A growing body of intervention studies has established that the acquisition of EF skills can be enhanced through repeated practice in the process of reflecting upon and using specific EF skills. This research suggests that it is important to keep children motivated to practice EF skills and to challenge those skills continually using a graduated series of exercises that vary in difficulty.”

- “Mindfulness involves sustained, focused attention on moment-to-moment experience. A number of studies, most with adults, indicate that repeated engagement in mindfulness practices (e.g., paying attention to one’s breathing and gently redirecting attention back to one’s breathing when the mind wanders) improves performance on measures of EF and emotion regulation.”

From P.D. Zelazo, Clancy B. Blair, and Michael T. Willoughby, “Executive Function: Implications for Education,” 2016, for the National Center for Education Research, Institute of Education Sciences.

Dr. Norman Doidge, FRCPC, a psychiatrist and psychoanalyst, provides information on how the brain responds to ENGAGEMENT:

- “We now know that the right exercises and activities can build new circuitry in the brain, and strengthen areas of identified weaknesses. Essentially, the brain can learn to bypass neural pathways that aren’t working and build new ones—not just in childhood, but through adolescence and even adulthood.

Doidge, N. (2007). *The Brain that Changes Itself: Stories of Personal Triumph from the Frontiers of Brain Science*. New York: Viking Adult.

How does Cerebrate incorporate ENGAGEMENT?

Cerebrate lessons include learning tasks that encourage students to think, reflect, and respond critically as they learn skills, making them active participants in the development of new habits. An inherent piece is for students to stay engaged and take ownership of the skills they need for learning.

5 Application

Why is APPLICATION important?

The opportunity to practice a newly acquired strategy is crucial to skill development. Application transforms the initial learning into long-term mastery, where students enhance their versatility and problem-solving skills by learning to adapt their approach to different scenarios.

What does the research say?

Harriet Greenstone, a psychologist and director of a multidisciplinary care center in Montreal, makes this statement after listing examples of strategies that can be used for all students in a classroom. The examples she provided included task analysis checklists, memory aids, and breaking down projects into manageable “chunks.” Her statement speaks directly to APPLICATION:

- “These types of strategies have important implications even beyond the academic years. They encourage self-reliance and self-knowledge skills which would benefit any student, and should be applied in all classes, so they may begin to be generalized.”

From Harriet Greenstone, “Executive Function in the Classroom: Neurological Implications for Classroom Intervention,” *LEARNing Landscapes*, Vol. 5, No. 1, Autumn 2011.

Dr. Jerome Schultz, a member of ADDitude Magazine’s ADHD Medical Review Panel, stresses the importance of APPLICATION:

- We have to teach kids what EF skills are, and we have to give them the chance to practice these skills. Unless we ask kids to apply these skills in learning to get a feel for what it’s like when EF is working, their brains will go into fight-or-flight mode. No one learns anything when that escape alarm goes off. It’s survival biology. Kids have to believe they will be successful for the EF training to become internalized and automatic.

From <https://www.additudemag.com/executive-function-for-kids/> by Jerome Schultz, PhD, “It’s Easy to Hover Over a Child with Executive Function Deficits. Don’t,” 5/5/20.

Research from experts in field of executive functioning, **Drs. Isquith, Gioia and Guy and Kenworthy**, offers details on how ENGAGEMENT is significant in obtaining EF skills:

- “In structuring an executive function intervention, we advocate the use of everyday executive routines in a meaningful, real-world everyday context. Many students with executive function difficulties do not yet possess the internalized routines needed for well-regulated problem solving. Therefore, intervention often begins from an external support position with active modeling, coaching, and guidance by important everyday people, which gradually transitions into an internal process as the direct coaching and cuing is faded.” The general intervention process includes the following: “Externally model multistep problem-solving (i.e., executive) routines.” “Externally guide with the development of everyday executive routines.” “Practice using executive routines in everyday situations.” “Fade external support and cue internal generation and use of executive routines.” “Coach for generalization to new situations or new coaches.” “Provide feedback throughout the process.”

From Peter K. Isquith, PhD, Gerard A. Gioia, PhD, Steven C. Guy, PhD, Lauren Kenworthy, PhD, and PAR Staff, Parent Form Interpretive Report, copyright 02/12/2015.

Dr. Lynn Meltzer explains the necessity of APPLICATION when teaching executive function strategies:

- “...students need to learn that hard work and use of effective strategies will help them bypass the impact of their learning difficulties so that they can show what they know in the classroom and on tests. Strategies help students learn how to learn and to recognize the important phases in the learning process as steps toward their goals.”
- “Teach students how, when, and why, specific strategies can be successfully used for different academic tasks.”

From Lynn Meltzer, Julie Dunstan-Brewer, and Kalyani Krishnan, “Learning Differences in Executive Function: Understandings and Misunderstandings,” in Executive Function in Education: From Theory to Practice, 2018.

Again we hear from **Dr. Gioia** in collaboration with colleagues, summarizing APPLICATION:

- ...interventions that improve functioning in the real-world environment are most useful.

From Gerard A. Gioia, PhD; Lauren Kenworthy, PhD; Peter K. Isquith, PhD, "Executive Function in the Real World: BRIEF Lessons from Mark Ylvisaker," in *Journal of Head Trauma Rehabilitation*, Wolters Kluwer Health, Lippincott Williams & Wilkins, copyright 2010.

How does Cerebrate incorporate APPLICATION?

Cerebrate curriculum provides students with ample opportunities for practice in real-life settings and situations. Students become equipped to associate specific skills to their own circumstances by establishing independent academic and personal goals and by developing habits and routines meaningful to their lives.

6 Instruction

Why is INSTRUCTION important?

The development of executive functions skills often require close-attention to habits, and teaching these skills with a straight-forward, direct approach and repetitive practice proves to be most effective. In addition, students should be provided with opportunities to self-reflect and evaluate their progress.

What does the research say?

Dr. Peg Dawson from the Center for Learning and Attention Disorders, has written multiple books and articles on executive skills. On the topic of INSTRUCTION, she states:

- "Direct instruction in executive skill strategies has... been shown to be effective within the context of academic skills...."

All from Dr. Peg Dawson, 04/10/13, "Best Practices in Assessing and Improving Executive Skills," in *Best Practices in School Psychology*, The Charleston Group, Wakefield.

Dr. Lynn Meltzer on the subject of INSTRUCTION:

- EF Training... involves teaching a student EF skills until he masters them... In her book *Promoting Executive Function in the Classroom*, Lynn Meltzer, Ph.D., recommends: attending to detail; repetition, rehearsal, and review; attaching meaning; and grouping bits of information.

From Lynn Meltzer, PhD, *Promoting Executive Function in the Classroom*, 2010, The Guilford Press.

Experts in developmental psychology, **Drs Zelazzo, Blair, and Willoughby**, collaborated on a research project for the National Center for Education Research in 2016 and had this to say on INSTRUCTION of executive functions:

"...research suggests that even very brief (15 minute) interventions targeting high-level skills like reflection and cognitive flexibility are effective."

"...the literature on the malleability of EF suggests that training can lead to improvements in performance on the trained tasks, as well as corresponding changes in the brain."

From P.D. Zelazo, Clancy B. Blair, and Michael T. Willoughby, "Executive Function: Implications for Education," 2016, for the National Center for Education Research, Institute of Education Sciences.

How does Cerebrate incorporate INSTRUCTION?

Cerebrate Educator Guides include clear goals, objectives, and lesson instructions. They also provide activities to boost student motivation and engagement, extend student learning through collaboration, and encourage lasting skill development through reflection, strategy implementation, and application of newly developed skills.

7 Metacognition

Why is METACOGNITION important?

One of the most important components of executive function instruction is metacognition. Metacognition skills allow students to consider how they learn and what executive function skills work best in each circumstance. Students who consistently practice metacognition become increasingly self-aware, while they establish routines, goals and habits that are applied to everyday life in meaningful ways.

What does the research say?

Professors of Psychology, **Hofmann, Schmeichel**, and **Baddeley**, asserted this about METACOGNITION related to executive function skills:

- “To think metacognitively, it is important to hold goals in working memory, inhibit behaviors that don’t help for the current task, and shift attention when adapting strategy – these are all key executive functions.”

From Hofmann, W., Schmeichel, B. J., & Baddeley, A. D. (2012). “Executive Functions and Self-Regulation.” *Trends in Cognitive Sciences*, pp. 16, 174-180.

Several renowned experts, including **Dr. Gerard A. Gioia**, the Division Chief of Neuropsychology and the director of the Safe Concussion Outcome, Recovery & Education (SCORE) Program at Children's National Hospital in Washington D.C, provide this input on the goal of interventions, that speaks directly to METACOGNITION:

- “The student should become increasingly more active in formulating and carrying out the plans and reviewing his performance, thus promoting internal executive control. The goal of executive function intervention is maximal independence, which necessitates the active involvement of the student in each phase via a coaching model.”

From Peter K. Isquith, PhD, Gerard A. Gioia, PhD, Steven C. Guy, PhD, Lauren Kenworthy, PhD, and PAR Staff, Parent Form Interpretive Report, copyright 02/12/2015.

Drs. Meltzer, Pollica, Barzillai explain how METACOGNITION can be taught:

- “Metacognitive strategies should be taught explicitly—using very literal and concrete terms, and including frequent modeling and repetition. It is important to also teach the students exactly how each strategy will help them....”

From Meltzer, L., Pollica, L.S., & Barzillai, M. (2007). *Executive Function in the Classroom: Embedding strategy instruction into daily teaching practices*. in L. Meltzer (Ed.), *Executive Function in Education: From Theory to Practice* (pp. 165-193). New York: Guilford Press.

Dr. Jerome Schultz, a member of ADDitude Magazine’s ADHD Medical Review Panel, summarizes how METACOGNITION can actually look when taught:

- “Students are expected to take more responsibility for predicting the need for EF-enhancing strategies that eliminate or reduce roadblocks to learning. After completing work successfully, students should be able to state the relation between the strategy they employed and the positive outcome.”

From <https://www.additudemag.com/executive-function-for-kids/> by Jerome Schultz, PhD, “It’s Easy to Hover Over a Child with Executive Function Deficits. Don’t,” 5/5/20.

Again we hear from **Dr. Lynn Meltzer** and colleagues on METACOGNITION:

- “Metacognitive awareness... boosts students’ motivation to master and use these strategies in their daily classwork and homework so that their academic performance improves beyond a single task.”
- Meltzer, et al. propose several guiding principles “critical for students with learning differences who display weaknesses in EF processes,” including, “Promote metacognitive awareness and self-understanding in students explicitly and emphasize that students have different profiles of strengths and weaknesses.

From Lynn Meltzer, Julie Dunstan-Brewer, and Kalyani Krishnan, “Learning Differences in Executive Function: Understandings and Misunderstandings,” in *Executive Function in Education: From Theory to Practice*, 2018.

How does Cerebrate incorporate METACOGNITION?

Cerebrate provides multiple chances for students to reflect on how they learn, what habits they have, and what changes could be impactful. Many lessons are reflective in nature, while others include specific reflection questions and activities. Students also have opportunities to evaluate themselves before and after each lesson to consider the significance of their growth. Students are able to become increasingly self-aware while establishing goals, routines, and habits that are meaningful to them.