

Springboard for the Future:

Executive Function and Implications for Educators



This brief is the first in a series and has been created with the generous support of the Barbara MacFadyen Cartwright Fund for Learning Strategies

The ways individuals enact processes to achieve goals and govern their behaviour can be a gateway for personal fulfillment, schooling, and independence. Many of these processes hinge on a person's ability to organize and process information, sustain attention, problem solve, and self-regulate (Goldstein, Naglieri, Princiotta, & Otero, 2014; Reynolds & Horton, 2008).

This brief provides an overview of executive function and related resources for educators. Executive Function (EF) is an umbrella term that refers to three aspects of brain function: working memory; cognitive flexibility (flexible thinking); and inhibitory control, which includes self-control (Zelazo, Blair, & Willoughby, 2016). The skills associated with EF provide the foundation for academic and emotional school readiness and, in later years, for strong achievement and positive growth (Dawson & Guare, 2018; Mann et al., 2017).

Characteristics of Executive Function

- *Cognitive or mental flexibility* refers to the ability to adapt to situations and adopt new methods, see alternate perspectives, alter approaches to problem-solving, and mentally shift between tasks or contexts (e.g., from one activity to another).
- *Working memory* is the ability to hold and manipulate information (ideas, numbers, and letters), for example, when responding appropriately to a conversation or listening to instruction.
- *Inhibitory control* is the intentional effort to focus attention, avoid responding to distraction, resist temptation, and pause and think before acting.

Each capacity (above) is significant alone, but also works in tandem with other capacities such as the ability to regulate emotional reactions in the moment and the ability to readily process information (Miyake et al., 2000; Zelazo et al., 2016). Executive functions are also connected to non-cognitive skills, which relate to an

individual's personality traits and other socio-emotional skills such as perspective-taking and recognizing social cues (Heckman, Stixrud, & Urzua, 2006; McClelland, Tominey, Schmitt, Duncan, 2017). The non-cognitive skills also represent behavioural characteristics that apply beyond academic contexts: for example, work ethic, and a sense of perseverance and passion for achieving a goal (Zelazo et al., 2016).

“The skills associated with EF provide the foundation for academic and emotional school readiness and, in later years, for strong achievement and positive growth.”

Implications for Educators

Nearly all children have the potential to develop EF skills. These skills are learned and honed over time both within and outside the school context (Centre on the Developing Child at Harvard University, 2017; Diamond, 2012). Among those whose skill development is challenged due to learning or behavioural needs, educators can foster the students' use of learning strategies and use teaching techniques to strengthen EF skill development (Brown & Landgraf, 2010).

Weak EF skills can impact the ability to organize materials, take tests, manage time, keep tasks in order, and initiate actions.

Educators can use different strategies to support students in developing their EF capacities. For example, they can help students acquire organizational skills by giving verbal information slowly and clearly, incorporating visual or verbal cues (e.g., orally repeating a task), and by having students chunk out large tasks into smaller actions. Since the needs of each student are different, educators need to understand how a particular student's abilities can be fostered through the development of particular EF skills, with the ultimate goal of helping them succeed in school environments.

“Childhood offers parents and teachers a critical opportunity to enhance the learning development of executive skills in a child.”

Researchers and clinicians confirm that EF capacities **can** and should **be explicitly taught** by teachers **to all** children. Peg Dawson and Richard Guare (2009), American researchers and authors on child and adolescent EF development, affirm that “childhood offers parents and teachers a critical opportunity to enhance the learning development of executive skills in a child” (p. 21). Students need to be able to retain information, focus attention, filter distractions, and switch mental gears, and the complexity of these tasks increases as they progress through the education system. The digital age has also changed the demands on children, requiring independence at a young age. As Lynn Meltzer (2010) states, “students are now required to organize and integrate a rapidly changing body of information that is available through the Internet and to take greater responsibility for their own learning” (p. 3). The following resources have been compiled to help educators learn more about EF skills and the importance of fostering learning environments that promote positive relationships and strength-based learning from Kindergarten to Grade 12.

Resource List for Educators

EXECUTIVE FUNCTION AND BRAIN DEVELOPMENT

Goldstein, S. & Naglieri, J.A. (Eds.) (2014). *Handbook of executive functioning*. New York: Springer.

This handbook describes the geography of brain development and its executive system, and discusses the key influential models of EF, instruments for its assessment as well as interventions for its enhancement.

Cartwright, K.B. (2012). Insights from cognitive neuroscience: The importance of executive function for early reading development and education. *Early Education and Development*, 23, 24-36.

The article describes the development of executive function in young children, including brain development and related processes, and its critical relation to early reading development and education as evidenced in research literature.

Zelazo, P. (n.d.). *Executive function and the brain* [Video file]. Retrieved from <https://u.org/2JAbdqo>.

This resource explains the processes that occur in the brain when executive function is used, as well as the ways in which children can practice, and thereby strengthen, their EF skills.

STRATEGIES FOR K TO 12 EDUCATORS

Faith, L. (n.d.) *Activated learning website for teachers and parents*. Retrieved from <http://activatedlearning.org/> This is a Canadian website that provides videos, research links, and teacher-created resources for developing EF in the classroom.

Center on the Developing Child at Harvard University (n.d.). *Enhancing and practicing executive function skills with children from infancy to adolescence*. Retrieved from <http://bit.ly/2JZ3HEY>. This report provides a list of age-appropriate EF games and activities from childhood to adolescence.

Meltzer, L. (Ed.) (2018). *Executive function in education* (2nd Edition). New York: The Guilford Press. This book explores the development of EF in Pre K-12 students and the link between EF and academic performance, as well as practical classroom strategies for educators.

PESI Inc. (Producer). (2016). *10 classroom activities to enhance executive function and improve task completion* [Video file]. Retrieved from <http://bit.ly/2wdO4RX>. In this video, Dr. Lynne Kenney describes the cognitive science behind learning and memory, how to become a 'Cognitive Detective' to identify EF dysfunction which might be impeding student success and how to have 'Cognitive Conversations' with students.

National Educational Psychological Service, Report Writing Group (2015). *Executive functioning skills: Classroom strategies—primary and post-primary*. Retrieved from <http://bit.ly/2WnvPYO>. This report includes a list of classroom strategies which may be used to enhance and support EF.

DePasquale, J. (2017). *Strategies to build executive functioning skills, part 1*. Retrieved from <http://bit.ly/2HRXWGc>. This resource provides an easy-to-access overview of EF and tips for teachers to help their grade 3-8 students.

OISE (n.d.). *Executive functions superheroes*. Retrieved from <http://bit.ly/2Qm9dT1>. This activity guide is aimed at ages 6-10 (grades 1-4) and provides a 'how-to' description of the activity, its implementation in a classroom setting, as well as links to other adaptations.

SUPPORTING STUDENTS WITH LEARNING NEEDS

Fuglei, M. (2016). List it, time it, do it: *Teaching strategies for students with executive function issues*. Retrieved from <http://bit.ly/2HNeBe9>. This resource argues that creating a classroom that helps foster EF skills benefits all students, not only those with EF deficits, and provides a list of teaching strategies that may be adopted to this end.

Gallagher, R. (2017, April 4). *Building organizational skills and executive functions in children with ADHD* [Video file]. Retrieved from <http://bit.ly/2JAly4o>. This webinar video from NYU Langone Health is a discussion of the techniques and best practices that have been empirically shown to be effective in developing EF skills in children with ADHD.

Wiley, P. (2015, May 21). *Executive function and ADHD* [Video file]. Retrieved from <http://bit.ly/2QIGKN7>. This video seminar provides a discussion of executive functioning and how ADHD impedes normal EF functions, and provides practical advice for strengthening EF skills in children with ADHD.

References

- Best, J.R. & Miller, P. H. (2010). A developmental perspective on executive function: Development of executive functions. *Child Development*, 81(6), 1641-1660.
- Brown, T. E., & Landgraf, J. M. (2010). Improvements in executive function correlate with enhanced performance and functioning and health-related quality of life: Evidence from 2 large, double-blind, randomized, placebo-controlled trials in ADHD. *Postgraduate Medicine*, 122(5), 42-51.
- Center on the Developing Child at Harvard University (2017). *Three principles to improve outcomes for children and families*. Retrieved from <http://www.developingchild.harvard.edu>
- Dawson, P., & Guare, R. (2009). *Smart but scattered: The revolutionary "executive skills" approach to helping kids reach their potential*. New York: Guilford Press.
- Dawson, P., & Guare, R. (2018). *Executive skills in children and adolescents: A practical guide to assessment and intervention*. New York: Guilford Publications.
- Diamond, A. (2012). Activities and programs that improve children's executive functions. *Current Directions in Psychological Science*, 21(5), 335-341.
- Goldstein, S., Naglieri, J. A., Princiotta, D., & Otero, T. M. (2014). Introduction: a history of executive functioning as a theoretical and clinical construct In J. Naglieri & S. Goldstein (Eds.), *Handbook of executive functioning*, (pp. 3-12). New York: Springer.
- Heckman, J. J., Stixrud, J., & Urzua, S. (2006). The effects of cognitive and noncognitive abilities on labor market outcomes and social behavior. *Journal of Labor Economics*, 24(3), 411-482.
- Mann, T. D., Hund, A. M., Hesson McInnis, M. S., & Roman, Z. J. (2017). Pathways to school readiness: Executive functioning predicts academic and social-emotional aspects of school readiness. *Mind, Brain, and Education*, 11(1), 21-31.
- McClelland, M., Tominey, S., Schmitt, S., & Duncan, R. (2017). SEL Interventions in Early Childhood. *The Future of Children*, 27(1), 33-47.
- Meltzer, L. (2010). *Promoting executive function in the classroom*. New York: Guilford Press.
- Miyake, A., Friedman, N., Emerson M., Witzki, A., Howerter, A., & Wager, T. (2000). The unity and diversity of executive functions and their contributions to complex "frontal lobe" tasks: A latent variable analysis. *Cognitive Psychology*, 41(1), 49-100.
- Reynolds, C. R., & MacNeill Horton Jr, A. (2008). Assessing executive functions: A life span perspective. *Psychology in the Schools*, 45(9), 875-892.
- Zelazo, P. D., Blair, C. B., & Willoughby, M. T. (2016). *Executive function: Implications for education* (NCER 2017-2000). Washington, DC: National Center for Education Research, Institute of Education Sciences, U.S. Department of Education.