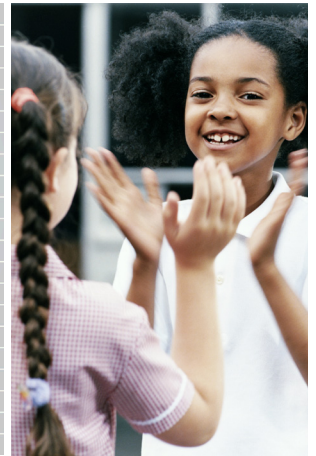


As part of the EF + STEM project at TERC, we've gathered some recommended resources for learning about Executive Function (EF) as it relates to STEM education. This list will grow and change.



Introduction to Executive Function

[InBrief: Executive Function: Skills for Life and Learning](#)

A five-minute video with overview of Executive Function and Self-Regulation from Harvard Center for the Developing Child.

Diamond, A. (2013). [Executive Functions](#). *Annual Review of Psychology*, 64, 135-168.

An overview of EF from a psychological perspective.

EF Interventions

Diamond, A., & Lee, K. (2011). Interventions shown to aid executive function development in children 4 to 12 years old. *Science*, 333(6045), 959-964.

A strong body of work on interventions for EF for young children.

EF + STEM

Gropen, J., Clark, Chiarelli, N., Hoisington, C., & Ehrlich, S. B. (2011). The Importance of Executive Function in Early Science Education. *Child Development Perspectives*, 5(4), 298-304.

An article the role of EF in scientific hypothesis making in early childhood learning.

EF + Math

Math + Literacy Finding:

EF, and its components, are strong predictors of future math and literacy skills.

Allan, N. P., & Lonigan, C. J. (2011). Examining the dimensionality of effortful control in preschool children and its relation to academic and socioemotional indicators. *Developmental psychology*, 47(4), 905.

Blair, C., & Razza, R. P. (2007). Relating effortful control, executive function, and false belief understanding to emerging math and literacy ability in kindergarten. *Child development*, 78(2), 647-663.

Bull, R., Espy, K. A., & Wiebe, S. A. Sheffield, & Nelson (2011) Using confirmatory factor analysis to understand executive control in preschool children: sources of variation in emergent mathematic achievement. *Developmental Science*, 14, 679-692.

Bull, R., Espy, K. A., & Wiebe, S. A. (2008). Short-term memory, working memory, and executive functioning in preschoolers: Longitudinal predictors of mathematical achievement at age 7 years. *Developmental neuropsychology*, 33(3), 205-228.

Clark, C. A., Pritchard, V. E., & Woodward, L. J. (2010). Preschool executive functioning abilities predict early mathematics achievement. *Developmental psychology*, 46(5), 1176.

Lan, X., Legare, C. H., Ponitz, C. C., Li, S., & Morrison, F. J. (2011). Investigating the links between the subcomponents of executive function and academic achievement: A cross-cultural analysis of Chinese and American preschoolers. *Journal of experimental child psychology*, 108(3), 677-692.

Monette, S., Bigras, M., & Guay, M. C. (2011). The role of the executive functions in school achievement at the end of Grade 1. *Journal of experimental child psychology*, 109(2), 158-173.

Ponitz, C. C., McClelland, M. M., Matthews, J. S., & Morrison, F. J. (2009). A structured observation of behavioral self-regulation and its contribution to kindergarten outcomes. *Developmental psychology*, 45(3), 605.

Wang, L. C., Tasi, H. J., & Yang, H. M. (2012). Cognitive inhibition in students with and without dyslexia and dyscalculia. *Research in developmental disabilities*, 33(5), 1453-1461.

Yeniad, N., Malda, M., Mesman, J., Van IJzendoorn, M. H., & Pieper, S. (2013). Shifting ability predicts math and reading performance in children: A meta-analytical study. *Learning and Individual Differences*, 23, 1-9.

Learners in Marginalized Situations Finding: EF may be a mediator of math learning for learners in marginalized situations.

Blair, C., Granger, D. A., Willoughby, M., Mills-Koonce, R., Cox, M., Greenberg, M. T., ... & FLP Investigators. (2011). Salivary cortisol mediates effects of poverty and parenting on executive functions in early childhood. *Child development*, 82(6), 1970-1984.

Howse, R. B., Lange, G., Farran, D. C., & Boyles, C. D. (2003). Motivation and self-regulation as predictors of achievement in economically disadvantaged young children. *The Journal of Experimental Education*, 71(2), 151-174.

Dilworth-Bart, J. E. (2012). Does executive function mediate SES and home quality associations with academic readiness?. *Early Childhood Research Quarterly*, 27(3), 416-425.

Kishiyama, M. M., Boyce, W. T., Jimenez, A. M., Perry, L. M., & Knight, R. T. (2009). Socioeconomic disparities affect prefrontal function in children. *Journal of cognitive neuroscience*, 21(6), 1106-1115.

Ready, D. D., & Reid, J. L. (2019). Children's executive function development and school socio-economic and racial/ethnic composition. *Early Childhood Research Quarterly*, 47, 457-471.

Welsh, J. A., Nix, R. L., Blair, C., Bierman, K. L., & Nelson, K. E. (2010). The development of cognitive skills and gains in academic school readiness for children from low-income families. *Journal of educational psychology*, 102(1), 43.

EF + Learning

Meltzer, L. (Ed.). (2018). *Executive Function in Education: From Theory to Practice*. Guilford Publications.

Lynn Meltzer's edited book is a great collection of seminal papers on EF in education, but unfortunately, it is not available online.

[CIRCL Primer: Neuroscience and Education](#).
Contributors: Judi Fusco, Jodi Asbell-Clarke, & Bernadette Sibuma

The Center for Innovative Research in Cyberlearning (CIRCL) pulled together ideas and resources from current NSF educators on neuroscience and executive function.

Zaitchik, Deborah & Solomon, Gregg & Tardiff, Nathan & Bascandziew, Igor. (2016). [Conceptual Change](#). 10.1093/acprof:oso/9780190467630.003.0005.

A learning science article that refers to the biological role of EF in Conceptual Change

EF + LD/UDL/Accessibility

Meltzer, L. & Krishnan, K. (2007). [Executive Function Difficulties and Learning Disabilities: Understandings and Misunderstandings](#). *Executive Function in Education: From Theory to Practice*, 77-105.

This is a seminal chapter from the first edition of Meltzer's book. Her full edited book (second edition) is highly recommended for purchase; see "EF + Learning" above.

Parker, David & Boutelle, Karen. (2009). *Executive Function Coaching for College Students with Learning Disabilities and ADHD: A New Approach for Fostering Self-Determination*. *Learning Disabilities Research & Practice*. 24. 204 - 215. 10.1111/j.1540-5826.2009.00294.x.

EF by Specific Age Groups

Early Learning Finding:

EF in kindergarten mediated the relation between SES, as assessed over the first three years of life, and Grade 1 literacy and math achievement. In addition, EF mediated the relationship between race and Grade 1 math ability.

Nesbitt, K. T., Baker-Ward, L., & Willoughby, M. T. (2013). Executive function mediates socio-economic and racial differences in early academic achievement. *Early Childhood Research Quarterly*, 28(4), 774-783.



Jones, S. M., Bailey, R., Barnes, S. P., & Partee, A. (2016). *Executive Function Mapping Project: Untangling the Terms and Skills Related to Executive Function and Self-Regulation in Early Childhood*. OPRE Report # 2016-88, Washington, DC: Office of Planning, Research and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.

A helpful article for understanding EF and its relationship to other self-regulation concepts, such as socioemotional learning.