

Reaching for joy in math learning: Embracing executive function processes and strategic instruction for students who struggle.

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References

- Boaler, J., and Dweck, C. (2016) *Mathematical Mindsets: Unleashing Students' Potential through Creative Math, Inspiring Messages, and Innovative Teaching*. San Francisco, CA: Jossey-Bass; a Wiley Brand.
- Bull, R. and Lee, K. "Executive Functioning and Mathematics Achievement." Child Development Perspectives. Volume 8, Number 1, 2014, p. 36-41
- Cragg, L. and Gilmore, C. "Skills underlying mathematics: The role of executive function in the development of mathematics proficiency." Trends in Neuroscience and Education 3 (2014) 63-68.
- Dawson, P. and Guare, R. (2012). <u>Coaching Students with Executive Skills Deficits</u>. New York. Guilford Press
- Dupre, K. "3 Strategies to Conquer Math Word Problems." Corkboard Connections. www.lauracandler.com. December 11, 2014.
- Dweck, C. (2006). Mindset: The new psychology of success. New York, NY: Ballentine Books.
- Fuchs, L.S. and Fuchs, D. (2007). Mathematical problem solving. In D. Birch and M. Mazzacco, Eds. Why is math so hard for some children? The nature and origins of mathematical difficulties and disabilities.
 - (P. 397-414). Baltimore: Brookes.
- Klingberg, Torkel. (2013). <u>The Learning Brain: Memory and Brain Development in Children</u> New York. Oxford University Press.
- Krasa, N. and Shunkwiler, S. (2009). <u>Number Sense and Number Nonsense: Understanding the</u> Challenges of Learning Math. Baltimore: Paul H. Brooks Publishing Co.

- Landmark College, "Universal Design of College Algebra; Improving the accessibility & usability of algebra instruction & resources." http://usablealgebra.landmark.edu/instructor-training/beneficial-practices
- Lewis, Katherine E. (2014) Difference Not Deficit: Reconceptualizing Mathematical Learning Disabilities, NCTM. Vol.45 Issue 3.
- "Math Instruction From America's Most Trusted Math Educator, Marilyn Burns." *Help Kids Learn Math with Do The Math by Marilyn Burns*. Scholastic, n.d. Web. 13 Feb. 2017.
- McKellar, D. Math Doesn't Suck. Plume (Penguin Group). New York. 2008.
- Meltzer, L. (2010). *Promoting executive function in the classroom*. K.R. Harris & S. Graham (Eds.). New York, NY: The Guildford Press
- Meltzer, L. (2014). Teaching executive functioning processes: Promoting metacognition, strategy use, and effort. In S. Goldstein & J. Naglieri (Eds.), *Handbook in Executive Function* (445-473). New York, NY: Springer Science and Business Media.
- Steinberg, J. and Roditi, B. (2018). The strategic math classroom: How executive function affects math learning. in Meltzer (Ed). *Executive Function in Education*, 2nd Edition. NY: Guilford Press.
- Roditi, B., and Steinberg, J. (2006). Math strategy instruction: Assessment for strategic teaching in Meltzer et. al. *Strategies for Success*. 2nd Edition. Austin, TX: Pro-Ed. Inc.
- Russell, S. J., Schifter, D., Bastable, V.(2011) Connecting arithmetic to algebra (Professional Book): Strategies for building algebraic thinking in the elementary grades. Portsmouth: Heinemann.
- Spiegel, Alix. "Struggle For Smarts? How Eastern And Western Cultures Tackle Learning." *NPR.* 12 Nov. 2012. Web. 13 Feb. 2017.
- Strauss, Valerie. "Key PISA test results or U.S. students." The Washington Post. December 3, 2013.
- Star, Jon R., and Bethany Rittle-Johnson. 2009. It pays to compare: An experimental study on computational estimation. Journal of Experimental Child Psychology, 102, no. 4: 408-426.
- K., Dragoo, K., Arefeh, S., & Luke, S. (2012, August 12). Effective mathematics instruction in Evidence for Education (III) https://eric.ed.gov/?id=ED572704
- Warshauer, H.K. (2014) Productive struggle in middle school math classrooms. *Journal of Mathematics Teacher Education*. *17*(4), Retrieved from http://link.springer.com/article/10.1007/s10857-014-9286-3#page-2

Resources

Low-bar, High-Ceiling Tasks:

- 1. Meyer, Dan. Math in Three Acts. http://threeacts.mrmeyer.com
- 2. Fletcher, Graham (Three Act Math and other things) https://gfletchy.com/
- 3. Bourassa, Mary, Which one Doesn't Belong (www.wodb.ca)
- 4. Desmos and activities through Desmos for high school students (teacher.desmos.com)
- 5. Numberless word problems: Bushhart, Brian, *Teaching to the Beat of a Different Drummer.* https://bstockus.wordpress.com/numberless-word-problems/

Apps for tablets/phones

- 1. Pet Bingo- App for Ipad- untimed game for learning math facts and for computation in general. http://www.duckduckmoose.com/educational-iphone-itouch-apps-for-kids/pet-bingo/
- 2. Slice Fractions- NCTM App- fraction concepts, mostly visual and conceptual rather than numbers. Appropriate for primary through middle. https://ululab.com/slice-fractions/
- 3. Mathevolve- APP for basic math facts- Space theme. Adjustable time https://www.commonsensemedia.org/app-reviews/math-evolve-a-fun-math-game
- 4. Set Pro HD- Card game, SET as an app for tablets.
- 5. Towers of Hanoi for tablets- there are many. One example is Tap Towers- all foster logical thinking and strategy use.
- 6. Unblock Me- App for tablets- build perseverance. Can adjust levels of difficulty.
- 7. Math Doodles- Parent's Choice Award- aims to make math fun. Lots of ability to customize the look of the puzzles. http://www.carstensstudios.com/mathdoodles/mathdoodles.htm