Research

Articles

1.
5 Steps to a Problem Solving Classroom Culture (Gerald Aungst)
https://globaldigitalcitizen.org/5-steps-to-a-problem-solving-classroom-culture

2.
In Math You Have to Remember, In Other Subjects You Can Think About It (Keith Devlin)
https://www.maa.org/external_archive/devlin/devlin_06_10.html

3.
The Importance Of Teaching Critical Thinking (Global Digital Citizen Foundation)
http://tinyurl.com/hxd73xl

4.
The Effective Mathematics Classroom (Andrews University)
https://www.andrews.edu/sed/leadership_dept/webinars/presentationdocuments/the_effective_mathematics_classrroom.pdf

5.
TIPS4RM: Mathematical Processes (13 pages) (Edugains)
http://www.edugains.ca/resources/LearningMaterials/MathProcesses/MathProcessesPackage.pdf

6.
Marzano's High Yield Instructional Strategies (Summarized High Yield Strategies)
http://www.palmbeachschools.org/qa/documents/Handout5-MarzanoHighYieldStrategies.pdf

Link to book on Amazon: http://www.amazon.ca/Classroom-Instruction-that-Works-Research-Based/dp/0131195034

7.
Math and Inquiry: The Importance of Letting Students Stumble
http://ww2.kqed.org/mindshift/2014/02/03/math-and-inquiry-the-importance-of-letting-students-stumble/

Research

1. WNCP Mathematics Research Project : Final Report (148 pages)

McAskill, B., Holmes, G., Francis-Pelton, L., Watt, W. (2004). WNCP Mathematics Research Project: Final Report. Retrieved from: https://www.wncp.ca/media/39083/final_report.pdf

This report summarizes information from "research journals, articles, books, theses, websites, etc. in order to compile an accurate picture of the state of mathematics education in Canada, North America, and the world at large." It focuses on "Research on the Teaching and Learning of Mathematics", "Numeracy & Mathematical Literacy", "Analysis of International Mathematics Assessments". This research gives insight into how children learn certain skills and concepts and instructional practices that support learning. It also gives insight into the teacher's role onto the learning of the students.

2. Fixed Mindset and Growth Mindset

Mind Your Errors: Evidence for a Neural Mechanism Linking Growth Mind-Set to Adaptive Posterror Adjustments (7 pages)

Moser, J., Schroder, H. S., Heeter, C., Moran, T.P. & Lee, Y.H. (2011) Mind Your Errors: Evidence for a Neural Mechanism Linking Growth Mind-Set to Adaptive Post Error Adjustments. *Psychological Science, 22, 1484-1489.* http://cpl.psy.msu.edu/wp-content/uploads/2011/12/Moser_Schroder_Moran_et-al_Mind-your-errors-2011.pdf

Abstract
"How well people bounce back from mistakes depends on their beliefs about learning and intelligence. For individuals with a growth mind-set, who believe intelligence develops through effort, mistakes are seen as opportunities to learn and improve. For individuals with a fixed mind-set, who believe intelligence is a stable characteristic, mistakes indicate lack of ability. We examined performance-monitoring event-related potentials (ERPs) to probe the neural mechanisms underlying these different reactions to mistakes. Findings revealed that a growth mind-set was associated with enhancement of the error positivity component (Pe), which reflects awareness of and allocation of attention to mistakes. More growth-minded individuals also showed superior accuracy after mistakes compared with individuals endorsing a more fixed mind-set. It is critical to note that Pe amplitude mediated the relationship between mind-set and posterror accuracy. These results suggest that neural mechanisms indexing on-line awareness of and attention to mistakes are intimately involved in growth-minded individuals' ability to rebound from mistakes."

3. Brain Research versus Improved Classroom Practices

Abiola, O. & Dhindsa, H.S, (2011) "Improving Classroom Practices Using Our Knowledge of How the Brain Works," *International Journal of Environmental & Science Education,* 7(1) 71-81, Retrieved from http://files.eric.ed.gov/fulltext/EJ972445.pdf

Abstract
"During the last decade of the 20th century (the decade of the brain) large sums of money were spent in researching how the brain works in relation to our day-to-day activities. As a result, we now know to a much greater extent the roles played by various regions of the brain when we are carrying out various activities including learning. We also know that different types of rewards and instruments can stimulate specific parts of the brain which enable individuals to carry out their daily chores efficiently. These findings when applied to a classroom learning situation, which is a step forward from theory to practice, might make it possible for us to improve learning for all learners. Thus, in this presentation we plan to combine our knowledge of how the brain functions with those of the other scientific disciplines to provide teachers with the tools they may need to be more effective and efficient teachers. More specifically, this paper aims to lay a foundation for an interfaculty collaboration in UBD towards helping teachers improve their thinking skills which in our opinion are of great importance to fostering their classroom practices."

4. Instructional Practices in Kindergarten

Do instructional practices contribute to inequality in achievement? the case of mathematics instruction in kindergarten. (2007). *Journal of Early Childhood Research, 5*(3), 301-322.

To access this research for a cost: http://ecr.sagepub.com/content/5/3/301.short

Abstract
We use multilevel modeling of ECLS-K data (a nationally representative sample of American kindergarteners) to describe the process and content of kindergarten mathematics instruction, as well as the associations of such instruction with achievement gaps by social class and race/ethnicity. Where instructional effectiveness is concerned, time spent on two of the process characteristics — traditional math and group/interactive activities — was significantly and positively associated with achievement gains. Time spent on three of the content variables — advanced counting, practical math, and single-digit operations — was associated with increased achievement. Time spent on basic numbers/shapes significantly decreased achievement. Classes with a high percentage of African American students were particularly likely to receive full-day kindergarten, which increased total instructional time, and this may have modestly decreased the achievement growth gap for these classes. Overall, kindergarten instructional practices were found to modestly reduce the mathematics achievement growth gap of African American students, but have no significant effects on the achievement growth gaps of lower social class or Hispanic students.

5. Findings on Project-Based Learning

Thomas, John W. (2000). *A review of research on project-based learning.*
http://www.newtechnetwork.org.590elmp01.blackmesh.com/sites/default/files/dr/pblresearch2.pdf

Here are some findings taken directly from the conclusion of this review.
'There is some evidence that students have difficulties benefiting from self-directed situations, especially in complex projects.'
'PBL seems to be equivalent or slightly better than other models of instruction for producing gains in general academic achievement and for developing lower-level cognitive skills
in traditional subject matter areas.'
"There is ample evidence that PBL is an effective method for teaching students complex processes and procedures such as planning, communicating, problem solving, and decision making, although the studies that demonstrate these findings do not include comparison groups taught by competing methods."