

Recommended References and Resources about Student Learning

Books about the science of learning applied to teaching

Ambrose, S.A., Bridges, M.W., DiPietro, M., Lovett, M.C., & Norman, M.K. (2010). *How learning works: Seven research-based principles for smart teaching*. San Francisco: Jossey-Bass. The authors, faculty members at Carnegie Mellon University, wrote this book for college teachers. Excellent combination of theory, research, and practice. CATL has distributed it widely on campus, and has used individual chapters as background readings for many faculty workshops. This should be the text for College Teaching 101.

Schwartz, D.L., Tsang, J.M., Blair, K.P. (2016). *The ABCs of how we learn: 26 scientifically proven approaches, how they work, and when to use them*. NY: W.W. Norton and Company. Chapters are incisive, thoughtful explanations of key topics, e.g., becoming an expert; making lectures and readings work; overcoming misconceptions and misplaced reasoning. Target audience is teachers. Many examples apply to K-12, but almost everything in this book applies to higher education too. A unique feature is they identify examples good and bad uses of each strategy.

De Bruyckere, P., Kirschner, P.A., & Hulshof, C.D. (2015) *Urban myths about learning and education*. London: Elsevier. Short chapters that debunk 35 myths related to learning, neuroscience and education, technology in education, and educational policy. It's a dirty job, but somebody had to do it.

Brown, P.C., Roediger, H.L., McDaniel, M. A. (2015). *Make it stick: The science of successful learning*. Cambridge, Massachusetts: Harvard University Press. Two eminent memory researchers team up with a very good science writer. This book is for a mass audience with a minimum of jargon but based soundly in research.

Willingham, D.T. (2009). *Why don't students like school? A cognitive psychologist answers questions about how the mind works and what it means for the classroom*. San Francisco: Jossey-Bass. Focuses mainly on K-12 education but applies broadly to higher education as well. Willingham is a cognitive psychologist who switched career focus to translating research on learning for educators. He also writes a blog and publishes op-ed pieces in the *NYT*.

Fiorella, L. & Mayer, R.E. (2015). *Learning as a generative activity: Eight learning strategies that promote understanding*. NY: Cambridge University Press. A state-of-the-research review of eight strategies that promote understanding. Excellent resource if you want to become familiar with the research on learning. Although steeped in research it is accessible to a non-researcher audience.

Weinstein, Y. & Sumeracki, M. (2019). *Understanding how we learn: A visual guide*. NY: Routledge. An excellent primer for educators and parents that focuses on applications of research to teaching. A unique feature is extensive integration of graphics to illustrate ideas, principles and studies.

Brown, A.M. & Kaminske, A.N. (2018). *Five teaching and learning myths debunked: A guide for teachers*. NY: Routledge. A compact (70 pages) overview of five educational myths—multitasking, examples, focus, testing, and learning styles.

Gazzaley, A. & Rosen, L.D. (2016). *The distracted mind: Ancient brains in a high-tech world*. Cambridge, MA: MIT Press. Excellent book about “how and why we struggle with interruptions and distractions that emerge from both our inner and outer worlds,” and “offers practical strategies for changing your behavior and enhancing your brain function to alleviate interference and better accomplish your goals.”

Hattie, J. (2009). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. London: Routledge. An astonishing book that synthesizes an enormous body of research, 800 meta-analyses involving thousands of studies with millions of students. This is like the *Encyclopedia Britannica* of student achievement research.

Practice Testing and Retrieval Practice

Argarwal, P. (2017). *Retrievalpractice.org*. Retrieved from <http://www.retrievalpractice.org>

Agarwal, P., Roediger, H.L., McDaniel, M. A., McDermott, K.B. (2013). *How to use retrieval practice to improve learning*. Download free handbook at <http://www.retrievalpractice.org/download>

Cerbin, B. (2011). *Test-enhanced learning: Testing can improve learning*. Five-minute screencast. Retrieved from <https://sites.google.com/a/uwlax.edu/exploring-how-students-learn/test-enhanced-learning>

Cerbin, W. (2015). Practice testing. In *Teaching Improvement Guide*. University of Wisconsin at La-Crosse Center for Advancing Teaching and Learning. Retrieved from <https://sites.google.com/a/uwlax.edu/teaching-improvement-guide/improvement-strategies/student-learning/a-practice-testing>.

Dunlosky, J., Rawson, K. A., Marsh, E. J., Nathan, M. J., & Willingham, D. T. (2013). Improving students' learning with effective learning techniques: Promising directions from cognitive and educational psychology. *Psychological Science in the Public Interest*, 14, 4-58. <http://dx.doi.org/10.1177/1529100612453266>

Karpicke, J. & Blunt, R. (2011). Retrieval practice produces more learning than elaborative studying with concept mapping. *Science*. 331, 772-775.

Fiorella, L. & Mayer, R.E. (2015). Learning by self-testing. In *Learning as a generative activity: Eight learning strategies that promote understanding*. NY: Cambridge University Press.

Pyc, M.A., Agarwal, P.K., & Roediger, H.L. (2014). Test-enhanced learning. In V. A. Benassi, C. E. Overson, & C. M. Hakala (Eds.), *Applying science of learning in education: Infusing psychological science into the curriculum*. Retrieved from <http://teachpsych.org/ebooks/asle2014/index.php>

Roediger, H., McDaniel, M., & McDermott, K. (March, 2006). Test enhanced learning. *APS Observer*. Vol. 19, No. 3.

Roediger H. L., Putnam A. L., Smith M. A. (2011). Ten benefits of testing and their applications to educational practice, in J. Mestre & B. Ross (Eds.). *Psychology of Learning and Motivation: Cognition in Education*, 1–36.

Smith, M. & Weinstein, Y. (2016, May 5). *The many benefits of retrieval practice*. [Blog post]. Retrieved from <http://www.learningscientists.org/blog/2016/5/5-1>

Woolridge, C. (2016, August 4). *Retrieval practice in the classroom: New evidence*. [Blog post]. Retrieved from <http://www.learningscientists.org/blog/2016/8/4-1>.

Explanation

Cerbin, W. (2015). Self explanation. In *Teaching Improvement Guide*. University of Wisconsin at La Crosse Center for Advancing Teaching and Learning. Retrieved from <http://www.uwlax.edu/catl/teaching-guides/teaching-improvement-guide/how-can-i-improve/self-explanation/>.

Chiu, J.L. & Chi, M.T.H. (2014). Supporting self-explanation in the classroom. In V. A. Benassi, C. E. Overson, & C. M. Hakala (Eds.), *Applying science of learning in education: Infusing psychological science into the curriculum*. Retrieved from <http://teachpsych.org/ebooks/asle2014/index.php>

Fonseca, B. & Chi, M.T.H. (2011). Instruction based on self-explanation. In R. Mayer & P. Alexander (Eds.), *The Handbook of Research on Learning and Instruction*. London: Routledge Press.

Fiorella, L. & Mayer, R.E. (2015). Learning by self-explanation. In *Learning as a generative activity: Eight learning strategies that promote understanding*. NY: Cambridge University Press.

Schwartz, D.L., Tsang, J.M., Blair, K.P. (2016). S is for self-explanation: Going beyond the information. In *The ABCs of how we learn: 26 scientifically proven approaches, how they work, and when to use them*. NY: W.W. Norton and Company.

Worked Examples

Cerbin, B. (2012). *Learning from worked examples*. Seven-minute screencast. Retrieved from <https://sites.google.com/a/uwlax.edu/exploring-how-students-learn/learning-from-examples>

Renkl, A. (2014). Learning from worked examples: How to prepare students for meaningful problem solving. In V. A. Benassi, C. E. Overson, & C. M. Hakala (Eds.), *Applying science of learning in education: Infusing psychological science into the curriculum*. Retrieved from <http://teachpsych.org/ebooks/asle2014/index.php>

Managing Cognitive Load

Cerbin, B. (2014). *Working memory and cognitive load*. Ten-minute screencast. Retrieved from <https://sites.google.com/a/uwlax.edu/exploring-how-students-learn/working-memory-as-a-bottleneck-in-learning>

Cerbin, B. (2014). *Reduce cognitive load, improve learning*. Seven-minute screencast. Retrieved from <https://sites.google.com/a/uwlax.edu/exploring-how-students-learn/working-memory-as-a-bottleneck-in-learning>

Paas, F. & Sweller, J. (2004). Implications of cognitive load theory for multimedia learning. In R.E. Mayer (Ed). *The Cambridge handbook of multimedia learning* (second edition). NY: Cambridge University Press.

Stanford graduate students (2014). *Improving learning by reducing unnecessary mental load*. Guide prepared by graduate students in a course on Science Teaching and Learning taught by Carl Wieman. Retrieved from http://www.cwsei.ubc.ca/resources/files/Cognitive-Load_CWSEI.pdf

Blogs

The Learning Scientists, <http://www.learningscientists.org>. Very active, productive blog on a wide variety of topics related to teaching and learning. Excellent resources oriented to classroom teaching.

Dan Willingham: Science and Education Blog. <http://www.danielwillingham.com/daniel-willingham-science-and-education-blog> Willingham often summarizes a research study and its implications for teaching.

Websites

Exploring How Students Learn. I maintain this site, which includes short summaries and commentaries about college student learning, <https://sites.google.com/a/uwlax.edu/exploring-how-students-learn/>

CATL Teaching Guides. Staff members at the UWL Center for Teaching and Learning maintain this teaching guide at <https://www.uwlax.edu/catl/teaching-guides/>. It includes a section on student learning at <https://www.uwlax.edu/catl/teaching-guides/teaching-improvement-guide/how-can-i-improve/student-learning/>

Carl Wieman Science Education Initiative at the University of British Columbia. Wieman is a Nobel Laureate in Physics and a serious educational reformer. The initiatives resource page includes numerous articles, guides and studies about learning in the STEM disciplines, <http://www.cwsei.ubc.ca/resources/index.html>

Videos

How to Get the Most Out of Studying, a series of 7 videos (each about 7 minutes long) by Professor Steve Chew of Samford University. An excellent resource for students and instructors. <https://www.samford.edu/departments/academic-success-center/how-to-study>