CWSEI new Science Teaching & Learning Fellow (STLF) development sessions, 2013 *(List of resources at end)*
The purpose of this series is to develop knowledge and skills in new STLFs so that they can effectively apply relevant research in cognitive psychology and education to improve teaching and learning in higher education. The series is 12 sessions, ~1 per week, with 1.5 hour meetings. We recommend keeping this order for #1-5, but the order is not important for later sessions, except for #12.

	Subject	**Preparation**	**Tasks at meeting**
#1	**Effect of prior knowledge**	Read: • How Learning Works chapter 1 • (extra: How People Learn chapter 1)	Develop a list of instructional approaches and ways to probe student prior knowledge/ misconceptions that are particularly relevant to the courses you are working on.
#2	**Knowledge organization; expert-novice differences**	Read: • How Learning Works chapter 2 • (extra: How People Learn ch. 2) Give some thought: what are the important organizational structures relevant to courses you are working on?	Develop approaches to make important organizational structures explicit for courses you are involved in. Think of ways to get the students to actively engage in this process.
#3	**Motivation**	Read: • How Learning Works chapter 3 • (extra: Yeager et. al.: *Addressing achievement gaps with psychological interventions*[1] or *Social-Psychological Interventions in Education: They're Not Magic*[2])	Work out how to apply some of the strategies discussed in this chapter to courses you are working on.
#4	**Learning and transfer**	Read: • How Learning Works Chapter 4 • SEI 2-pager *Teaching Expert Thinking* • (extra: How People Learn ch. 3)	Pick a few strategies from this chapter and work on how to apply these to the courses you are involved with.
#5	**Deliberate practice**	Read: • How Learning Works Chapter 5 • Ericsson: *The influence of experience and deliberate practice on the development of superior expert performance*[3] • (extra: Fortune Magazine *What it Takes to be Great*,[4] Sci. American *The Expert Mind*[5])	Work on designing a deliberate practice task for topic in a course you are connected with. Contrast this with a task that might be assigned and will take time but does not constitute deliberate practice.
#6	**Development of self-directed learners**	Read: • How Learning Works chapter 7: How Do Students Become Self-Directed Learners?	Pick a few strategies from this chapter & work on how to apply these to the courses you are involved with.
#7	**Learning goals**	Read: • How Learning Works Appendix D: What Are Learning Objectives and How Can We Use Them? • Simon & Taylor: *What is the Value of Course-Specific Learning Goals?* • Smith & Perkins: *"At the end of my course, students should be able to..:"* • Mayer: *Rote Versus Meaningful Learning*[6]	• Develop a few learning goals for a topic in a course you are working on. - or - • Critique & improve some learning goals you already have. - or - • From an exam (bring for course you are working on), evaluate the Bloom's level of some of the questions and create learning goals associated with these questions.
#8	**Formative assessment**	Read: • Chapter 3 of Scientific Teaching • SEI 2-pager *Assessments That Support Student Learning* • (extra: Gibbs and Simpson: *Conditions Under Which Assessment Supports Students' Learning*)[7]	Brainstorm about ways to build in frequent formative assessments of specific important aspects of the courses you are working on (e.g. learning goals) – including a plan for getting feedback to students.
#9	**Memory and retention**	Read: • Bjork: *Memory and metamemory considerations in the training of human beings*[8] • Karpicke & Roediger: *The Critical Importance of Retrieval for Learning*[9] • Mayer et al.: *Increased Interestingness of Extraneous Details in a Multimedia Science Presentation Leads to Decreased Learning*[10]	• List practices in course you are familiar with that encourage study of the type that enhances retention. • List practices that hinder retention. • Design modifications to improve retention.

#10	**Peer Instruction and effective clicker use**	Read: • SEI clicker user's guide • (extra: Beatty: *Designing effective questions for classroom response system teaching*[11]) Watch: SEI video clips *How to Use Clickers Effectively* and *The Research: Do Clickers Help Students Learn?*	Create or revise questions (either to be used with clickers or without), discuss how to facilitate in class, depending on outcome of vote. (Bring clicker or other discussion questions from the course you are working with if you have them – especially those you think need work)
#11	**Group work: (beyond Peer Instruction) Different types, levels, benefits and tradeoffs of group activities**	Read: • SEI 2-pagers: *Group Work in Educational Settings* and *Creating and implementing in-class activities; principles and practical tips* • (extra: Heller & Hollabaugh: *Teaching Problem Solving Through Cooperative Grouping. Part 2: designing problems & structuring groups*[12]) Watch: SEI video *Group Work in the College Classroom*	• Work on the design of a group activity for use in large lecture setting (for a course you are working on, if applicable). • Contrast above with what could be done with a smaller enrolment course or tutorial setting.
#12	**Characteristics of expert tutors**	Read: • Lepper & Woolverton: *The Wisdom of Practice: Lessons Learned from the Study of Highly Effective Tutors*[13] • Wood & Tanner: *The Role of the Lecturer as Tutor: Doing What Effective Tutors Do in a Large Lecture Class*[14]	• List which characteristics could be generally applied to a large class. • Create activities that embody these.

Books:

How Learning Works: Seven Research-Based Principles for Smart Teaching - Susan Ambrose et al.
How People Learn: Brain, Mind, Experience, and School - Ann Brown, Rodney Cocking, and John Bransford
Scientific Teaching - Jo Handelsman, Sarah Miller, and Christine Pfund

SEI Resources: www.cwsei.ubc.ca/resources/ - a variety of resources developed by the CWSEI and CU-SEI + external links:
    www.cwsei.ubc.ca/resources/instructor_guidance.htm - SEI 2-pagers, etc.
    www.cwsei.ubc.ca/resources/clickers.htm - resources on using clickers effectively
    www.cwsei.ubc.ca/resources/SEI_video.html - short videos illustrating teaching techniques (more to come)
    www.cwsei.ubc.ca/resources/learn_goals.htm - resources on developing learning goals
    www.cwsei.ubc.ca/resources/tools.htm – tools & workshop materials (more to come)
    www.cwsei.ubc.ca/resources/papers.htm - journal articles and book chapters that we find particularly relevant
    www.cwsei.ubc.ca/resources/other.htm - course transformation documents, good books, etc.

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[1] Addressing achievement gaps with psychological interventions, D. Yeager, G. Walton, G. Cohen, *Kappan,* pp. 62-65 (2013).

[2] Social-Psychological Interventions in Education: They're Not Magic, D. Yeager, G. Walton, Review of Ed. Research, Vol 81(2), pp. 267–301 (2011).

[3] The influence of experience and deliberate practice on the development of superior expert performance, K. Anders Ericsson, in The Cambridge Handbook of Expertise and Expert Performance, Ch. 38, (Cambridge University Press, 2006).

[4] What it takes to be great, Geoffrey Colvin, Fortune Magazine, October 19 2006.

[5] The Expert Mind, Philip Ross, Scientific American, Vol 295(2), pp. 64-71 (August 2006).

[6] Rote Versus Meaningful Learning, Richard Mayer, Theory Into Practice, Vol 41(4), pp. 226-232 (2002).

[7] Conditions Under Which Assessment Supports Students' Learning, G. Gibbs and C. Simpson, Learning and Teaching in Higher Education, Issue 1, (2004-5).

[8] Memory and metamemory considerations in the training of human beings, Robert Bjork, in Metacognition: Knowing about knowing (pp.185-205), J. Metcalfe and A. Shimamura (Eds.), Cambridge, MA: MIT Press (1994).

[9] The Critical Importance of Retrieval for Learning, J. Karpicke and H. Roediger, Science, Vol. 319. no. 5865, pp. 966-968 (2008).

[10] Increased interestingness of extraneous details in a multimedia science presentation leads to decreased learning, R. Mayer et al., Journal of Experimental Psychology: Applied. Vol 14(4), pp. 329-339 (2008).

[11] Designing effective questions for classroom response system teaching, I. Beatty et al., American Journal of Physics, Vol 74(1), pp. 31-39 (2006).

[12] Teaching problem solving through cooperative grouping. Part 2: Designing problems and structuring groups, P. Heller and M. Hollabaugh, American Journal of Physics, Vol 60(7), pp. 637-644 (1992).

[13] The Wisdom of Practice: Lessons Learned from the Study of Highly Effective Tutors, M. Lepper and M. Woolverton, in Improving academic achievement: Impact of Psychological Factors on Education, Ch. 7, Academic Press, pp. 135-158, (2002).

[14] The Role of the Lecturer as Tutor: Doing What Effective Tutors Do in a Large Lecture Class, William Wood and Kimberly Tanner, CBE—Life Sciences Education, Vol. 11, pp. 3–9, Spring 2012.