Principles and Practices of Effective University Teaching

New mini-course (6 three hour sessions spread over 3 weeks) for faculty on teaching based on active learning and other research.

The workshop will focus on research-based principles for learning and applying those principles to the creation and implementation of the course activities.   This will involve going from the basic research on learning and the development of expertise from cognitive psychology to the creation of specific instructional activities using those finding and implementing them in classrooms with small group work etc.. The readings are the short chapters from the book, The ABCs of How We Learn, by D. Schwartz et al., and 1-2 page articles prepared for the CWSEI, usually by Wieman, and are collected in the "Training workshop readings" booklet. All those readings are targeted at specific ideas in learning and/or implementation of instructional activities. A good general reference on university teaching is How Learning Works by Ambrose et al. It would be beneficial but not essential for participants to have read this in advance.

Participants in the workshop are expected to have a course which they have previously taught or are planning to teach. They should come to the workshop with drafts of following items for this course:
- learning goals (same as "objectives") for at least a substantial portion
- two or more instructional activities
- one or more sets of lecture notes used in the course or a similar course, previously
- set of exam questions
- set of homework questions or assignments

These will serve as starting points for discussion and refinement. Participants should send in advance material to be shared including: a short paragraph describing their target course, including the number and level of students likely to be enrolled, the instructional space in which it is to be taught, and a 2-4 sentence description of the material covered. They should also include the course learning goals.

 "SGR" = small group work followed by readout on activity.

Time (hr)	Home/Class?	Activity/reading	Other info	Day
Agenda for day 1: - Intro - watch and discuss videos of lecture vs. active - prior knowledge discussion of readings - SGR about list of prior knowledge needed for activity previously created				
1. Introduction				
	home	Readings: • 1pg on expertise (expert mind/thinking) **(cw to write)** • First Day of Class – Recommendations for Instructors		**Before day 1**

		• What Not To Do; practices that should be avoided when implementing active learning		
0.5	class	General introductory materials (including discussion of reading key points)	Workshop introduction- overview of learning principles and basic course components and design. Idea of optimizing individual and coherently.	Day 1
1	class	Watch 5-10 min video of lecture. What notice? Discuss in groups of 3-4, followed by whole class readout/summary. (**"SGR"**) Watch 5-10 minute video of active learning in a large intro course, using clickers and possibly worksheets. *??Watch similar video but in a class of 25-40 students using worksheets(?)* What notice? **SGR**	What do they now notice about lecture vs active? Notice for active learning should Include: Had prior reading to get basic information. Practicing expert reasoning & decision making. Higher level questions with substantial challenge. Ongoing monitoring of learning and difficulties by instructor. Not waiting until everyone finished. Learning from student-student discussions. Instructor feedback and future class directions based on student performance and questions. Lots of student questions.	Day 1
2. Prior Knowledge				
	home	Readings: U is for Undoing. 2 pg-Better Ways to Review Material in Class (and measure student preparation	Readings on importance of addressing prior knowledge-	**Before day 1**
0.5	Class	Prior knowledge reading discussion	discuss general relevance of prior knowledge, source of diversity, need for knowing what is a solution and solution method, as well as facts	**Day 1**
	home	Look at teaching activity you previously created. List: what prior knowledge students will need to complete it? What prior knowledge or beliefs might they have that would hinder their successful completion? Make lists individually.		**Before day 1**

		Create an activity to measure students' prior knowledge relevant to your course		
1	class	**SGR** about prior knowledge lists and activity to measure prior knowledge		Day 1
	Home	Quiz to attendees on prior knowledge and beliefs about teaching. Carl needs to create	including bunch of misconceptions about, cant learn if teacher does not tell, do learn if do tell, what happens in peer discussion (just strong students tell weak students facts, primarily low level benefit to weak students, need to tell students bunch of stuff before they can start trying to solve a problem, failure to complete correct answer is automatically bad, every students should fully complete each task in class, best feedback is to show correct answer to student, exams test meaningful things and reliable, …)??	**Before day 1**

Agenda for day 2:
- Discuss understanding readings
- SGR for both measuring whether students understand/fail to understand in activity previously created, and modifying activity to include ways to enhance understanding
- Discuss deliberate practice readings

3. "Understanding" and expert knowledge structures

	Home	Look at the activity you created. Write down answers to following questions. What would demonstrate student understanding of that material? What would demonstrate failure to understand? How would you measure either? What things might a student do that would make you erroneously think they understood?		**Before day 2**
	Home	Readings: E for elaboration. A for Analogy. K for knowledge. J for Just in time telling S is for self explanation (Add in something to fill in about knowledge structures)	Readings on developing understanding, simple level. *Guiding questions. How do you see these as supporting understanding or not? What is most counterintuitive in the readings?*	**Before day 2**
.75	Class	Discussion of reading.		Day 2

	Home	Modify your instructional activity to include ways to enhance development of expert knowledge structure based on readings.		**Before day 2?** Or on day 2?
1.25	Class	**SGR about both "understanding" activities**		Day 2
4. Deliberate Practice.				
	home	Readings: • D for deliberate practice • K for Knowledge, • C for contrasting cases • Teaching expert thinking • *1 pg overview of deliberate practice and enablers*	*Guiding questions. What are the necessary components of deliberate practice? How well does your instructional activity provide deliberate practice?*	**Before day 2**
1	Class	Reading discussion	key items to bring out: break down into specific aspects of expert thinking (look at making decisions), knowledge organization, models, selection criteria, practice, feedback.	Day 2

Agenda for day 3:
  -   SGR for deliberate practice + feedback activity
  -   Discuss feedback readings
  -   Discuss motivation readings
  - SGR for motivation activity				

	home	Refine instructional activity to provide better deliberate practice. Focus on what cognitive tasks and decisions it is having student practice, and include ways to provide actionable feedback.	(Re: feedback: students get extra credit by explaining how thinking wrong, how to improve.)	After day 2 **(before day 3)**
1	Class	**SGR**		Day 3
4. Supporting Delib. Practice—Feedback				
	home	Readings: • F for feedback • J for Just in time telling • Assessments That Support Student Learning • Two stage exams to support learning.		**Before day 3**
.5	Class	Discussion of feedback readings		
5. Supporting Delib. Practice—Motivation				
	home	Readings: • R for rewards • Y for Yes I can		**Before day 3**

		• Q for question driven • Motivating learning • Basic Instructor Habits to Keep Students Engaged • Include a reading about inclusive classrooms Optional- seductive details paper		
.75	Class	Discuss reading on motivation.	Elements that motivate: need for individual and group deliverables. see as relevant and/or interesting based on learners' background, believe they can master and how to go about mastering (Importance of growth mindset.), and some control over learning process. Working together. Include discussion about inclusive classrooms	Day 3
	Home?	Modify activity to enhance motivation (or create new one).		**Before day 3**
.75	Class	**SGR about motivation activity**		Day 3
Agenda for Day 4: - (removing?) in class activities on value of group work, behavioral norms - Discuss group work readings - SGR on group work activity - Discuss cognitive load readings				
6. Collaborative learning-small group work				
	Home	Readings: • T for teaching • L for listening and sharing, • Student Group Work in Educational Settings—different options • Setting value and norms for behavior during group activities • Creating and Implementing In-Class Activities; principles and practical tips • Clicker question design and use • Orchestration of active learning activity 1 pg (from Jones…Wieman) (Note use of challenge questions) • Using active learning time most efficiently • Reading about group activities (Carl create based on activities) – on value of group	Group work readings. *Guiding questions: How does collaborative learning impact motivation, learning, feedback, testing one's thinking, and understanding?*	**Before day 4**

		work. Behavioral norms to optimize group activities		
1	Class	Discuss readings.	Personalized feedback. Not just the better students giving info and feedback to weaker. Novel cognitive activities from teaching, involve looking at topic more broadly, learning from perspective. Practicing critiquing arguments and metacognition. Need for individual and group deliverables. Various options. Group size 3-4. challenge questions. importance of keeping all engaged, easy questions at start to engage weakest, challenge questions at end to engage most rapid,	Day 4
	home	Individuals modify one of the activities they had prepared, to make better for small group work.		**Before day 4**
1	class	**SGR**	Mention here the idea of never being able to know perfect pacing or what will give problems, so should plan that activity will never be perfect, need to be flexible and modify in real time as needed. Make notes so can improve following year.	Day 4
7. Cognitive load and implications of limitations of working memory				
	home	Readings: - Improving learning by reducing unnecessary cognitive load - Preclass-Reading Assignments - E for Elaboration - W for worked examples - A for analogy optional-paper on seductive details	Cognitive load and why important to minimize	**Before day 4**
1	Class	Discuss readings.	How preclass prep can help. Why formalism first makes higher cognitive load. Chunking, and how analogies and knowledge organization structures are forms of chunking. Danger of seductive details, jokes. Split attention destroys learning.	Day 4
Agenda for day 5: - SGR for cognitive load activity - Discuss homework readings - SGR for homework activity				
	home	Examine lecture slides from some course. Go over how to modify to reduce unnecessary cognitive load. (Maybe repeat for instructional activity?)		After day 4 **(before day 5)**

		Lay out advance preparation for activities in your course, and explain how could reduce cognitive load.		
1	Class	**SGR**	Wieman list- explicit organization, value of figures, no unnecessary images or info, transitions, proper use of animation…	Day 5
8. Homework problems				
	Home	Reading: Creating good homework problems (and grading them)		**Before day 5**
0.5	class	Discuss reading.		Day 5
	Home	Modify existing HW problems so they integrate with in-class activity and practice expert thinking. Optimize feedback.		**Before day 5**
1	Class	**SGR**	Review and improve HW problems.	Day 5
9. Learning goals/objectives				
	Home	Readings: • Creating and Using Effective Learning Goals • Simon and Taylor article on how good learning goals are used by students and faculty. • Promoting course alignment		**Before day 5**
0.5	Class	Discuss learning goals reading	Really a Carl summary	**Day 5**
Agenda for day 5: - SGR for learning goals - Discuss putting pieces together readings - SGR to put pieces together/review activities - Concept mapping activity				
	home	Modify learning goals from your course (as needed) to reflect points brought up in readings. Particular considerations: Include both affective and cognitive goals. Check that goals are operationalized and measurable. How would they be practiced in instructional activity and homework?		**Before day 6**

		Look at an exam and see how well it reflects the learning goals for the course		
1	class	**SGR**		Day 6
10. Putting the pieces together				
		Readings • Guide to reflection on effective course design and implementation • Creating and implementing in-class activities; principles and practical tips • Observation Guide/Checklist for Active-learning Classroom • What not to do; practices to be avoided when implementing active learning	Reading for putting the pieces together.	**Before day 6**
0.5		Discussion of readings		Day 6
.75		Small group activity. Look at each group members sample activity(ies). Go down items in reflection guide and checklist to see how well covered, how could be improved. **SGR**	Going through activities that have been revised during the workshop	Day 6
.75		concept mapping activity on teaching and learning as represented in workshop.		Day 6
Extra: Optional readings				
	home	Readings: Designing exams. 1 page on grading (Dangers of curve, wieman philosophy of rewarding all activities that lead to learning.) Seductive details paper Other readings Carl may add in later		