Flipping the Classroom: Introducing Active Learning into the Large Group Setting

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Objectives

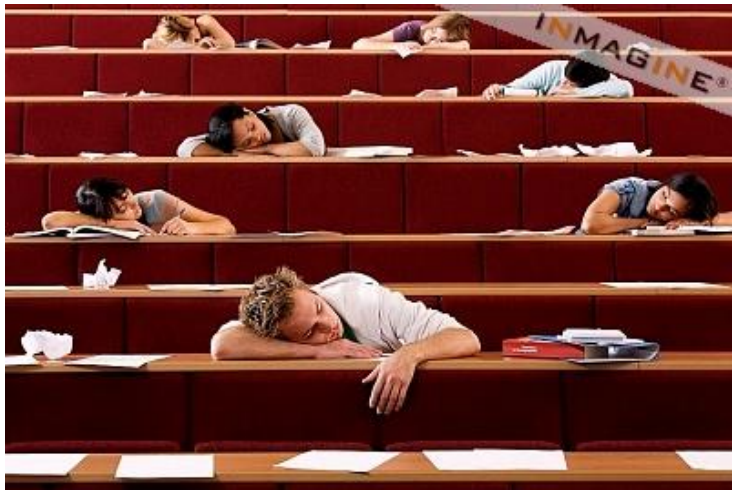
- Discuss need for active learning from a pedagogical and accreditation viewpoint
- Define active learning and explore barriers to active learning in health sciences teaching
- Describe the spectrum and provide examples of active learning opportunities in large group settings
- Provide resources for the development of a community of educators devoted to active learning

The Traditional Lecture

- 50 minutes
- PowerPoint
- Delivered “cold”
- Prime source of assessment material
- Brute force delivery
- Parade of experts
- Modern additions:
  - Podcasting w/ variable speed
  - Notebook computers w/ wireless

Why the Traditional Lecture?

- Good:
  - Knowledge transfer (although reading is better)
  - Easiest for faculty and students
  - Most economically feasible mechanism for the college
- Bad:
  - "Passive" learning
  - Long-term retention poor
  - Inferior for skills development
  - Inferior for changing attitudes



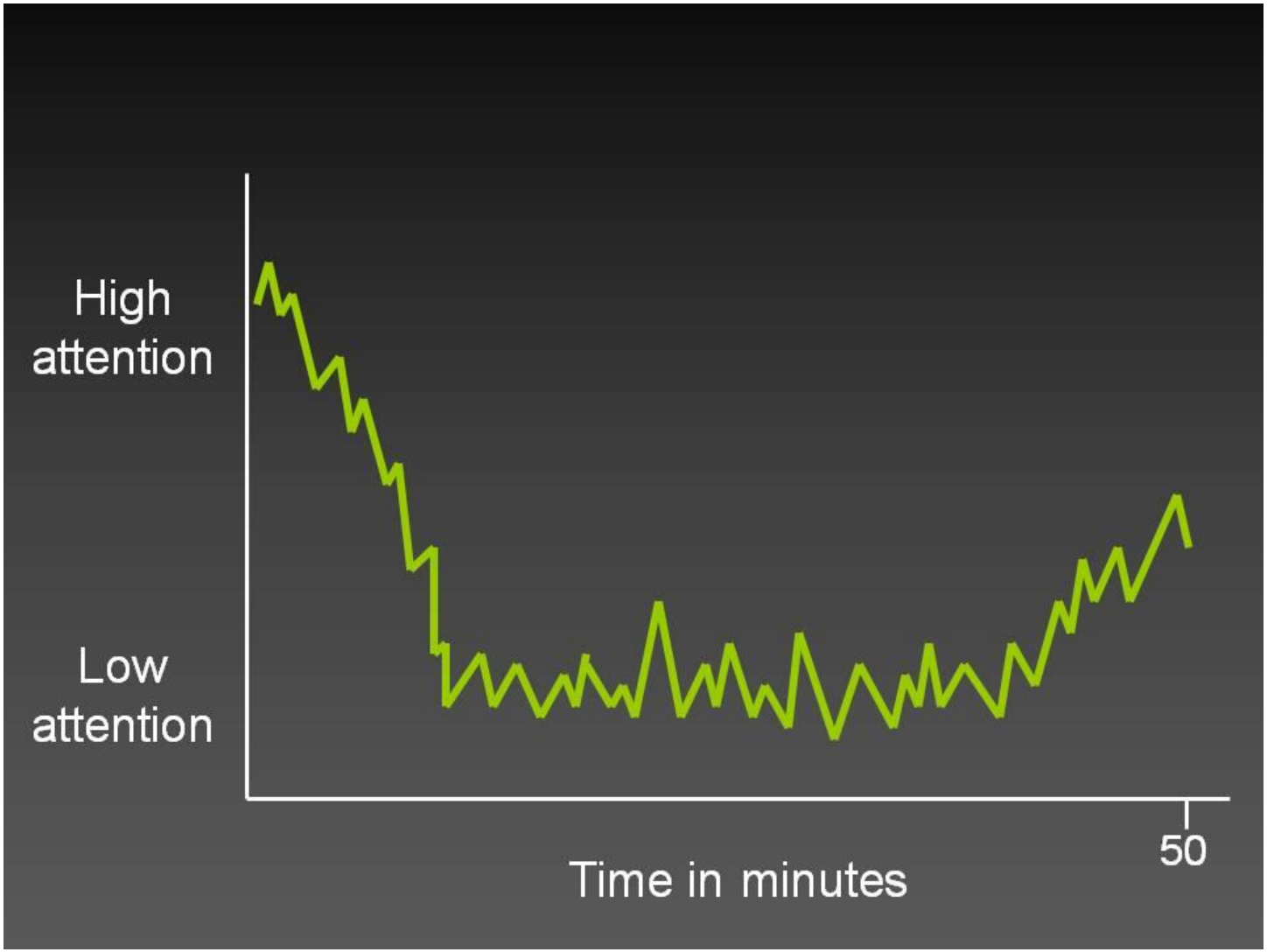
Bligh, 2000

Why change?

- David Kolb (1983): critical thinking skills develop best when students transform their own experience into knowledge by acting on information that they are learning
- In lecture model:
  - Students see themselves as receivers of information
  - Teachers see themselves primarily as providers of information
- Creates a one-way passive relationship, that avoids transformative aspects of learning

Pelley: *http://www.ttuhsc.edu/SOM/success/*

Arousal Curve



Hartley J and Davies I “Note taking: A critical review” Programmed Learning and Educational technology, 1978,15, 207-224) Also see Bligh, 2000, chapter 3

Active Learning:

Any instructional method that **engages** students in their own learning processes.

YES

NO

LCME Viewpoint

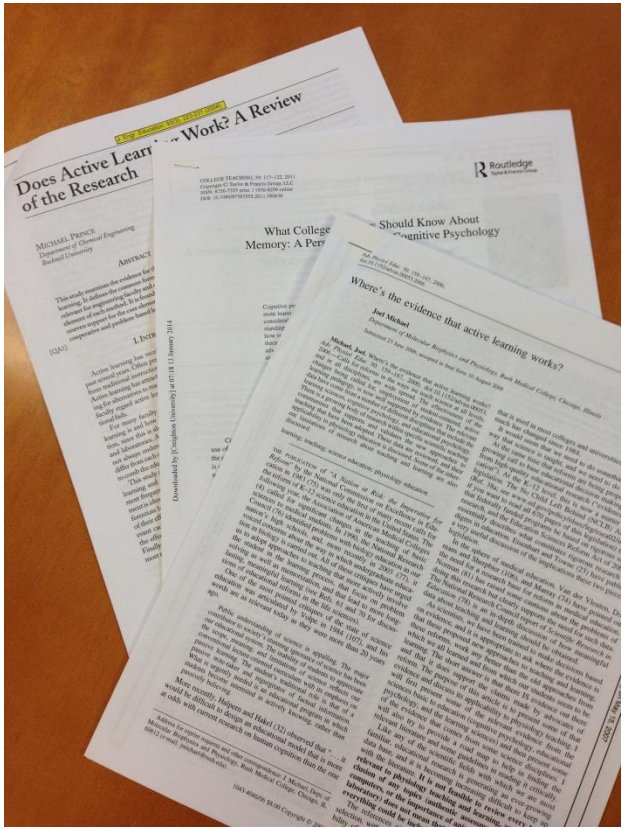
- ED-5-A* A medical education program must include instructional opportunities for active learning and independent study to foster the skills necessary for lifelong learning.

  It is expected that the methods of instruction and assessment used in courses and clerkships (or, in Canada, clerkship rotations) will provide medical students with opportunities to develop lifelong learning skills. These skills include self-assessment on learning needs; the independent identification, analysis, and synthesis of relevant information; and the appraisal of the credibility of information sources. Medical students should receive explicit experiences in using these skills, and they should be assessed and receive feedback on their performance.

*Will become Element 6.3 in 2015

Does Active Learning Work?

- The short answer is yes
- Prince (2004) and Michael (2006) reviewed literature on forms of active learning
- Conditions and implementation matter!



What are the benefits of AL?

- Learning declarative knowledge requires a different process than learning procedural knowledge
- Individuals learn more when they learn together
- Instructors can address misconceptions
- AL may provide equivalent learning, but is more engaging and efficient (Haidet 2004)

Why is Active Learning effective?

- Cognitive Load Theory (CLT) (Sweller 1998)
- Retrieval Practice aka "Testing Effect" (Karpicke et al. 2011)

Paris (1934)
Raoul Dufy
www.lacma.org

How do we learn?

- First step: encode new knowledge into long-term memory
- To do this, we engage our working memory
- Working memory has limited capacity
- Traditional lectures overload working memory

Simply “chunking” material is not the solution

(see Sweller 1998, Miller 2011)

Cognitive Load Theory (CLT)

- Intrinsic CL = difficulty of material
- Extraneous CL = anything that taxes memory
- Germane CL = processing needed to learn the material

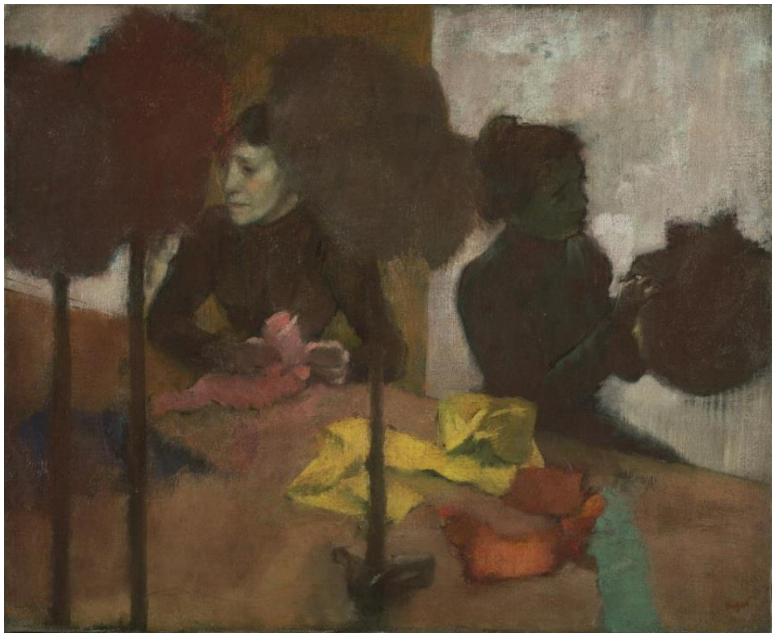
Our task: reduce extraneous load and redirect learners to the germane processes

Retrieval Practice

- Karpicke et al. (2011) compared 4 approaches:
  - One-time study
  - Repeated study
  - Concept mapping (elaborative)
  - Retrieval (recall tests)
- Retrieval outperformed all conditions

Wait! Isn't concept mapping Active Learning?

Information Generation Effect?



The Milliners (about 1882)
Edgar Degas
Getty Open Content Collection

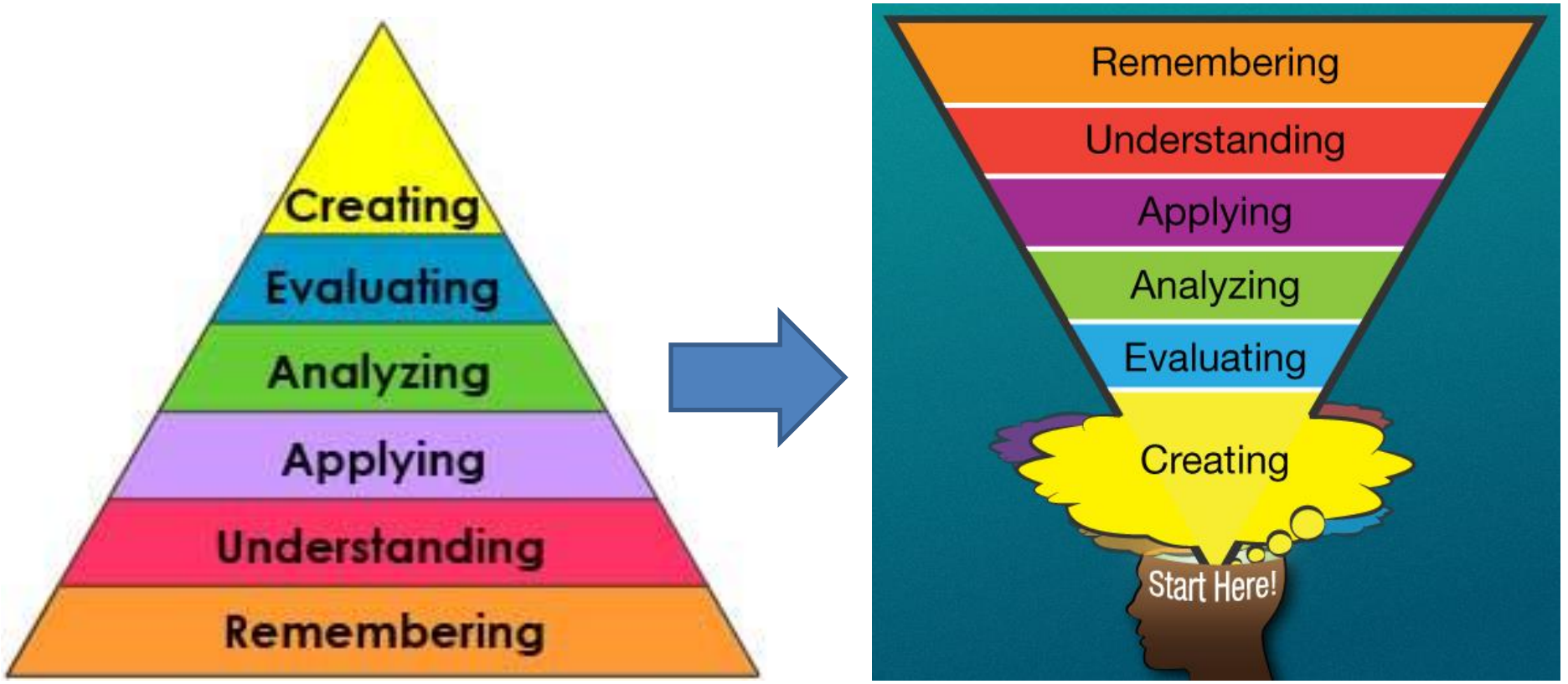
"Retrieval is not merely a readout of the knowledge stored in one's mind; the act of reconstructing knowledge itself enhances learning."

(Karpicke et al. 2011, p. 774)

Principles of Flipping

- Knowledge transfer outside of class
  - Learner's own pace
  - Learner's own style
- Homework assignment in class
- Peer teaching
- Contextual learning
- Assessment reinforces learning

Principle of Flipping: Inversion of Bloom's Taxonomy



Shelley Wright, 2012, http://plpnetwork.com/2012/05/15/flipping-blooms-taxonomy/

Knowledge Transfer

- Format?
  - Reading Assignment
  - Podcast
  - Online resource
- Do:
  - Make it specific for the exercise
  - Make it of the appropriate scale
  - Introduce a readiness assurance process

Readiness Assurance

- “By failing to prepare, you are preparing to fail.”
  - *Benjamin Franklin*
- Need:
  - Attendance
  - Precursory knowledge
  - Engagement
- Methods:
  - Quiz at the beginning of the session.
  - Required completion of online assessments or assignments
    - online bulletin board, exam system, Wiki, etc.
  - Peer assessment

Examples of Active Learning Exercises

- Simple Methods
  - Review Session
  - Worksheet
  - Case Report
  - Dry Lab
- Modifications of Classic Classroom Assessment Techniques
  - Background Knowledge Probe
  - The One-Minute Paper
  - The Muddiest Point
  - The One-Sentence Summary
  - Directed Paraphrasing
  - Application Cards
  - Student-generated Test Questions
  - Pro and Con Grid
- Team-Based Learning

Examples of Large Group Collaboration Methods

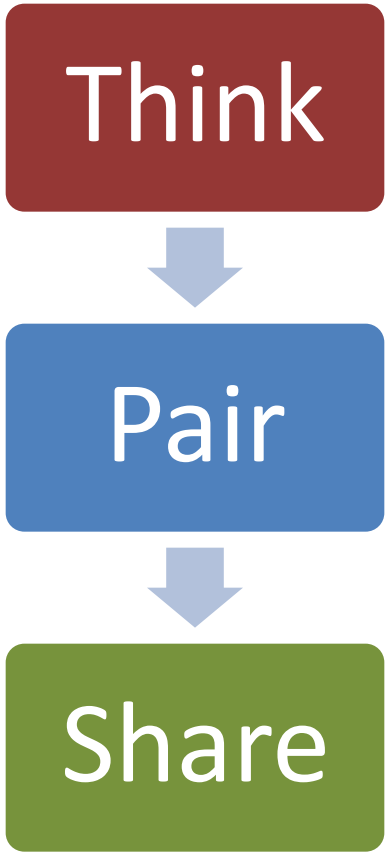
- Buzz Groups
- Think-Pair-Share
- Classroom survey techniques

Buzz groups

- Small informal discussion groups, usually of three to five people
- Encourage sharing in decision making
- Goal is to single out one or two points mentioned in earlier phases of the session
- Resolve problems that relate to these points.
- Call on groups to report out
- Examples
  - Identify key or unclear points
  - Relate previously achieved objectives to new points

Think-Pair-Share

- Ask a question (apply knowledge from lecture)
- Students think about it for 1 minute
- Students form pairs to discuss question
- Selected pairs are called upon to report (best to not ask for volunteers)
- Example Questions
  - Interpret an image
  - Calculate, estimate
  - Diagnose



Classroom Survey Techniques

- Assess learning on the fly
- Provides arousal boost
- Technology or non-technology implementation
- Used for:
  - Assessment (credit or non-credit)
  - Assessment w/ discussion
  - Feedback
  - Contests, opinions, etc.

Summary

- Compelling pedagogical and accreditation reasons to shift from lecture-based instruction
- Pedagogical and neurobiological evidence that a switch to active learning works
- A variety of methods exist to provide an engaging and meaningful flipped classroom session

Questions?

Resources for Active Learning

- Online Handout
- Twitter hashtag #IAMSEActiveLearning
- References

References

- Angelo TA, Cross KP: Classroom Assessment Techniques: A Handbook for College Teachers (Jossey-Bass Higher and Adult Education Series)
- Bligh, What's the Use of Lectures? Wiley, 2000
- Haidet P., Richards B., Morgan R.O., Wristers K., Moran B.J. "A controlled trial of active versus passive learning strategies in a large group setting." Adv Health Sci Ed. 2004; 9(1): 15-27.
- Jeffries, WB: Teaching Large Groups. *in* An Introduction to Medical Teaching, WB Jeffries and KN Huggett, eds, pp 11-25, Springer, 2010.
- Karpicke JD, Blunt JR. Retrieval practice produces more learning than elaborative studying with concept mapping. Science. 2011; 331:772-775.

References

- Miller MD. What college teachers should know about memory: A perspective from cognitive psychology. College Teaching. 2011; 59:117-122.
- Prince M. Does active learning work? A review of the research. J Eng Educ. 2004; 93:223-231.
- Prober CG, Heath C: Lecture Halls without Lectures – a Proposal for Medical Education. N Engl J Med 2012; 366:18.
- Saltman, Flipping for Beginners; Inside the New Classroom Craze, Harvard Education Letter **27** (6); 2011. http://www.hepg.org/hel/article/517
- Sweller J. Cognitive load during problem solving: Effects on learning. Cognitive Science. 1998; 12:257-288.