

Evidence based teaching and learning

Is it practical?

STA 2017

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#STA-FAERpanel



#STA17SanDiego

DISCLOSURE

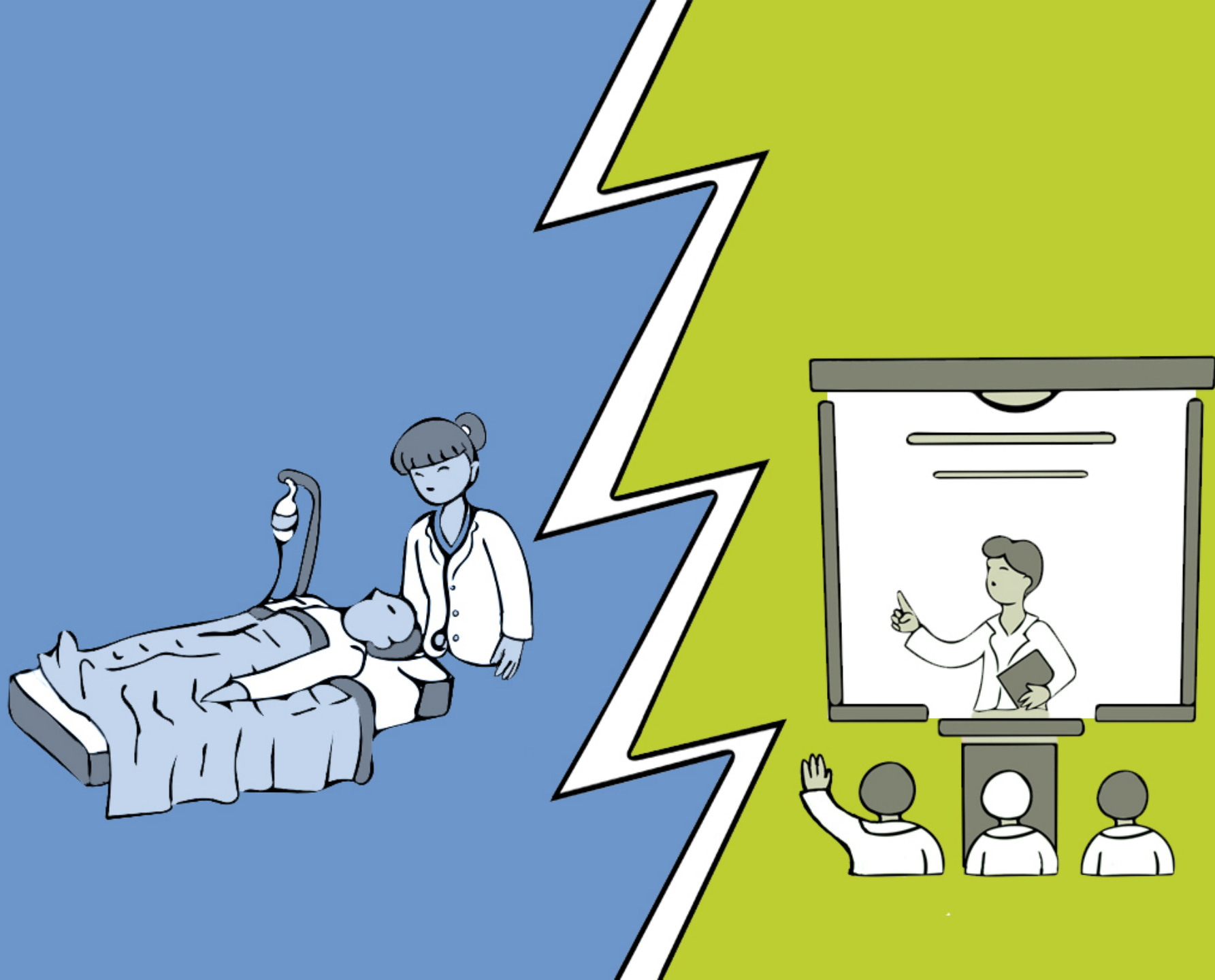


Session goals

After completing this activity the participant will be able to

1. Describe the 2 sigma problem in education
2. Analyze evidence for effective use of blended learning techniques
3. Critically appraise evidence for spaced repetition practice in learning
4. Synthesize current evidence to design a program that works in their institution





SCENARIO 1

- You have been tasked by your chairperson to create a curriculum for the CA1 residents.
- The overwhelming complaint from the faculty is that the residents do not read text books.
- You have only one hour in a week to accomplish this goal.
- What is the evidence, how can you use it to create a curriculum that will engage the learner and be acceptable to your faculty.

National Endowment for the Arts

- Americans are spending less time reading.
- Reading comprehension skills are eroding.
- These declines have serious civic, social, cultural, and economic implications.

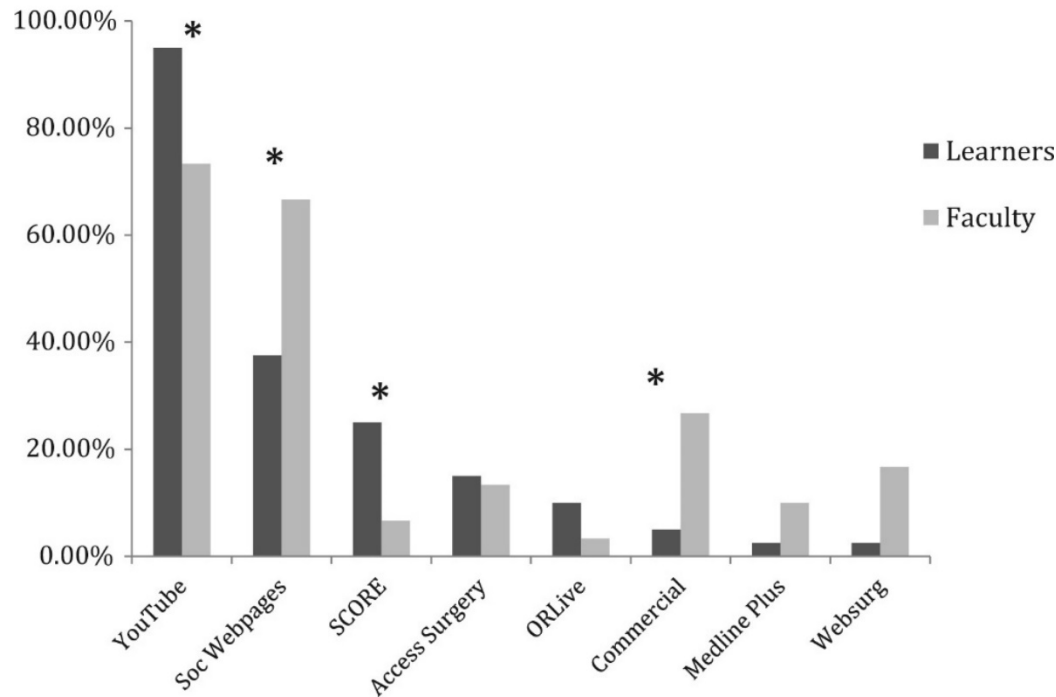
To Read or Not To Read

A QUESTION OF NATIONAL CONSEQUENCE

YouTube is the Most Frequently Used Educational Video Source for Surgical Preparation

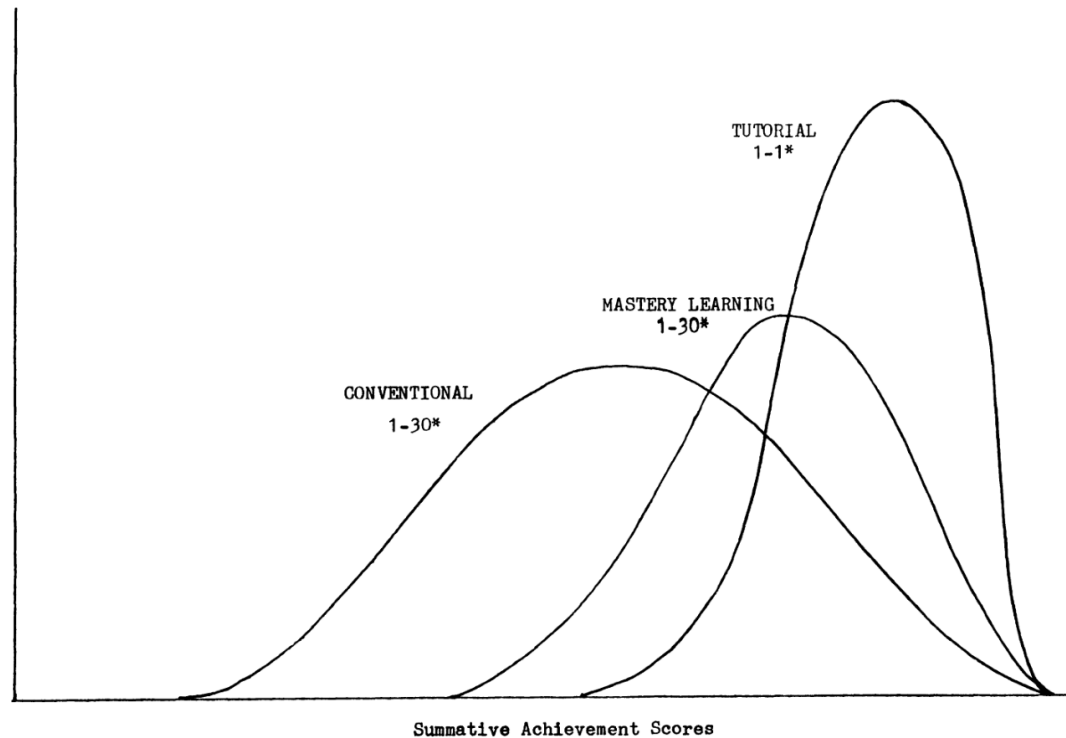
Allison K. Rapp, BS,^{*} Michael G. Healy, MS,[†] Mary E. Charlton, PhD,[‡] Jerrod N. Keith, MD,[†] Marcy E. Rosenbaum, PhD,[§] and Muneera R. Kapadia, MD, MME[†]

Percent of Learners and Faculty Reporting Use of Videos by Source (n=70)



The 2 Sigma Problem: The Search for Methods of Group Instruction as Effective as One-to-One Tutoring

BENJAMIN S. BLOOM
University of Chicago and Northwestern University



*Teacher-student ratio

U.S. DEPARTMENT OF EDUCATION

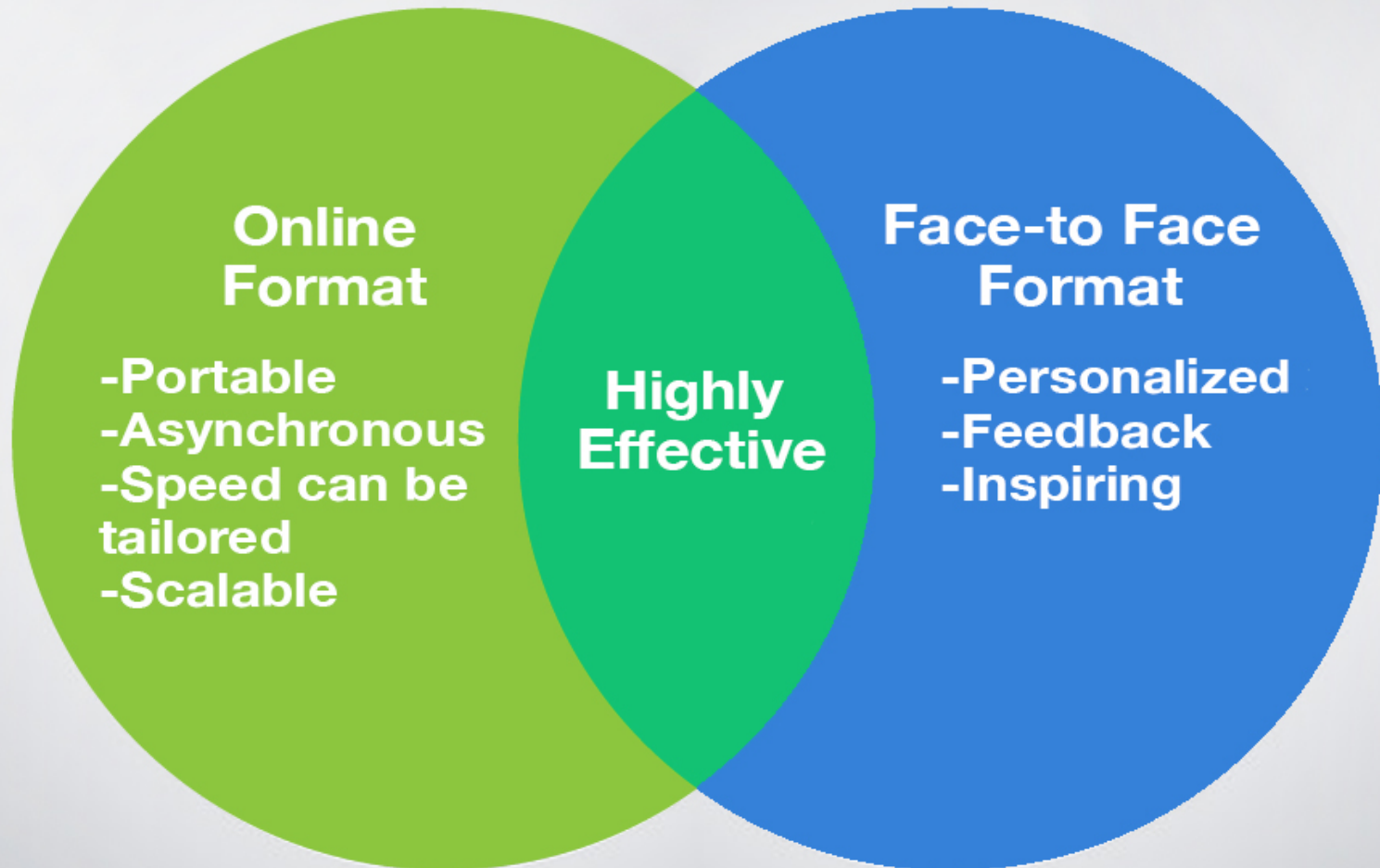


Evaluation of Evidence-Based Practices in Online Learning A Meta-Analysis and Review of Online Learning Studies

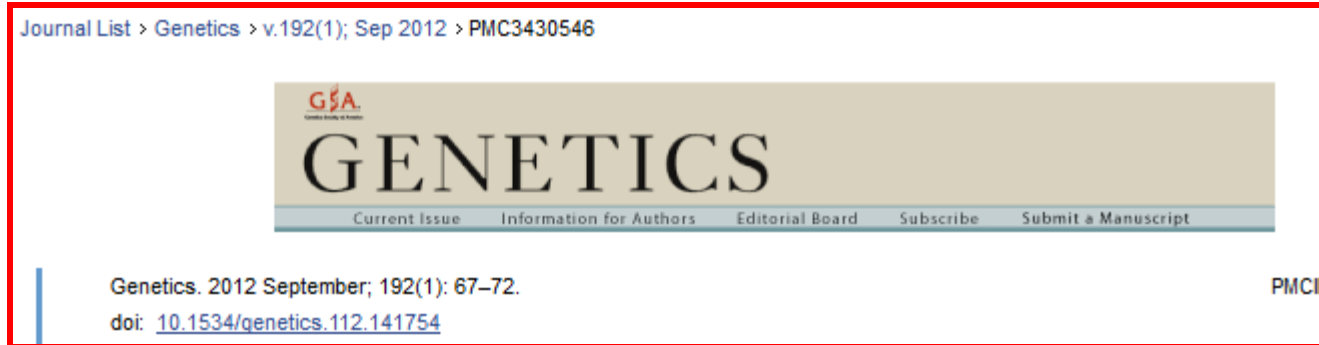
Methods

- Published literature from 1996-2008
- 1000 studies evaluated
- Only 176 had good experimental design and objective measured student outcomes
- 50 independent effects subjected to Meta analysis

Blended Learning



What material can be taught best using online format



Using Online Lectures to Make Time for Active Learning

Amy J. Prunuske,^{*,†} Janet Batzli,[†] Evelyn Howell,[‡] and Sarah Miller[§]

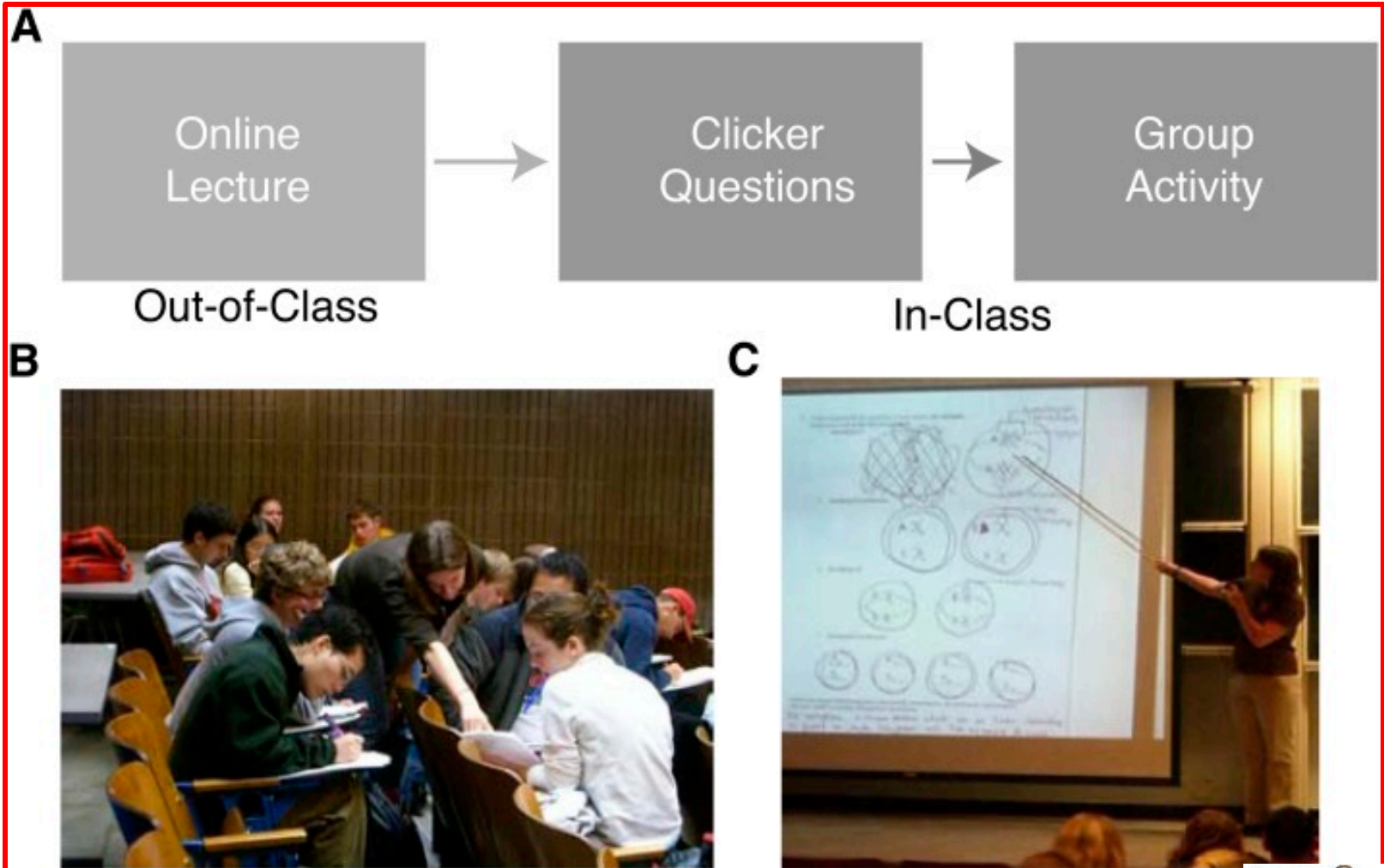
^{*}Department of Biomedical Sciences, University of Minnesota, Duluth, Minnesota 55812, and [†]Biology Core Curriculum,

[‡]Department of Landscape Architecture, and [§]Madison Teaching and Learning Excellence Program, University of Wisconsin, Madison, Wisconsin 53706

Methods

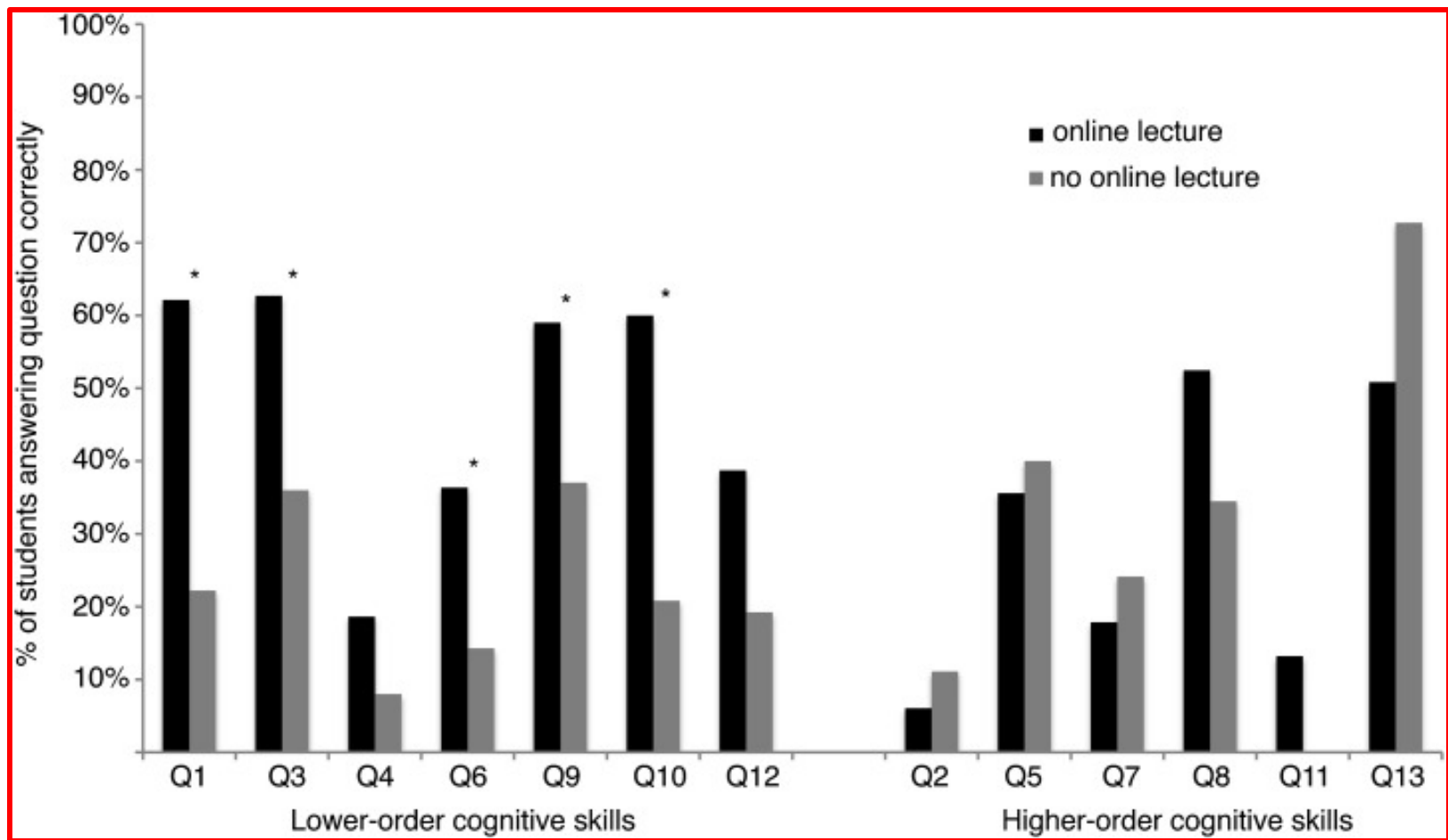
- Introductory biology class
- Online lectures were recorded powerpoint presentations
- Required viewing before the class
- To assess understanding, ARS used





Prunuske. Genetics. 2012 September; 192(1): 67–72.

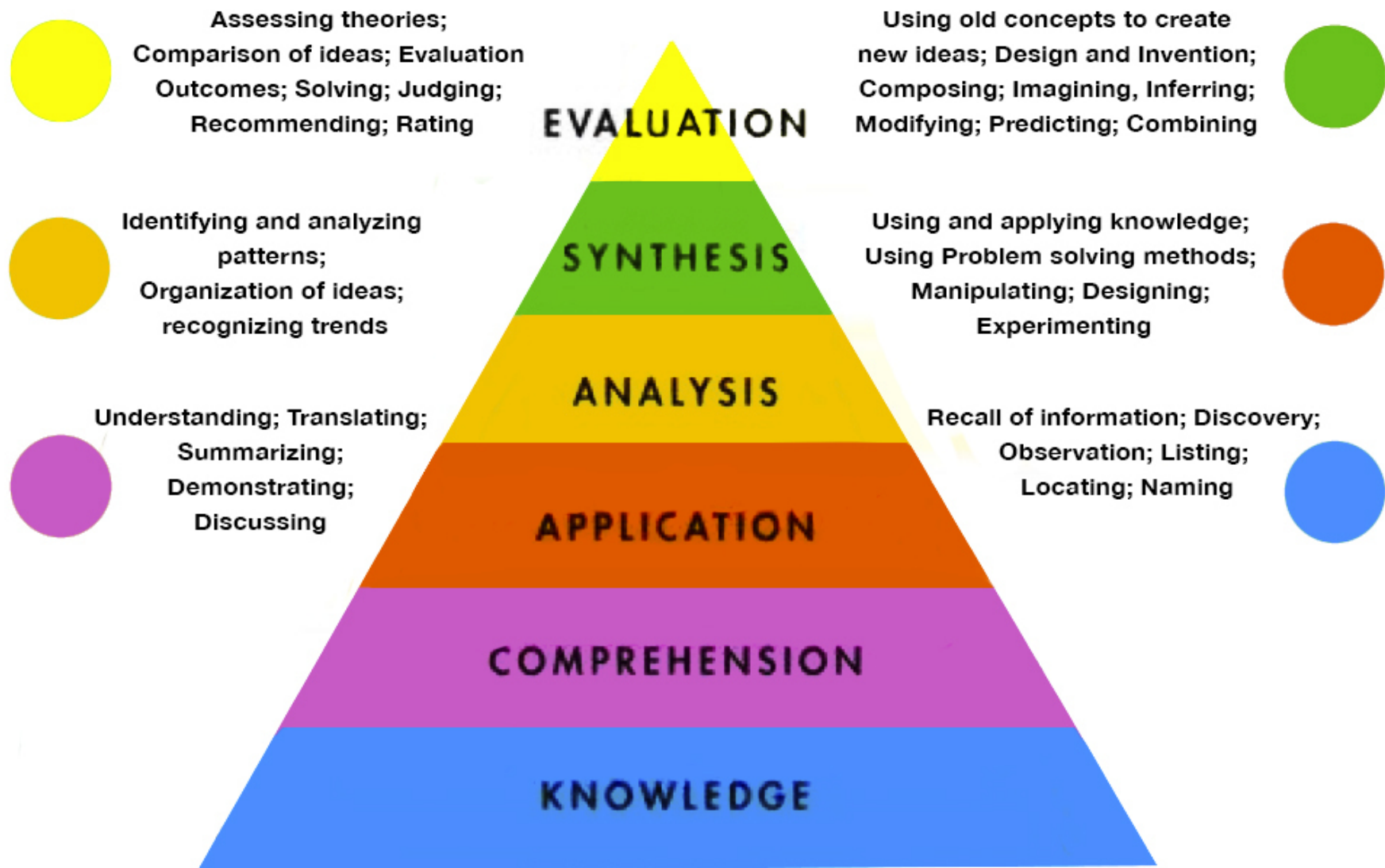


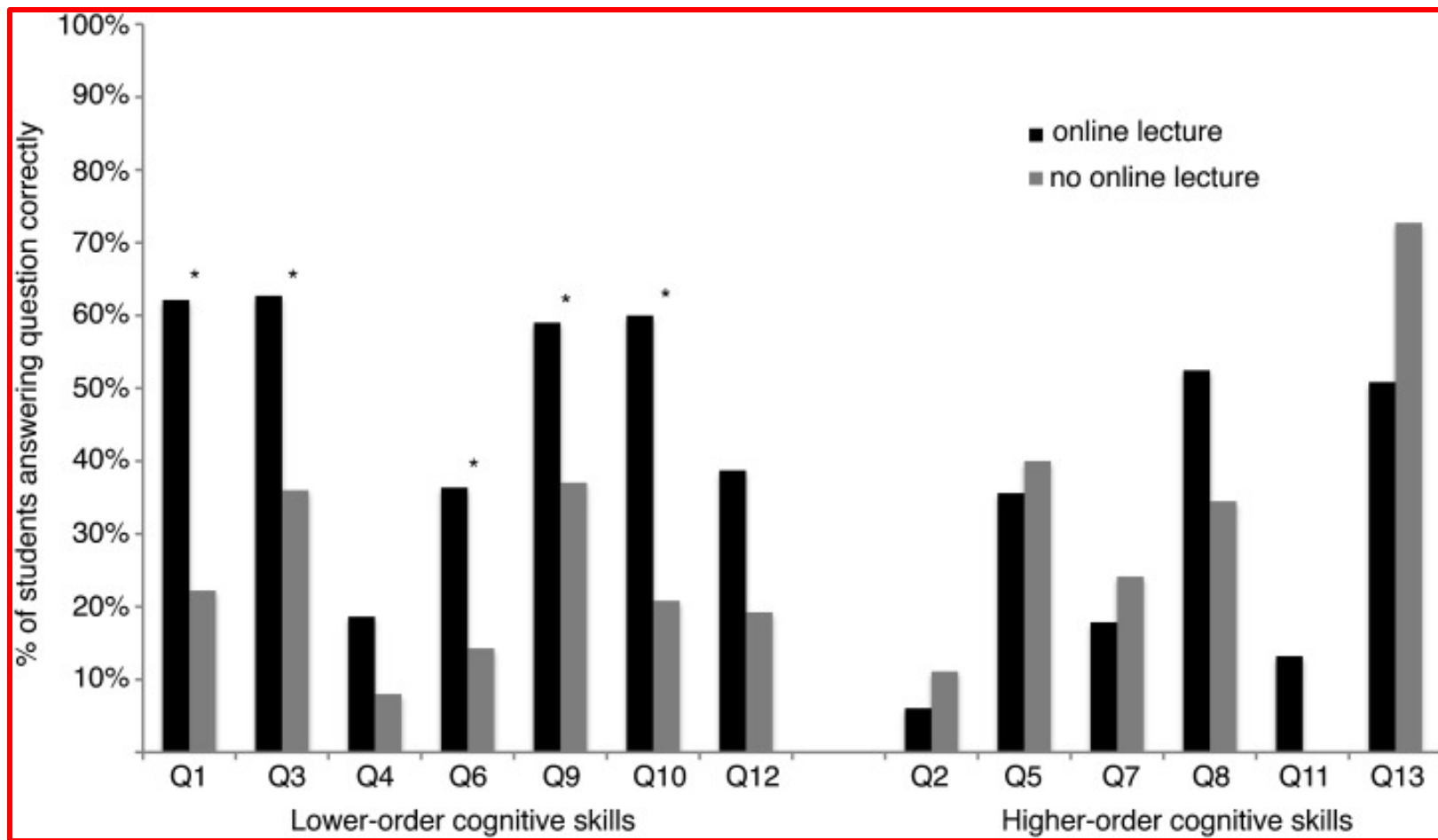


Prunuske. Genetics. 2012 September; 192 (1): 67–72.



BLOOMS TAXONOMY





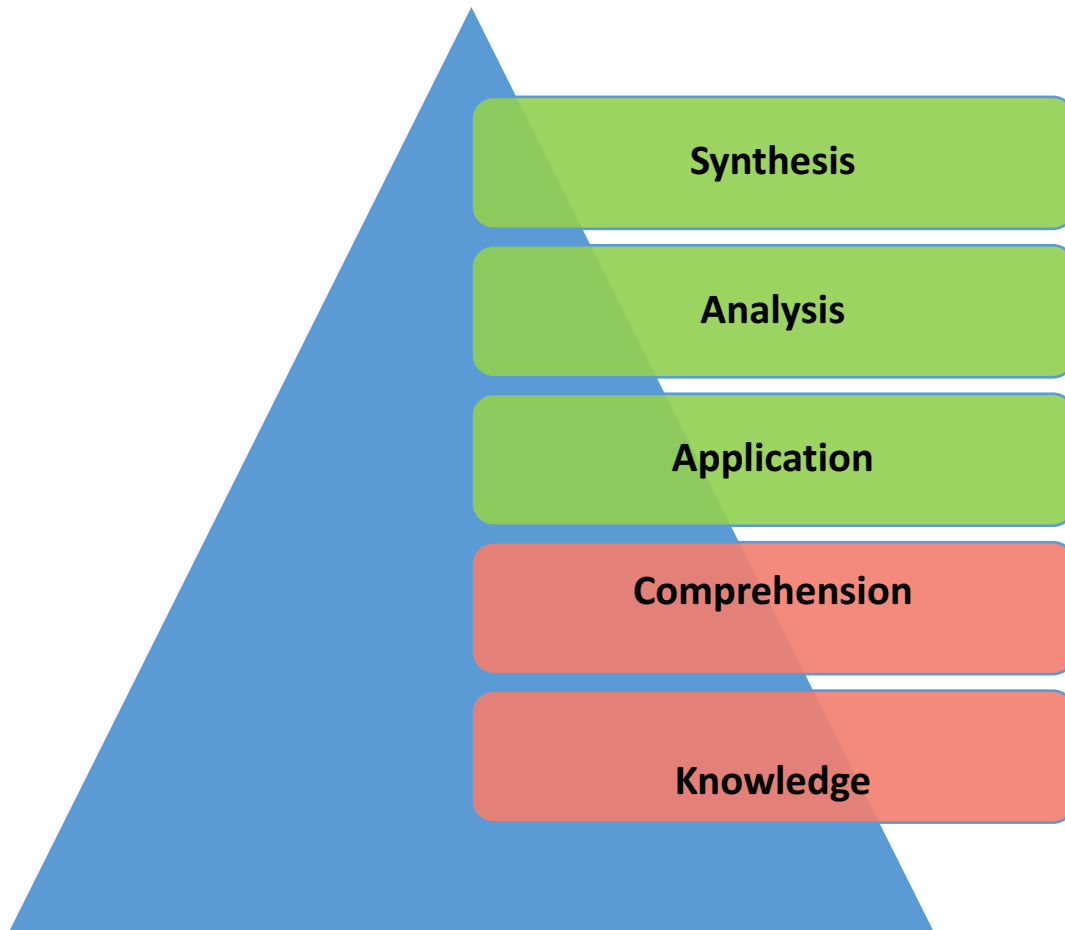
Prunuske. Genetics. 2012 September; 192 (1): 67–72.



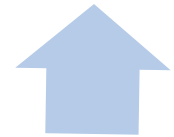
Summary

- Learning gains are similar whether material taught using didactic or blended approach (lower order cognitive skills)
- Combination of online and face-to-face teaching works better than either alone
- Students value face to face interaction with faculty
- Online format is best for imparting lower order cognitive skills and face to face format best for modeling higher order cognitive skills





In class



At home

Yale Anesthesia The Flipped Classroom Model

During



Analysis & synthesis of Information

IN CLASS

basic Information about topic



Before

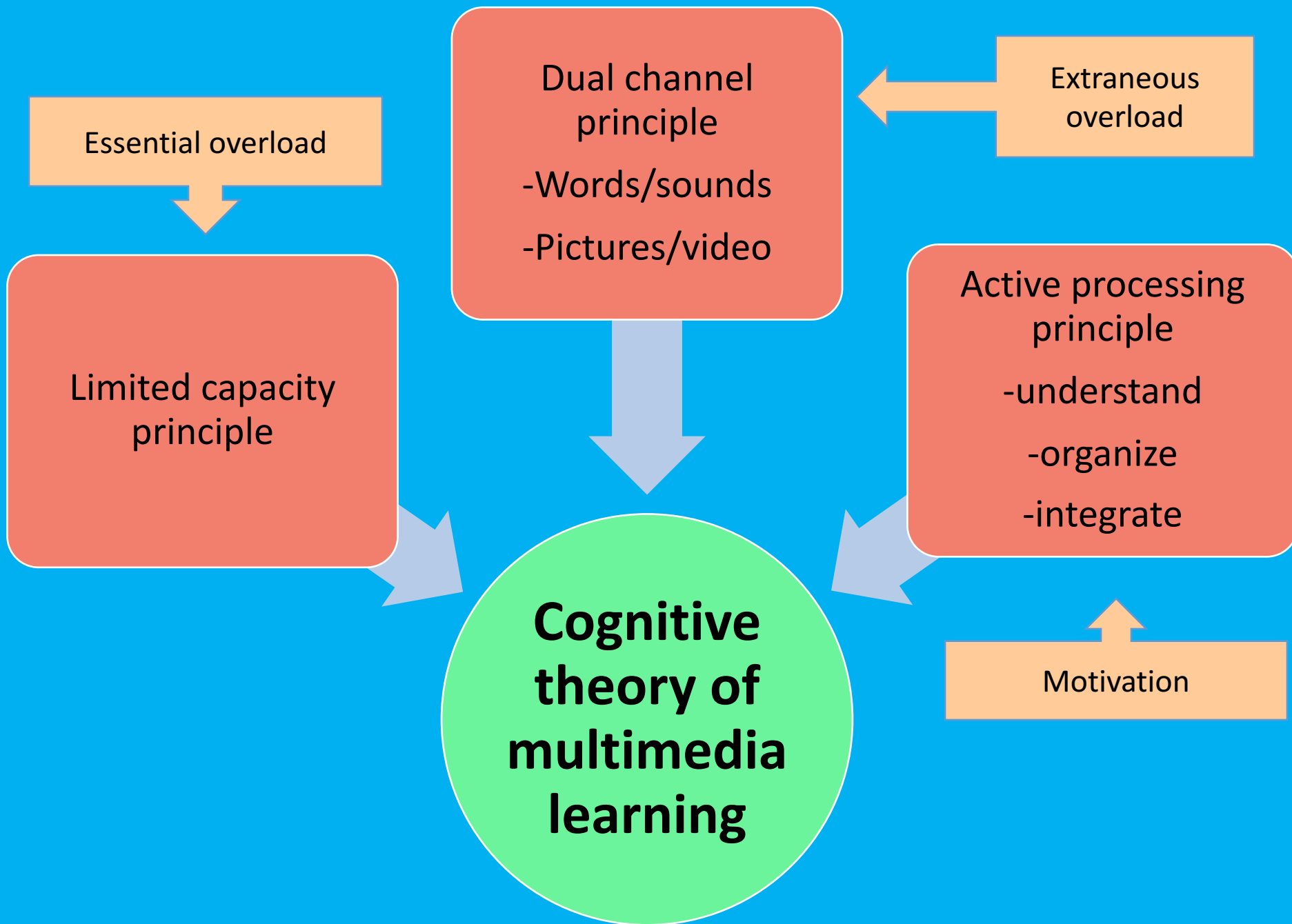
AT HOME

Reinforce concepts



After





Research based principles for instructional design of lessons


Principle		Effect Size
Decrease extraneous processing	Coherence: Eliminate extraneous material	0.97
	Signalling: Highlight essential material	0.52
	Contiguity: Place words near corresponding graphics	1.19
Manage essential processing	Pre-training: Pre-exposure to words/concepts	0.98
	Segmenting: Break lessons in small chunks	0.85
	Modality: Present words in spoken form	1.02
Foster generative processing	Multimedia: Words and pictures	1.39
	Personalization: Conversational tone	1.11


Our experience


Course Echoes


Reports


Available ▾ Most Recent ▾


**Physiology and Anatomy of Liver**
August 03 12:53 PM


**Protecting the Victims**
April 28 10:06 AM

**Structured Peer Review**
April 16 1:34 PM


**Echo360 Personal Capture Tutorial**
April 10 5:04 PM


**Spinal/Epidural**
November 18 9:48 AM

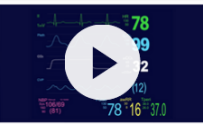
**Acid Base Management**
November 13 9:35 AM


**Trauma and Anesthesia**
November 03 11:03 AM

VIDEO RESOURCES

**Podcast Topics**
Neuromuscular Blockers
08:44

**Platelet Activation**
02:00

**Understanding CVP Waveforms**
05:36

**Local Anesthetics**
00:20:31

Flipped Classroom Resources

+ expand all - collapse all

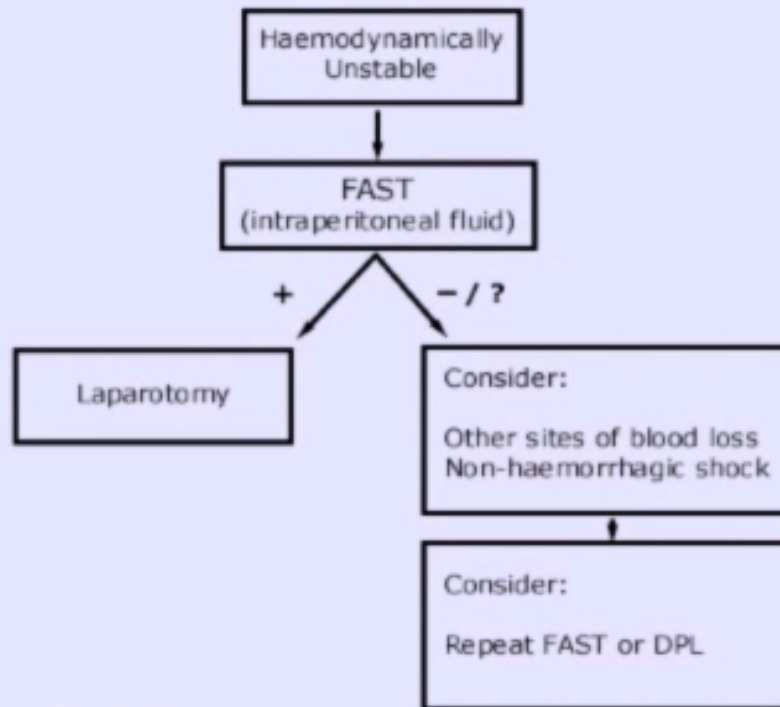
2015 (18)

Huffmyer JL, Nemergut EC: [Test-Enhanced Learning in Flipped Classroom](#). Anesth Analg. 2015 Sep. PMID: 26287290

https://medicine.yale.edu/anesthesiology/media/flipped_classroom.aspx

Algorithm

Blunt Abdominal Trauma



? : indeterminate

In class

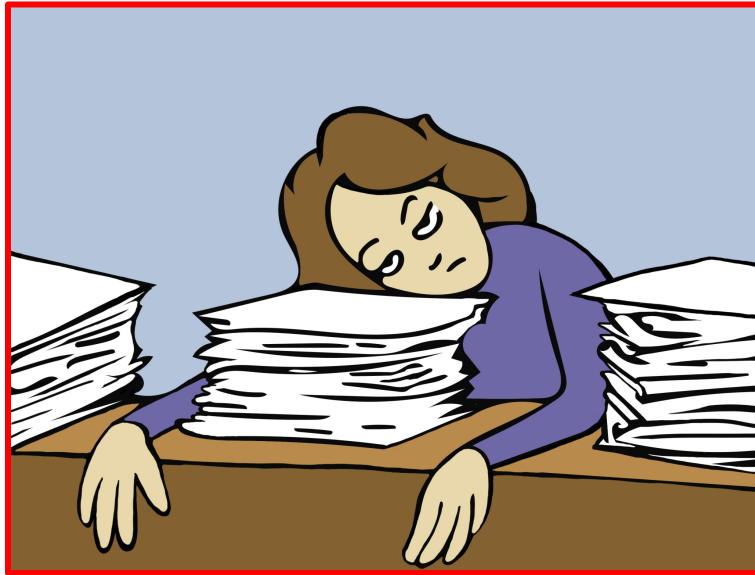


- Divided into 4 teams
- ATLS- Primary survey, secondary survey
- Pre-operative- warmers, calling blood bank
- Intra-operative- damage control resuscitation
- ICU- trauma coagulopathy, compartment syndromes

SCENARIO 2

- A CA1 resident comes to you and asks for advice regarding board prep for the Basic exam.
- He has failed it the first time and is devastated.
- He has been watching podcasts and reading books, but does not seem to remember the material although he has highlighted the material in multiple colors.
- What are some evidence-based tips that you can give him in terms of learning, that he can use to help him remember the material better and feel better prepared for the exam

Evidence for efficient learning techniques



Spaced repetition

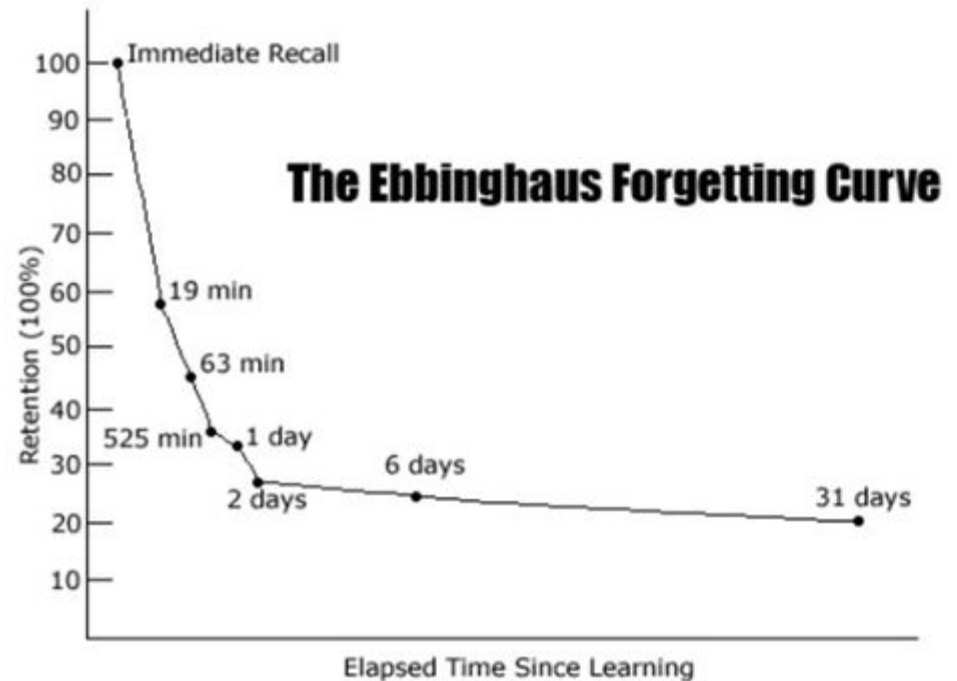
Testing effect

Learning and forgetting

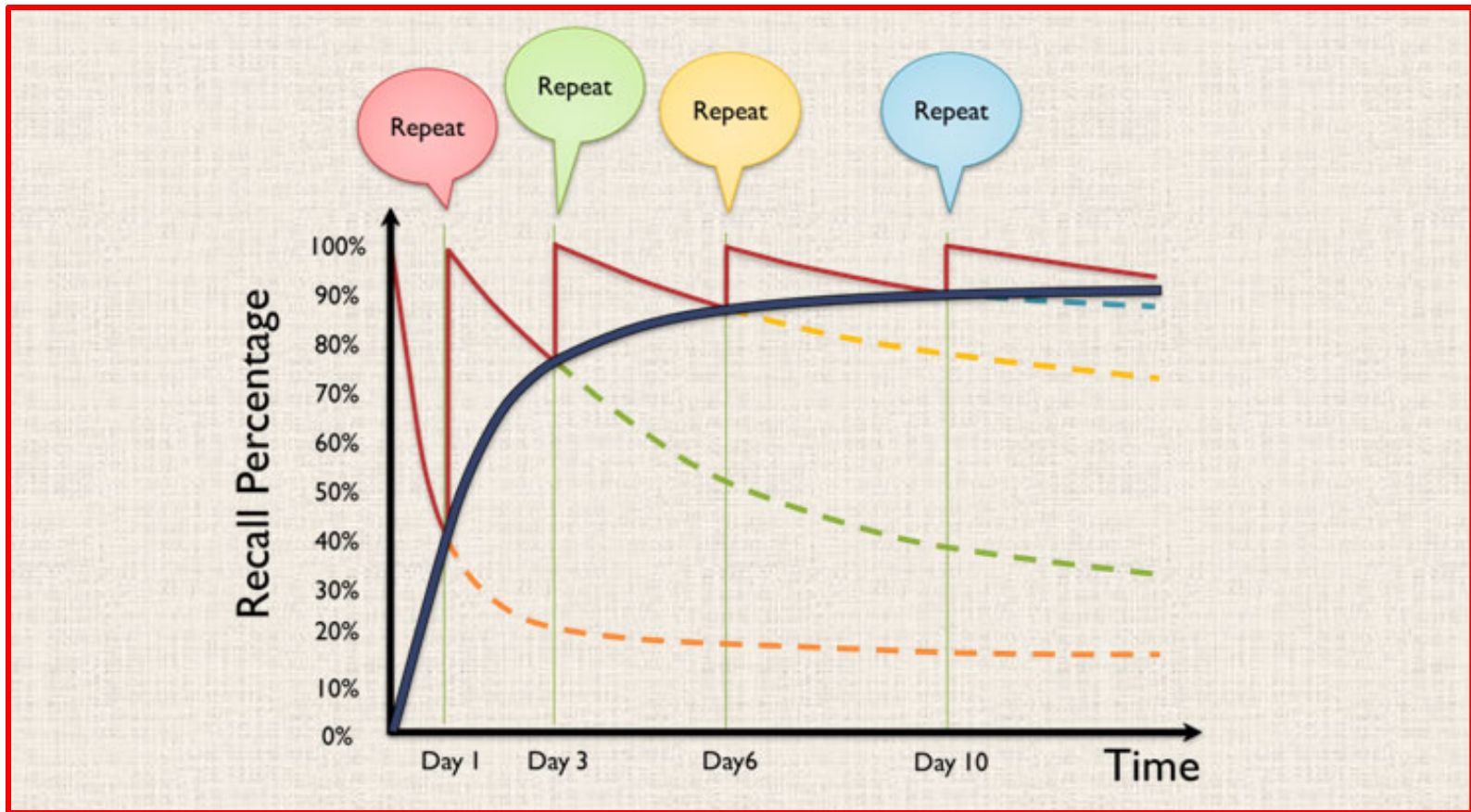
Memory: *A contribution to experimental psychology*



Hermann Ebbinghaus



Spaced repetition





The Spacing Effect

A Case Study in the Failure to Apply the Results of Psychological Research

Frank N. Dempster *University of Nevada, Las Vegas*

ABSTRACT: *The spacing effect would appear to have considerable potential for improving classroom learning, yet there is no evidence of its widespread application. I consider nine possible impediments to the implementation of research findings in the classroom in an effort to determine which, if any, apply to the spacing effect. I conclude that the apparent absence of systematic application may be due, in part, to the ahistorical character of research*

recent sampling of practitioner-oriented textbooks suitable for use in teacher education programs, I found either little or no mention of the practical benefits of the spacing effect, and in some cases the spacing effect was confused with other phenomena (e.g., Good & Brophy, 1986; Mayer, 1987; Slavin, 1986; Woolfolk, 1987). One well-known educator, in fact, advised against spaced practice at least in the early stages of learning (Hunter, 1983).

1988. American Psychologist

Recall/Testing

REPORT

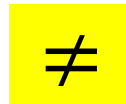
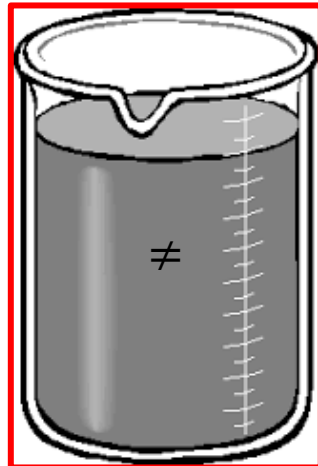
The Critical Importance of Retrieval for Learning

Jeffrey D. Karpicke^{1,*}, Henry L. Roediger III²

+ Author Affiliations

↵* To whom correspondence should be addressed. E-mail: karpicke@purdue.edu

Science 15 Feb 2008:
Vol. 319, Issue 5865, pp. 966-968
DOI: 10.1126/science.1152408



Repeated Testing versus Repeated Study

Fig. 1. Cumulative performance during the learning phase.

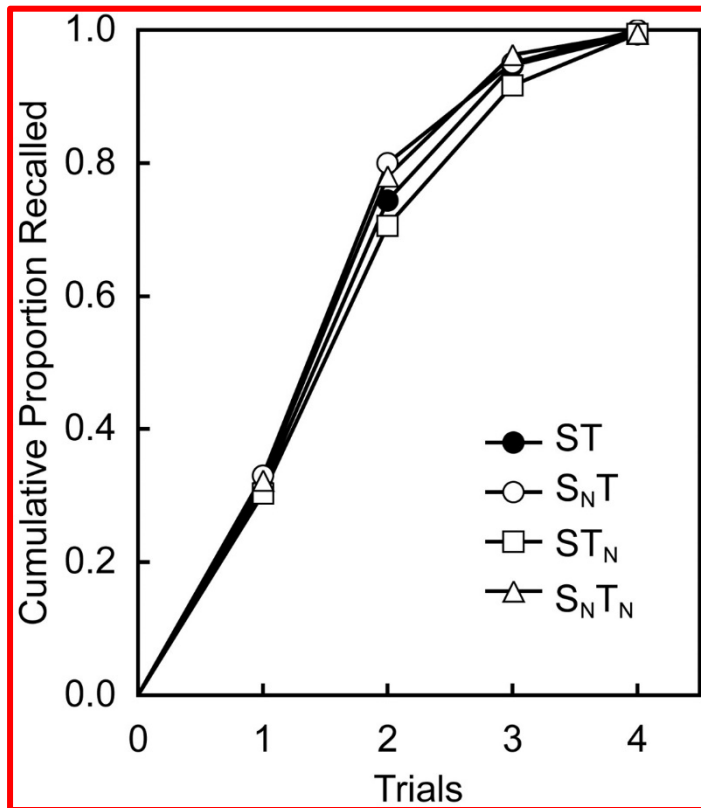
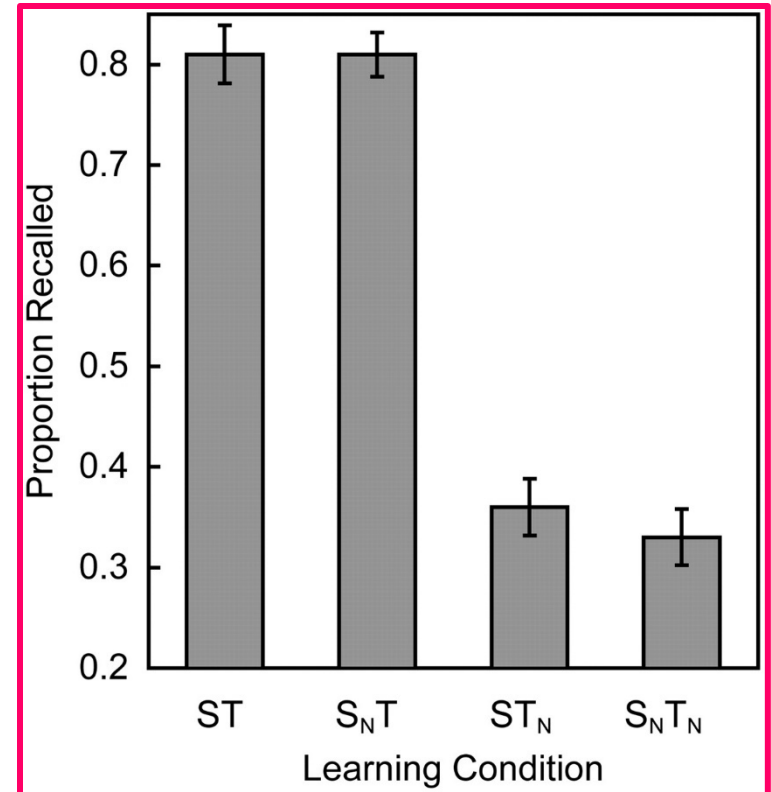


Fig. 2. Proportion recalled on the final test 1 week after learning.



Jeffrey D. Karpicke, and Henry L. Roediger III Science 2008;319:966-968

REPORT

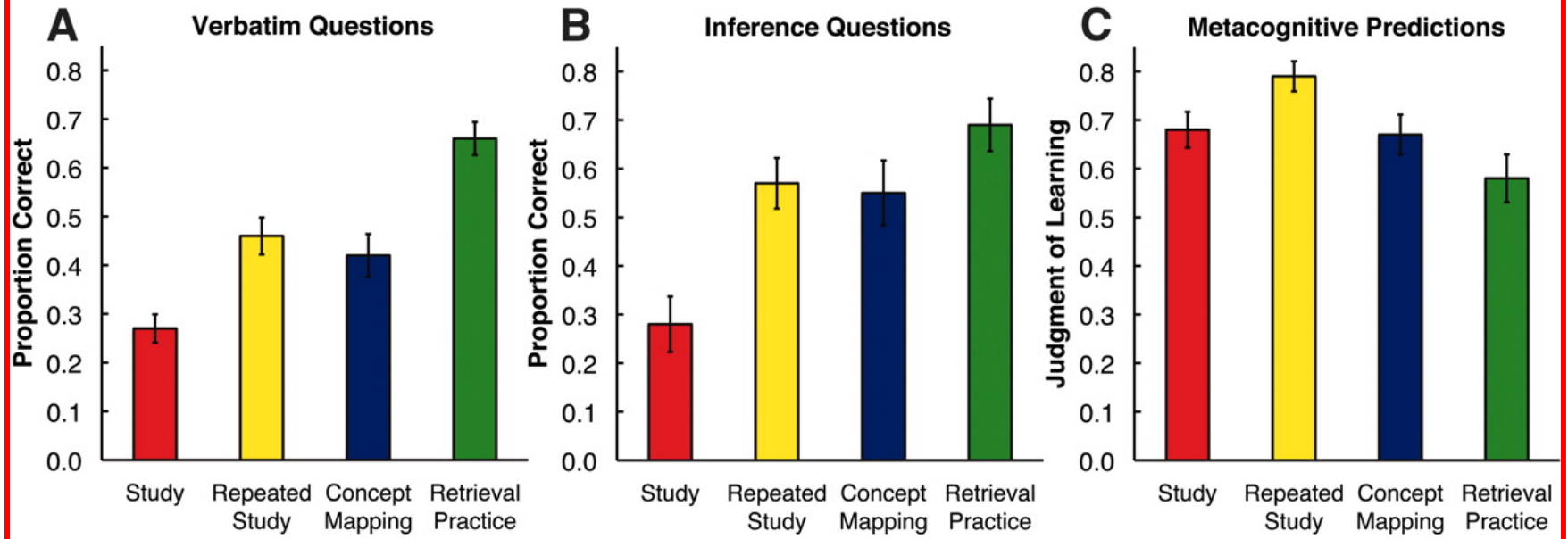
Retrieval Practice Produces More Learning than Elaborative Studying with Concept Mapping

Jeffrey D. Karpicke*, Janell R. Blunt

Department of Psychological Sciences, Purdue University, West Lafayette, IN 47907, USA.

*To whom correspondence should be addressed. E-mail: karpicke@purdue.edu

Science 11 Feb 2011:
Vol. 331, Issue 6018, pp. 772-775
DOI: 10.1126/science.1199327



Jeffrey D. Karpicke, and Janell R. Blunt Science 2011;331:772-775



Journals for medical education

- Academic Medicine
- Medical Education
- Medical Teacher
- Education for Health,
- Evaluation & the Health Professions
- Advances in Health Science Education
- Health Professional Education
- Medical Education Online
- BMC, Medical Education

Thank You Questions??



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Resources

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- Prober CG, Khan S. Medical education reimaged: A call to action. Acad Med. 2013; 88:1407-10
- Prunuske AJ, Batzli J et al. Using online lectures to make time for active learning. Genetics, 192; 2012: 67-72
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- Prober CG, Heath C. Lecture halls without lectures—a proposal for medical education. N Engl J Med. 2012;366:1657–1659
- Mayer, Richard E. Applying the science of learning to medical education. 2010. 44(6); 543-49.
- Karpicke. Retrieval practice produces more learning than elaborative studying with concept mapping. Science 2011. 331