CRLT CENTER FOR RESEARCH ON LEARNING & TEACHING UNIVERSITY OF MICHIGAN

Advances in health sciences teaching and assessment methodologies

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Agenda

Learning Goals: To promote higher-level thinking and collaborative learning skills

- Student-generated exams (dentistry)
- Team-based learning (pharmacy & medicine)
- Frequent use of active learning (kinesiology)

Universidad de los Andes, Principales Lineamientos Estratègicos: Los egresados de la Universidad de los Andes se distinguirán por ser personas capaces de discernir con sentido los paradigmas de las sociedad en que viven y trabajan.

Goals: Higher-Level Thinking

Bloom's Taxonomy

See also: www.celt.iastate.edu/teaching-resources/effective-practice/revised-blooms-taxonomy/

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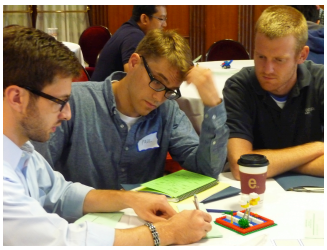
Discuss with your neighbor on your left (Think-Pair-Share)

What is one idea that you have tried (or hope to try) to develop your own students' **higher-level thinking skills**?



①Student-generated exams

Exam questions developed by students lead to higher cognitive level of learning

Carlos Gonzalez-Cabezas, DDS, MSD, PhD
Olivia S. Anderson, PhD (Nutrition)
Mary C. Wright, PhD (CRLT)
Margherita Fontana, DDS, PhD

Student-Generated Exams

- First-year Cariology course (104 students)
- Each group writes 5 exam questions
  - Extra credit for high cognitive level questions
- All questions available online for students to study
- Instructors made minor changes to questions and used many on midterm and final

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HYPOTHESIS 1:
STUDENT-GENERATED EXAM QUESTIONS ASSESS HIGHER BLOOM'S TAXONOMY LEVELS, COMPARED TO INSTRUCTOR-GENERATED EXAMS.

Goals: Higher-Level Thinking

Bloom's Taxonomy

3: High cognitive level (measuring synthesis and evaluation)

2: Medium cognitive level (measuring application and analysis)

1: Low cognitive level (measuring knowledge and comprehension)

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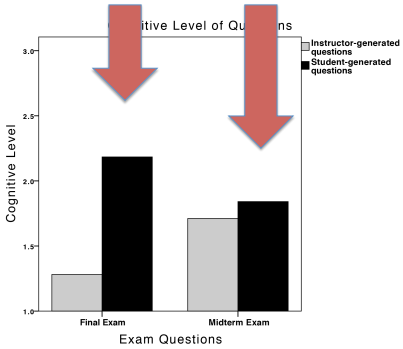
Student-generated exams are more cognitively complex



1: Low cognitive level (measuring knowledge and comprehension)

2: Medium cognitive level (measuring application and analysis)

3: High cognitive level (measuring synthesis and evaluation)

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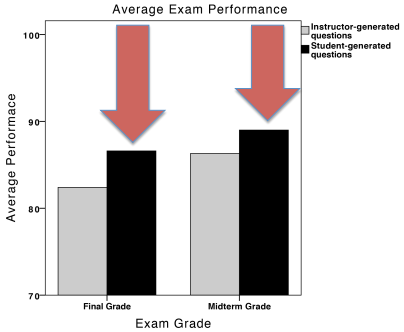
HYPOTHESIS 2:
STUDENT-GENERATED EXAM QUESTIONS LEAD TO SIMILAR OR IMPROVED PERFORMANCE ON EXAMS

Students perform as well or better on high-level exams



MIDTERM
Intervention: 86.6%
Control: 82.4%
p-value<0.001

FINAL
Intervention: 89.0%
Control: 86.3%
N.S.

Survey Feedback (69% response)

Most students agreed that the exercise:

- was **helpful** for their overall learning experience (77%)
- enhanced their **critical thinking** skills (73%)
- helped them **apply** ideas from lecture to clinic (80%)
- assisted them with making **connections** between ideas learned in Cariology & other courses (81%)

"This exercise forced me to evaluate questions and review why they were right and wrong, instead of just taking a test and never getting to …understand why the answer choices are right or wrong."

Team-based Learning (TBL)

- 5-Course Sequence (Self-Care and Therapeutic Problem Solving I-IV)
- Required for all Pharm.D students
- Approximately 80-100 students/cohort

Experiential Learning

Take a few minutes to review the TBL 101 handout in your packet

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What is TBL?

Experiential Learning

Individually, answer the questions on the Readiness Assurance Test.

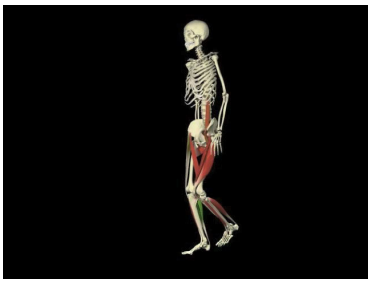
The timeline for a "typical" TBL module includes the pre-work, the readiness assurance process and application activities.

③Frequent Use of Active Learning

Effects of image-based and text-based activities on student learning outcomes

Anne K. Greenberg, PhD (Biology)
Mary C. Wright, PhD (CRLT)
Olivia S. Anderson, PhD (Nutrition)
M. Melissa Gross, PhD (Kinesiology)

Human Musculoskeletal Anatomy is a required course with 100+ students each term.



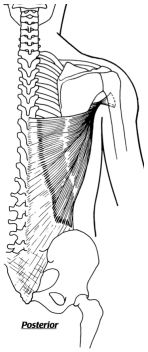
A typical approach to teaching and learning anatomy is to provide and memorize information.

Latissimus Dorsi

Origin
- Spinous processes of thoracic and lumbar vertebrae via thoracolumbar fascia; iliac crest

Insertion
- Medial lip of intertubercular groove

Function
- Extension
- Adduction
- Medial rotation



Professor Melissa Gross's goal is to help students learn anatomy deeply so they can build mental models and "see" anatomy in motion.

Look →  Think →  See → 

Which activity format helps students learn better?

①**IMAGE:**
What is the primary function of this muscle?

②**TEXT:**
What is the primary function of gluteus medius?

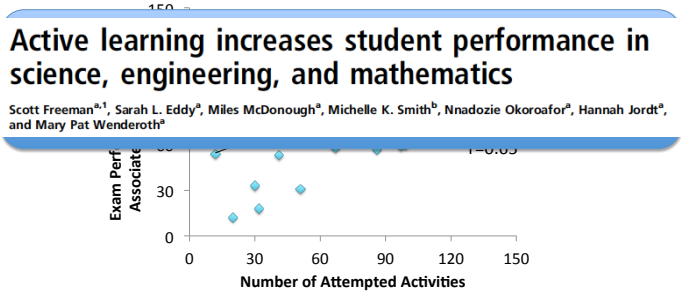
A. Hip extension
B. Hip flexion
C. Hip abduction
D. Hip adduction

Students in Course
n=231

Think-Pair-Share Activities
(n=523; 70% image-based)

Exam Items
(n=431; 61% activity associated)

Greater participation in active learning is associated with better exam performance.



The type of active learning matters

- In regression:
  - Gender
  - Race
  - Prior grades
  - **SIGNIFICANT: Participation in image-based activities**
  - **NOT SIGNIFICANT: Participation in text-based activities**

ALIGNMENT

Melissa Gross's goal is to help students learn anatomy deeply so they can build mental models and "see" anatomy in motion.

Look →  Think →  See → 

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Questions?

Learning Goals: To promote higher-level thinking and collaborative learning skills

- Student-generated exams (dentistry)
  - **Principle 1: Use students as a resource**
- Team-based learning (pharmacy & medicine)
  - **Principle 2: Give students practice applying knowledge**
- Frequent use of active learning (kinesiology)
  - **Principle 3: Alignment**