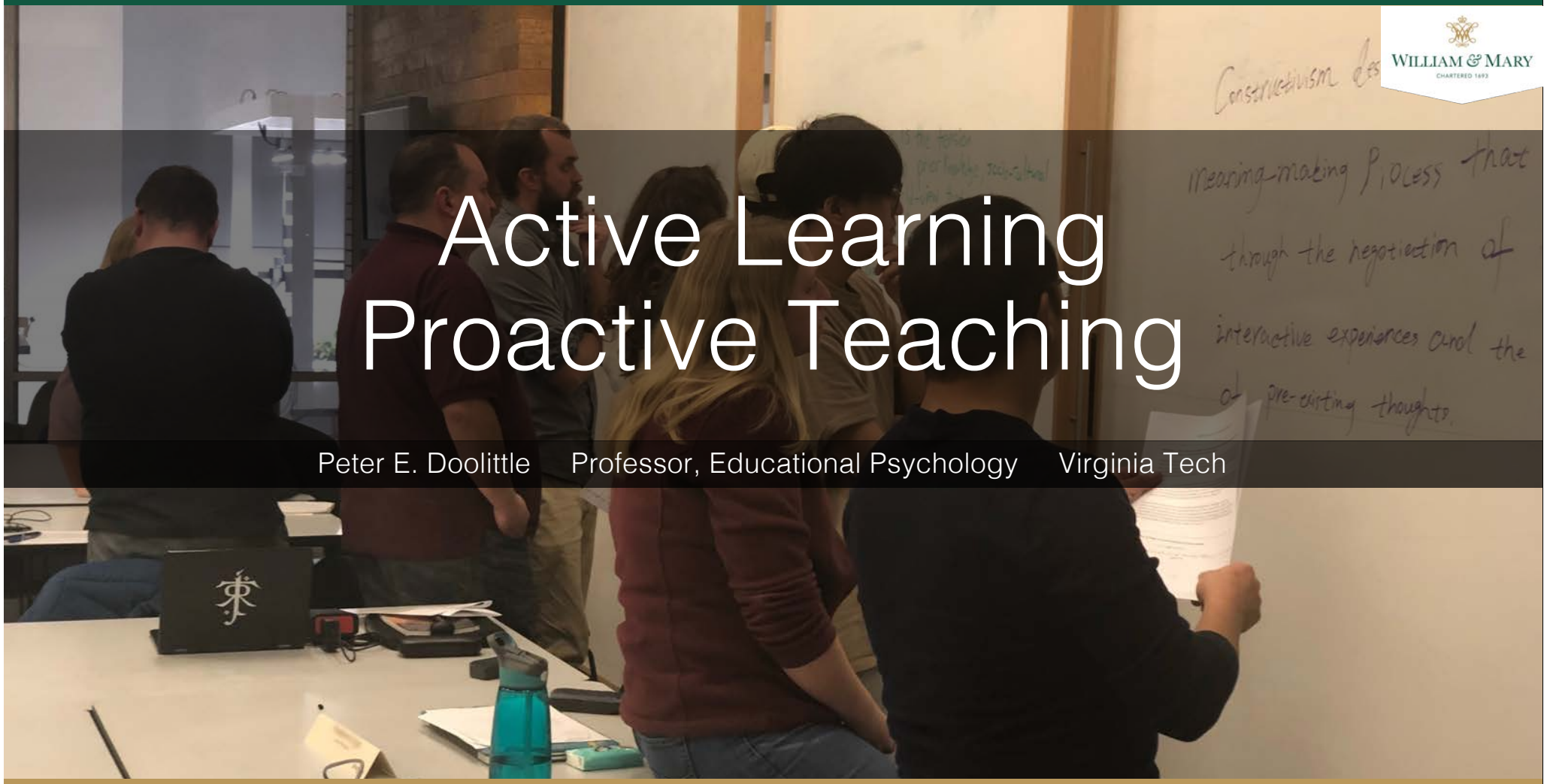

Active Learning Proactive Teaching

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What is Active Learning?

What is active learning?

(in one sentence)

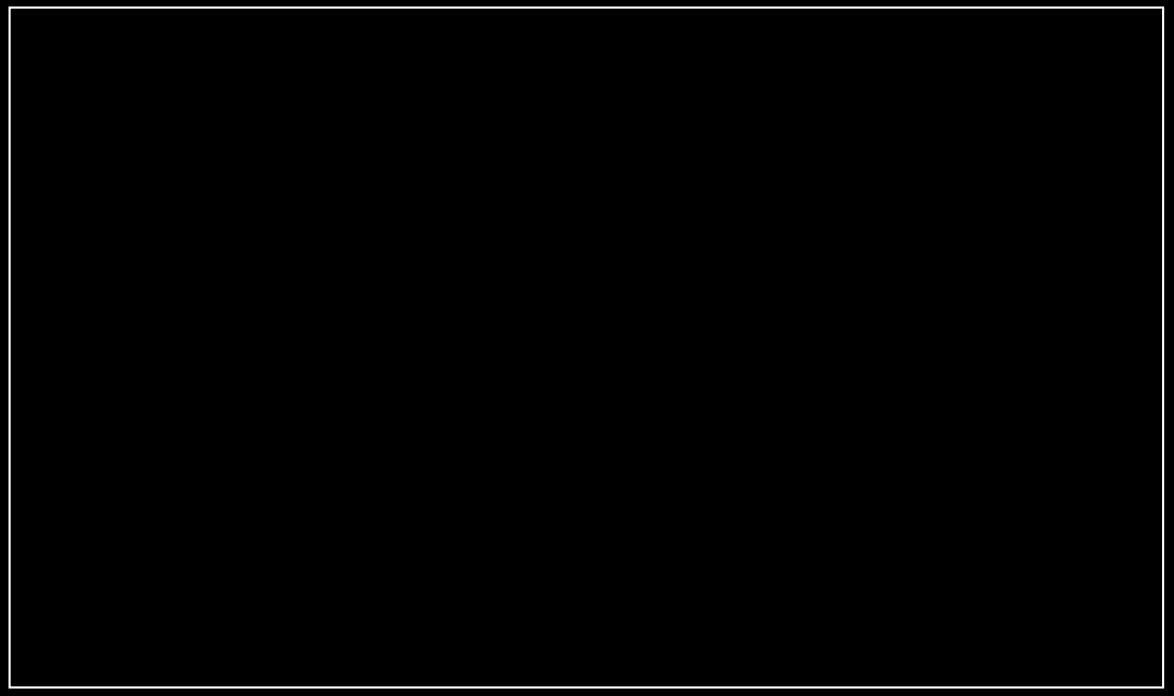
Today's Mantra

What we process we learn.


Cognitively
(thinking)
Behaviorally
(doing)
Engagement
Active Learning
What we process
we learn.
Interactive Learning
Hands On
Affectively
(emoting)
Socially
(interacting)

Active Learning

Defining Active Learning Is Like . . .



Freeman et al. (2014)

Research Methodology

- Active learning courses (AL) vs traditional lecture courses (TL)
- Systematic review of UG STEM courses (meta-analysis)
- Exam scores and Passing Rates (DFW)

1. .47 SD increase on exam scores (6% difference)
2. DFW rate: AL = 21.8%; TL = 33.8% (12% difference)
3. Greatest effects in smaller classes (< 50 students)

Freeman et al. (2014)

Defining Active Learning

> Active learning engages students in the process of learning through activities and/or discussion in class, as opposed to passively listening to an expert. (p. 8413)

Freeman et al. (2014)

This study's intent was to evaluate the average effect of any active learning type . . . contrasted with traditional lecturing. (p. 8414)

Freeman et al. (2014)

First Generation AL Research

- Active learning strategies vs Traditional lecture

Second Generation AL Research

- Active learning strategy vs Active learning strategy
- Active learning strategy and specific students, teachers, topics, environments, outcomes

see also Bernstein (2018), Daniel & Poole, 2009; Martella et al., 2020; Streveler & Menekse, 2017

Other Good Active Learning Articles

Bonwell & Eison	(1991)*	Active learning: Creating Excitement
Deslauriers et al.	(2019)	Measuring active learning
Driessen et al.	(2020)	Demystifying Active Learning
Freeman et al.	(2014)*	Active learning increases performance
Hake	(1998)*	Interactive engagement methods
Lombardi et al.	(2021)	The curious construct of active learning
Martella et al.	(2020)	Effects of Active Learning Implementations
Nguyen et al.	(2021)	Instructor Strategies
Prince	(2004)*	Does active learning work?
Theobald et al.	(2020)	Active learning narrows achievement gap

Some Other General Findings

Active learning increases academic achievement and decreases DFWs for underrepresented students in STEM classes (narrows achievement gaps). (Theobald et al., 2020)

Students often perceive engaging in active learning as resulting is less learning than engaging in lecture. (Deslauriers et al., 2019)

Some Other General Findings

Active learning increases academic achievement and decreases DFWs for underrepresented students in STEM classes (narrows achievement gaps). (Theobald et al., 2020)

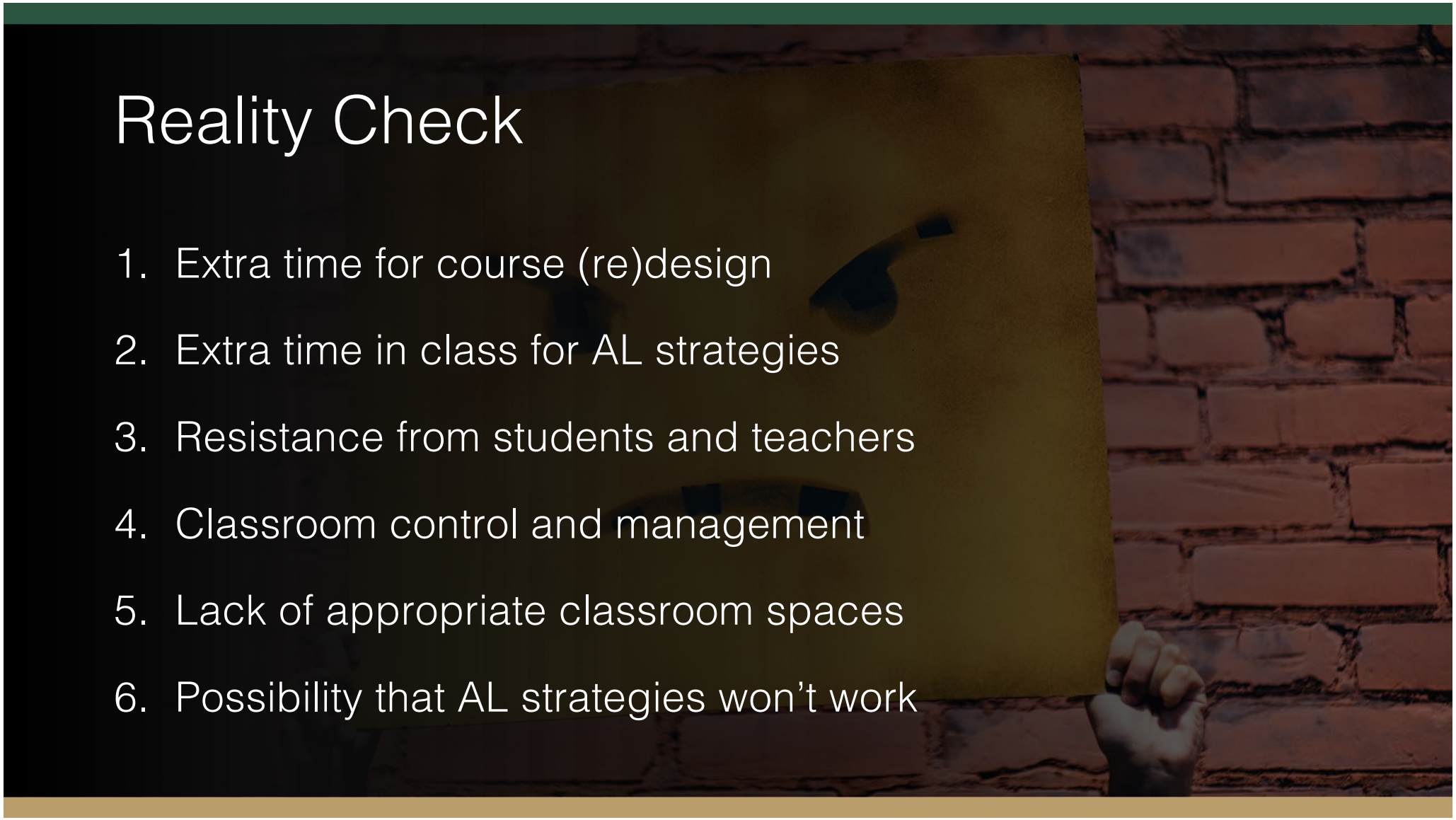
Students often perceive engaging in active learning as resulting is less learning than engaging in lecture. (Deslauriers et al., 2019)

Some Other General Findings

Active learning has a greater impact on student achievement in lower-level/introductory classes, as compared to advanced classes.

Active learning has a greater impact on students with higher prior knowledge.

Reality Check



1. Extra time for course (re)design
2. Extra time in class for AL strategies
3. Resistance from students and teachers
4. Classroom control and management
5. Lack of appropriate classroom spaces
6. Possibility that AL strategies won't work

What is Active Learning?

How does published research define AL?

	Driessen et al., 2020 Biology Ed 2016-2018	Doolittle et al., 2022 Across Domains 2017-2022
Articles Addressing Inclusion Criteria →	148 articles	586 articles
No Definition	83.5%	70.1%
Definition	16.5%	29.9%

What is Active Learning

Domains

accounting
biology
biomedical education
calculus
chemical education
chemistry
computer science
construction management
cybersecurity
economics
education
engineering
English as a FL
geosciences
health sciences
Info technology
library science
mathematics
medical education
moral education
nutrition education
pharmacy education
philosophy
physical therapy
physics
political science
quantum field theory
recreational therapy
STEM
transportaion

Active learning isn't domain specific.

What is Active Learning?

Active learning isn't a strategy.

Strategies

case-based learning
clickers
concept-point-recovery
controversial issues
cooperative learning
debate
design-based learning
discussion
dramatization
films
flipping
focused listening
group work
inquiry-based learning
jigsaw
laboratory learning
minute papers
music
online forums
peer instruction
problem-based learning
questioning
reflection journals
role play
serious games
service learning
simulations
social media
student presentations
team-based learning

What is Active Learning?

Strategies

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simulations
social media
student presentations
team-based learning

Active learning effectiveness depends on implementation.

(active learning *is not* **magic**)

What is Active Learning

To date, the active learning literature provides no unambiguous guidance to instructional designers who would like to ground their teaching methods in active learning.

-- (Martella et al., 2020)

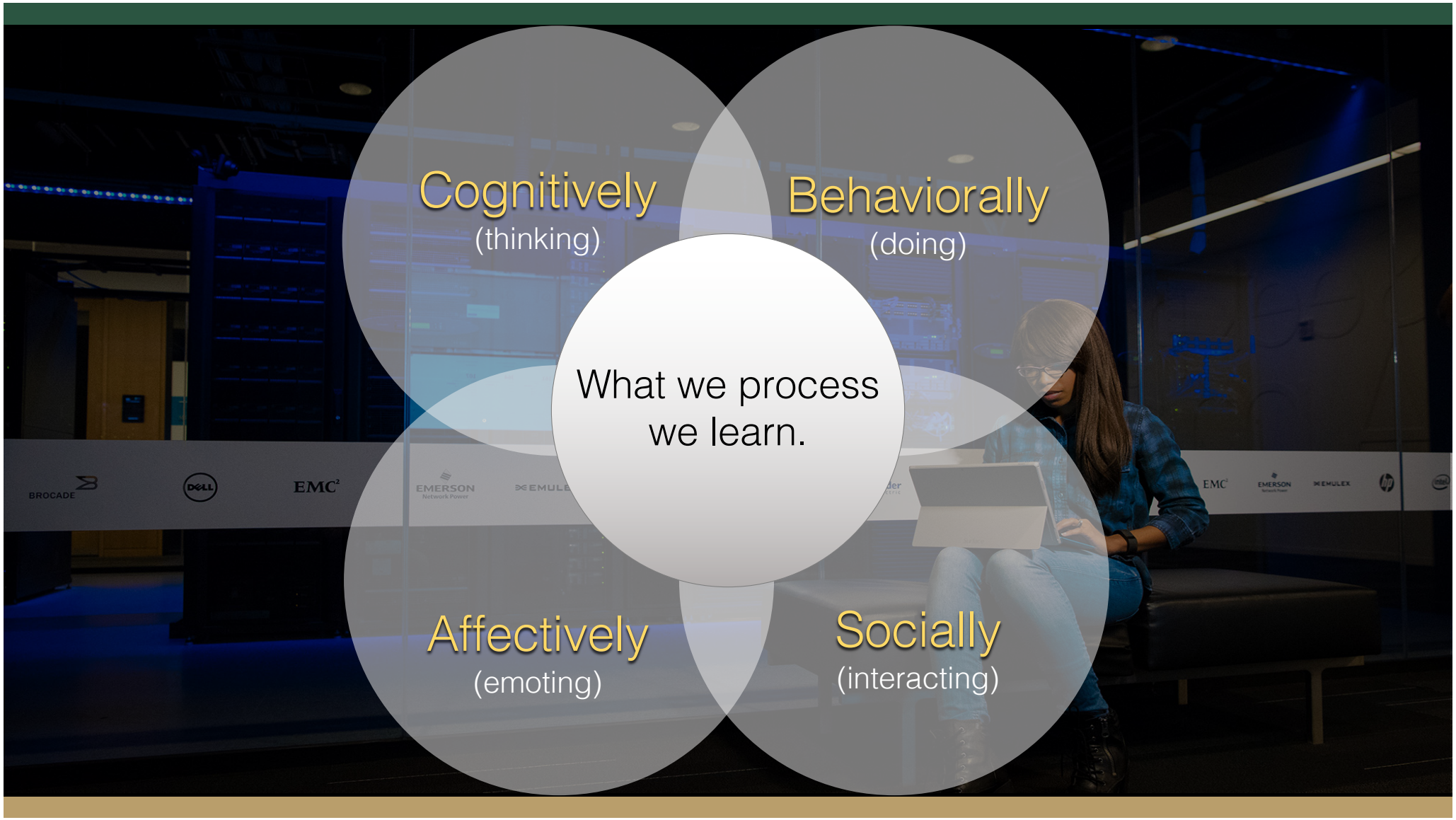
Domains

accounting
biology
biomedical education
calculus
chemical education
chemistry
computer science
construction management
cybersecurity
economics
education
engineering
English as a FL
geoscience
health sciences
info technology
library science
mathematics
medical education
moral education
nutrition education
pharmacy education
philosophy
physical therapy
physics
political science
quantum field theory
recreational therapy
STEM
transportaion

Active learning is deep and flexible

cognitive, behavioral, social, and/or affective processing

of one's new and prior knowledge and experience.


Cognitively
(thinking)
Behaviorally
(doing)
What we process
we learn.
Affectively
(emoting)
Socially
(interacting)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Active Learning in Action

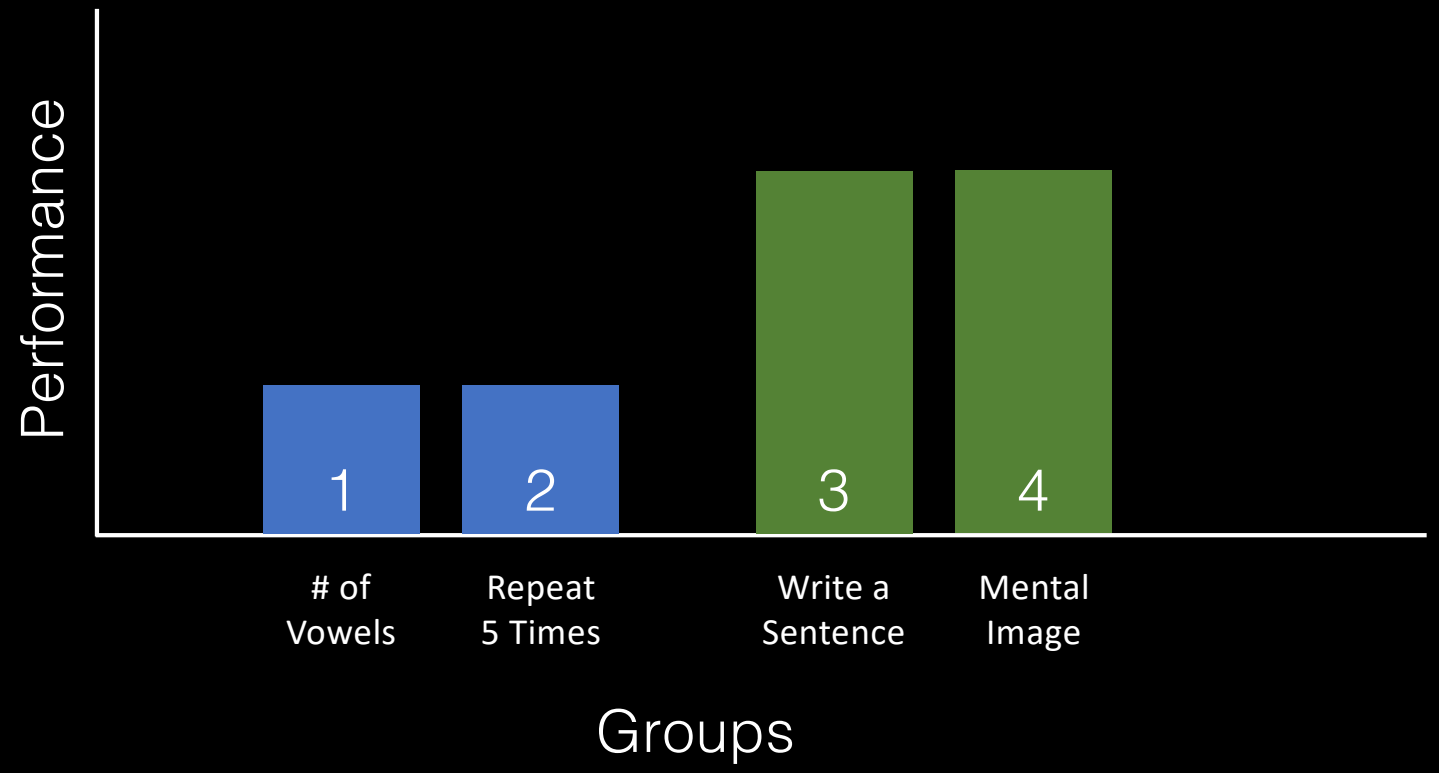
Word Pairs

That’s it!

Let’s See What You Remember

That’s it!

Long Term Memory



Active Learning and Cognitive Processing

1. Meaningful Learning & Elaborative Learning
   - Connecting new to prior knowledge increases retention.
   - Connecting prior to new knowledge increases retention.

2. ~~Testing Effect~~ Retrieval Practice & Generate Effect
   - The act of retrieving knowledge increases retention.
   - The act of generating meaning increases retention.

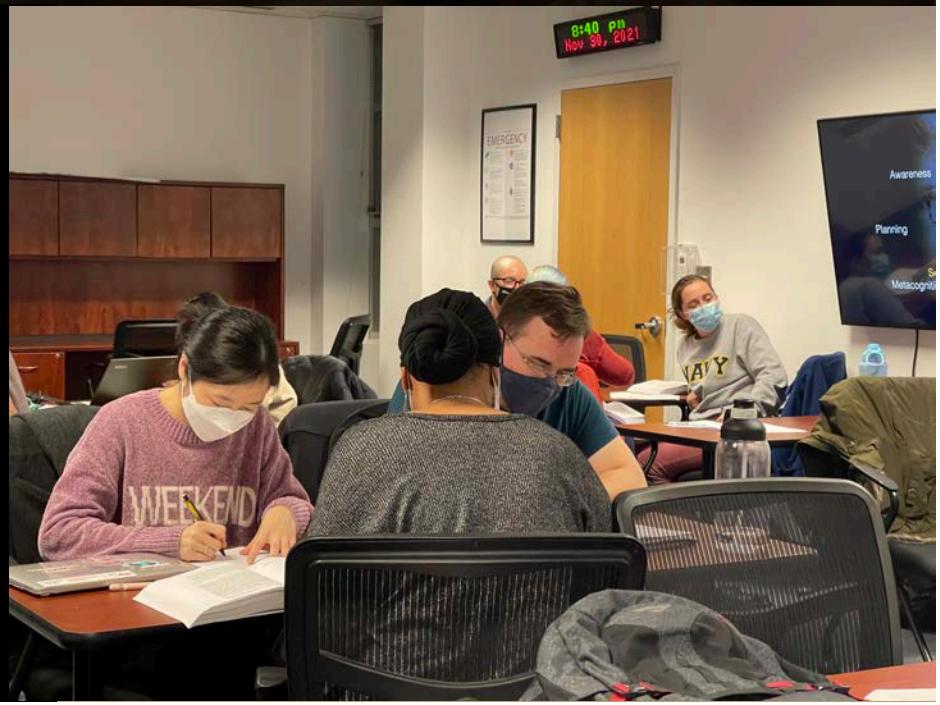
Active Learning and Cognitive Processing

3. Spacing Effect & Interleaving Effect
   - Distributing retrieval of knowledge over time increases retention.
   - Interlacing the retrieval of knowledge increases retention

4. Prior Knowledge Growth & Self-Regulated Learning
   - Increasing advance prior knowledge increases generalization.
   - Practicing the planning, enacting, monitoring, and evaluating of engagement increases the control of knowledge.

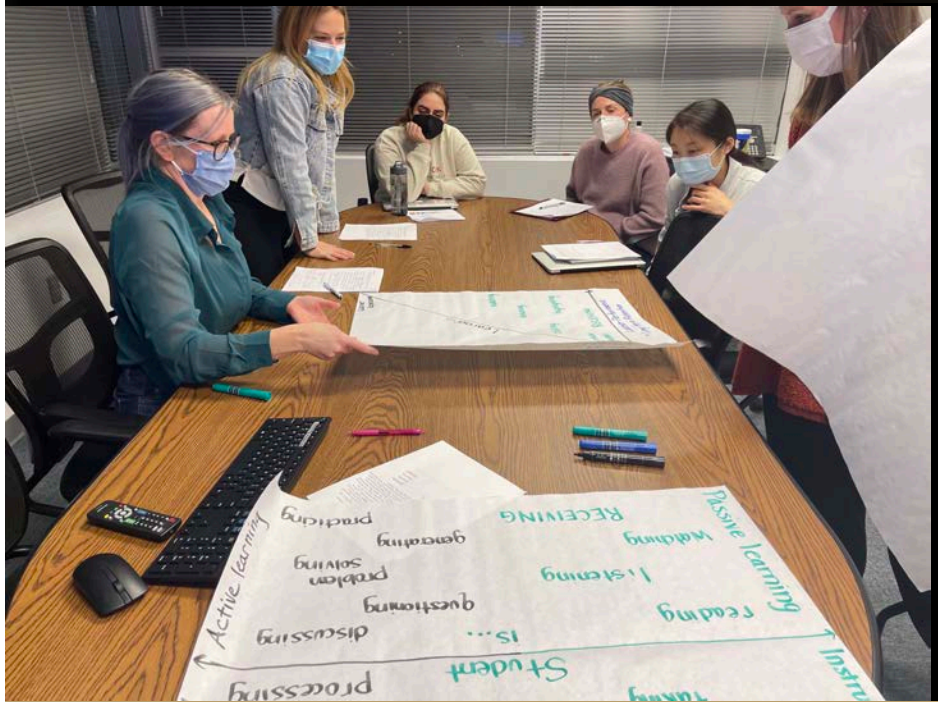
Active Learning and Cognitive Processing

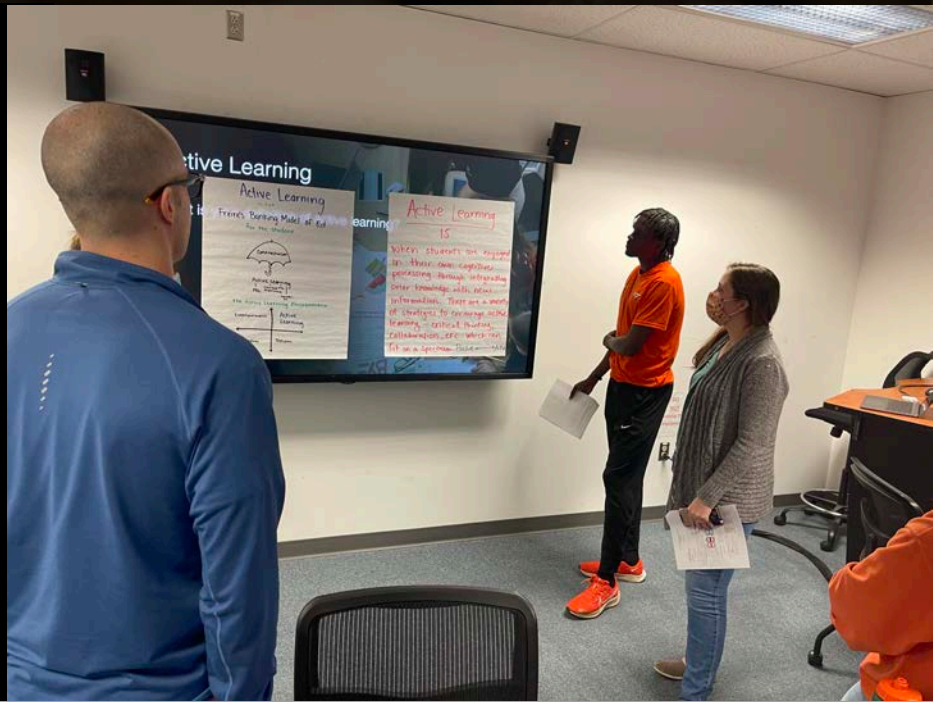
Early Knowledge Acquisition
Small Group Work – Jigsaw



Active Learning and Cognitive Processing

Organizing and Synthesize Knowledge
Small Group to Large Group Project

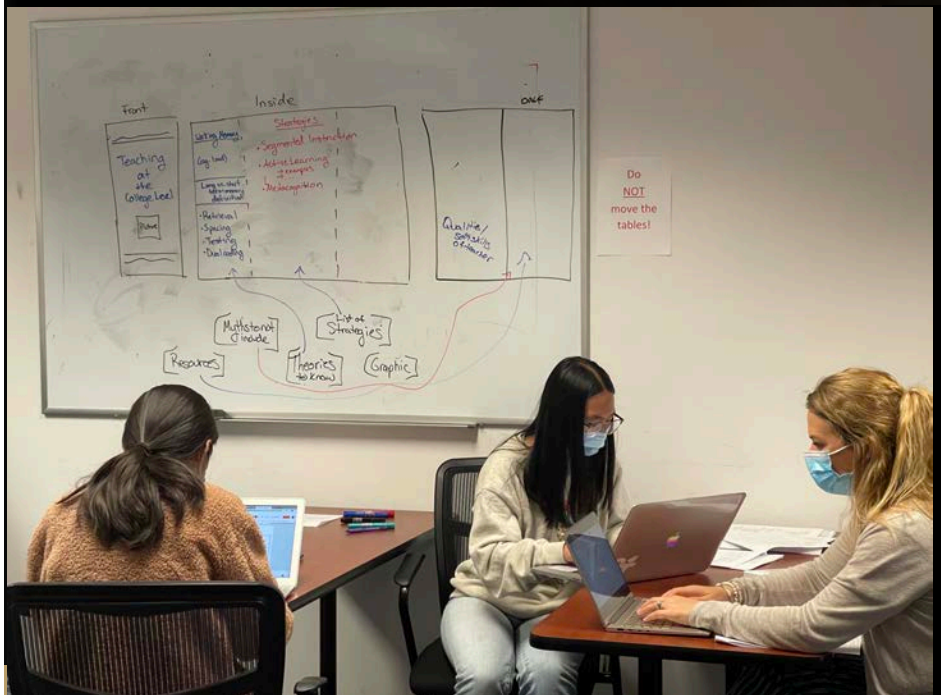


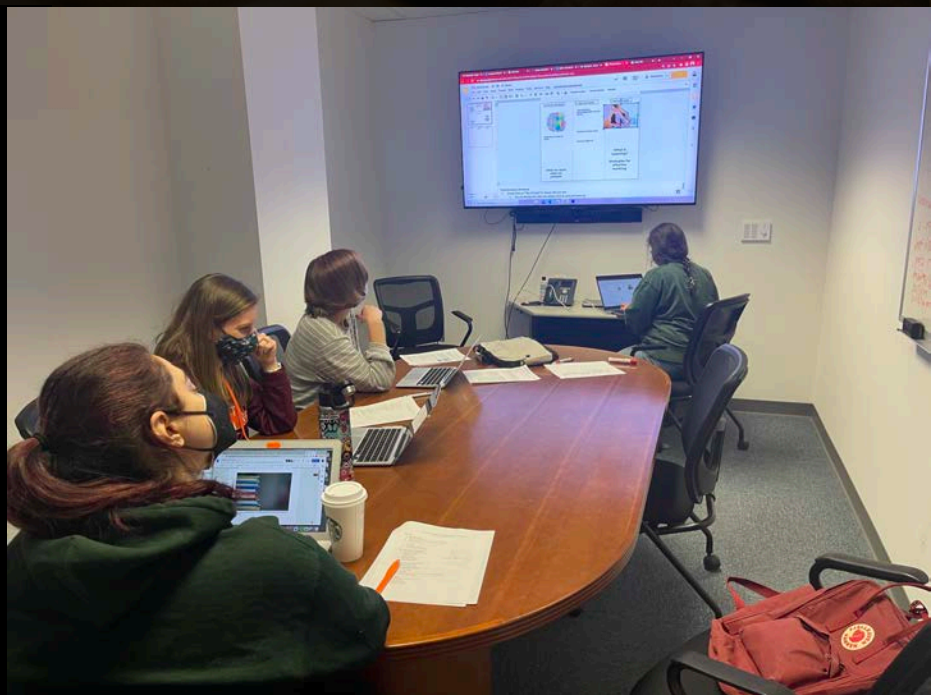


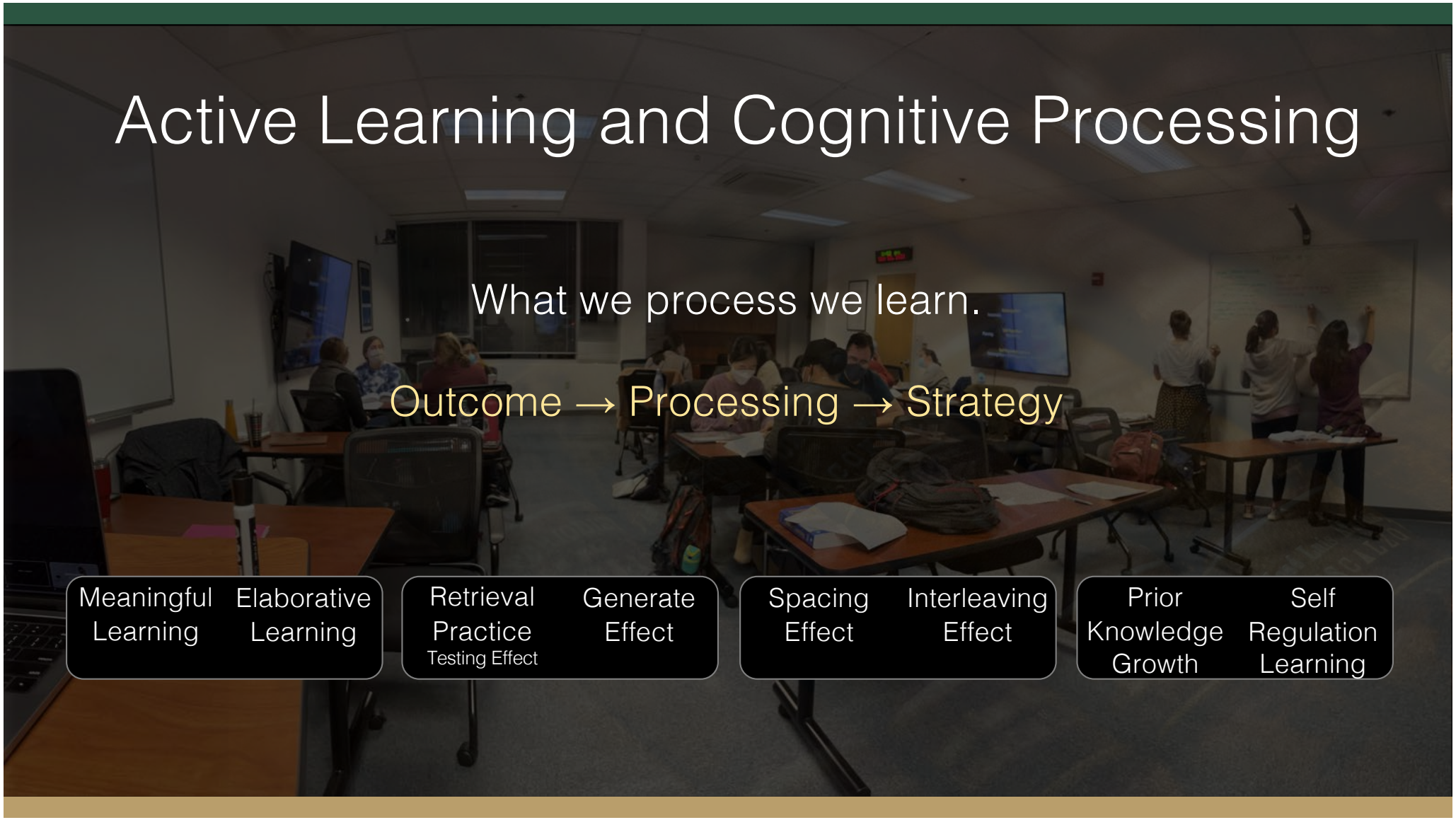
Active Learning and Cognitive Processing

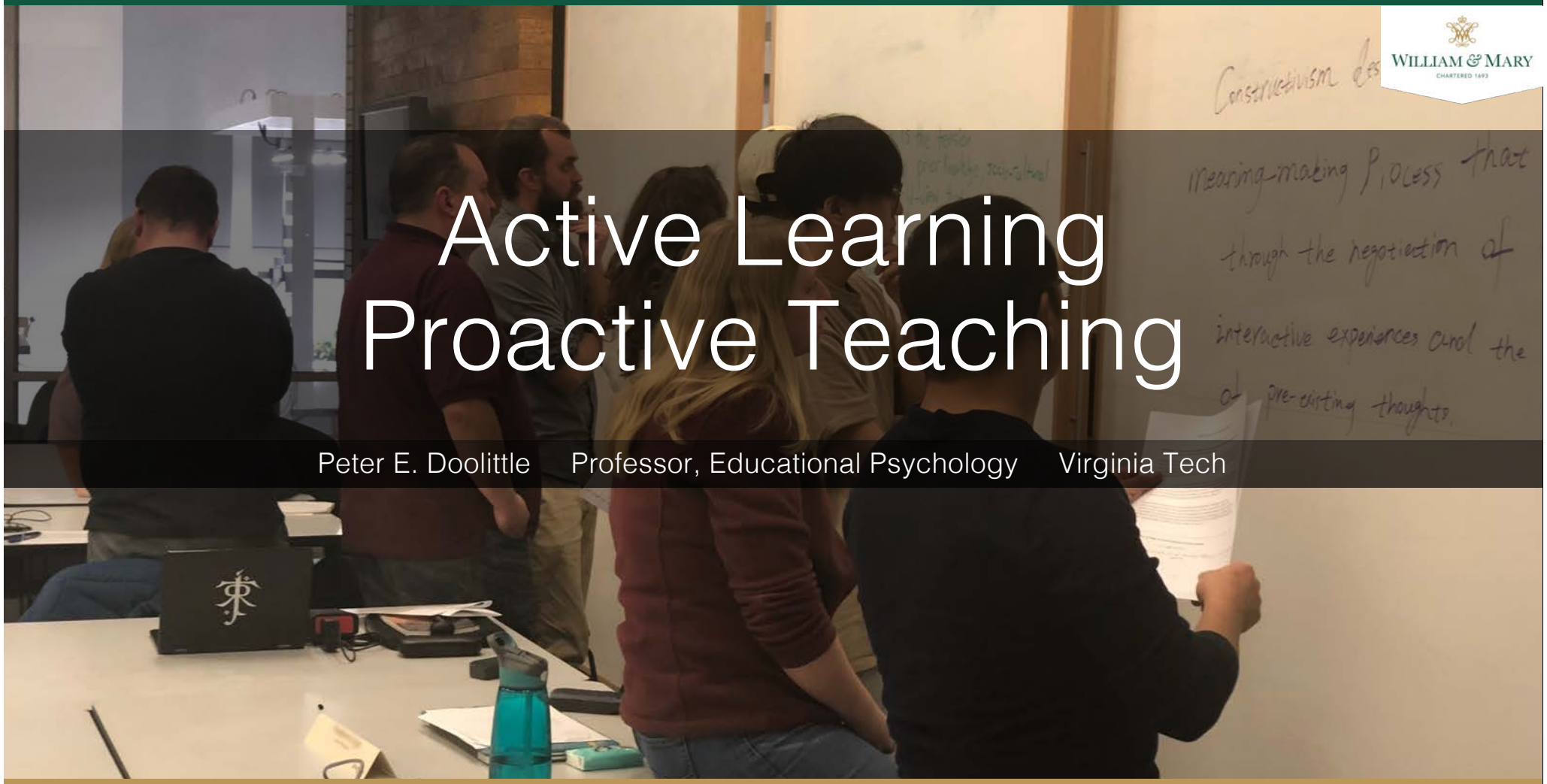
Analyze, Synthesize, and Create

Problem-Based Learning






Active Learning and Cognitive Processing
What we process we learn.
Outcome → Processing → Strategy
Meaningful Learning
Elaborative Learning
Retrieval Practice
Testing Effect
Generate Effect
Spacing Effect
Interleaving Effect
Prior Knowledge Growth
Self Regulation Learning



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