
TEXAS WOMAN'S
UNIVERSITY
Active Learning
Teaching • Learning • Engagement
Peter Doolittle, Professor
Educational Psychology
Virginia Tech • pdoo@vt.edu

1


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Peter Doolittle, Professor
Educational Psychology
Virginia Tech • pdoo@vt.edu
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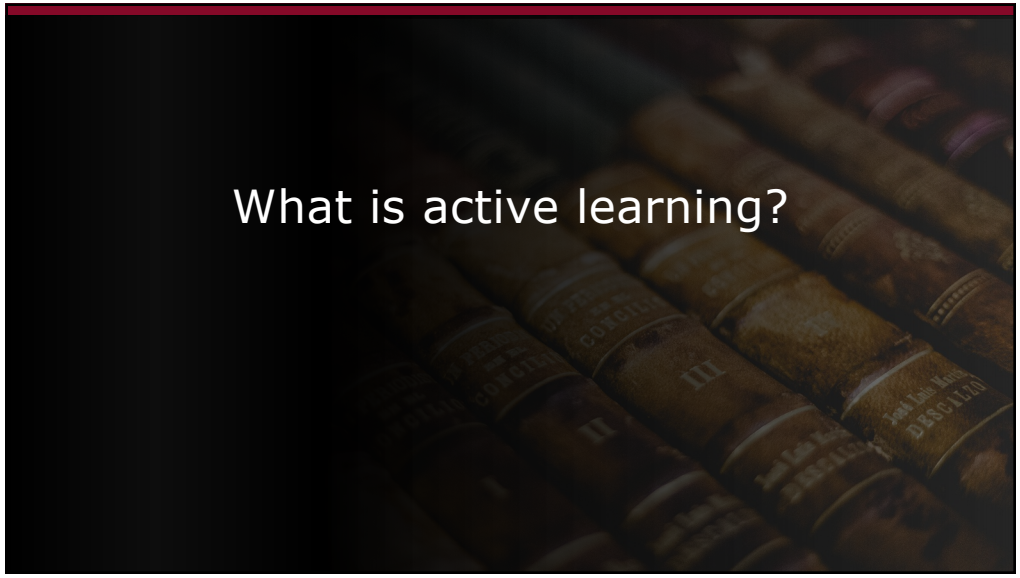
2



3

Perspective is Everything

4

Anticipation Guide

Directions: For each of the following 3 sentences,

- Agree
- Disagree
- Edit into agreement

5

Anticipation Guide

1. Active learning involves students doing things and thinking about the things they are doing.
2. Active learning-based classes result in more student learning than lecture-based classes.
3. Active learning works best in small STEM classes focused on problem solving.

6

Anticipation Guide

1. Active learning involves students doing things and thinking about the things they are doing.
2. Active learning-based classes result in more student learning than lecture-based classes.
3. Active learning works best in small STEM classes focused on problem solving.

It Depends.

7

Words

Rest Snore Sound

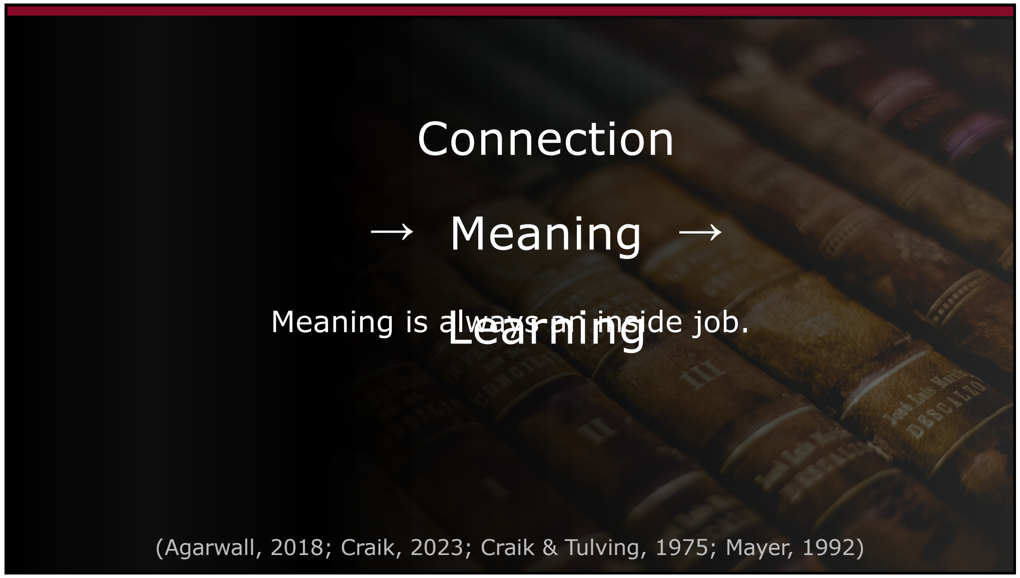
Tired Comfort

That's all!

Awake Eat Wake

Dream Slumber Night

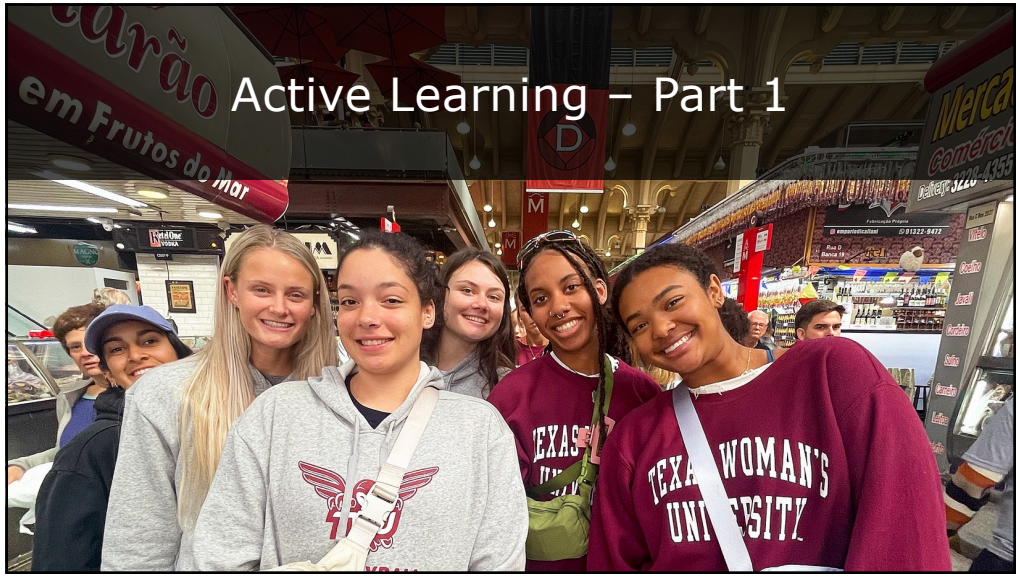
8


Connection
→ Meaning →
Learning
Meaning is always an inside job.
(Agarwall, 2018; Craik, 2023; Craik & Tulving, 1975; Mayer, 1992)

9


Rest
Snore
Sound
Tired
Bed
Comfort
Awake
Eat
Wake
Dream
Slumber
Night

10



11

Active Learning: A Beginning

Freeman et al. (2014)	Theobald et al. (2020)
AL vs Lecture Courses (225)	AL vs Lecture Courses (41)
UG STEM Courses	UG STEM Courses
Exam Scores & DFW Rates	Exam Scores & DFW Rates
• AL → ↑ Exams & ↓ DFWs	• AL → ↑ Exams & ↓ DFWs • Larger gains for students from underrepresented groups (narrowed achievement gap)

12

Active Learning: A Beginning

Freeman et al. (2014) Theobald et al. (2020)

Lecture Classroom Test Scores ⟷ Active Learning Classroom Test Scores

Global Effect Size

↑

Moderator Variables

Active Learning Intensity → ↓ Achievement Gap

~~Class Size, Course Level~~

13

What is Active Learning?

First Generation Active Learning Research

Second Generation Active Learning Research

Bernstein, 2018

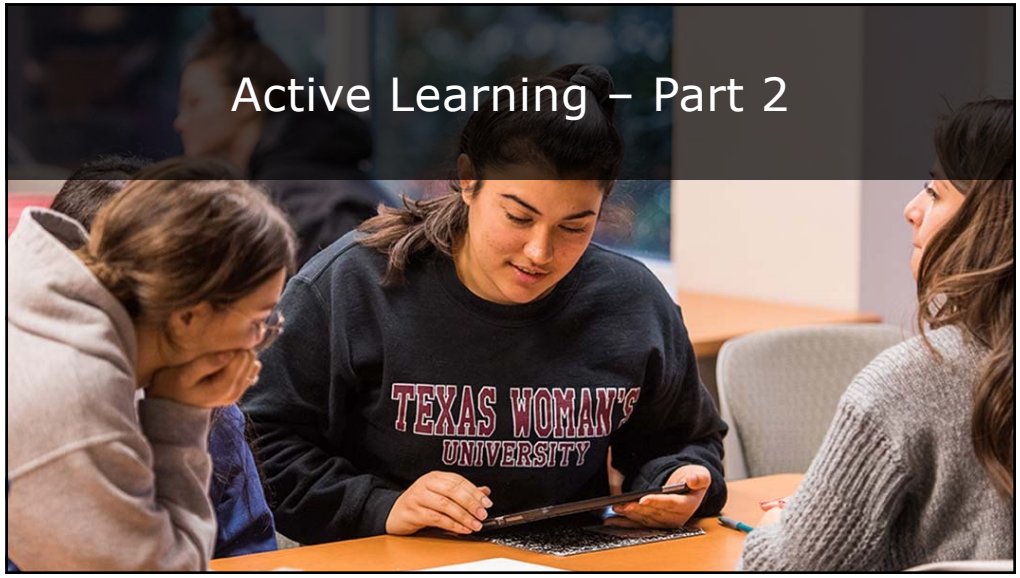
Freeman et al., 2014

Streveler & Menekse, 2017

14

15

16



17

What is Active Learning?

	Driessen et al., 2020 Biology Ed 2016-2018	Doolittle et al., 2023 STEM & Social Sci 2017-2022
	148 articles	586 articles
No Definition	83.5%	70.1%
Definition	16.5%	29.9%

18

What is Active Learning?

Qualitative Analysis : 161 Definitions – 3 Themes

1. Active learning as grounded in student-centered constructivist theory.
2. Active learning promotes higher-order thinking and deeper learning.
3. Active learning as an instructional strategy involving activity, participation, and engagement.

19

What is Active Learning

Domains

accounting
biology
biomedical education
calculus
chemical education
chemistry
computer science
construction mgmt
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
transportation

Active learning is not domain specific.

20

What is Active Learning? 190 Strategies

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

Active learning is not a strategy.

21

What is Active Learning? Application

flipping the class	flipping the class	flipping the class
flipping the class	flipping the class	flipping the class
flipping the class	flipping the class	flipping the class
flipping the class	flipping the class	flipping the class
flipping the class	flipping the class	flipping the class
flipping the class	flipping the class	flipping the class
flipping the class	flipping the class	flipping the class
flipping the class	flipping the class	flipping the class
flipping the class	flipping the class	flipping the class
flipping the class	flipping the class	flipping the class

Active learning is NOT a strategy.

22

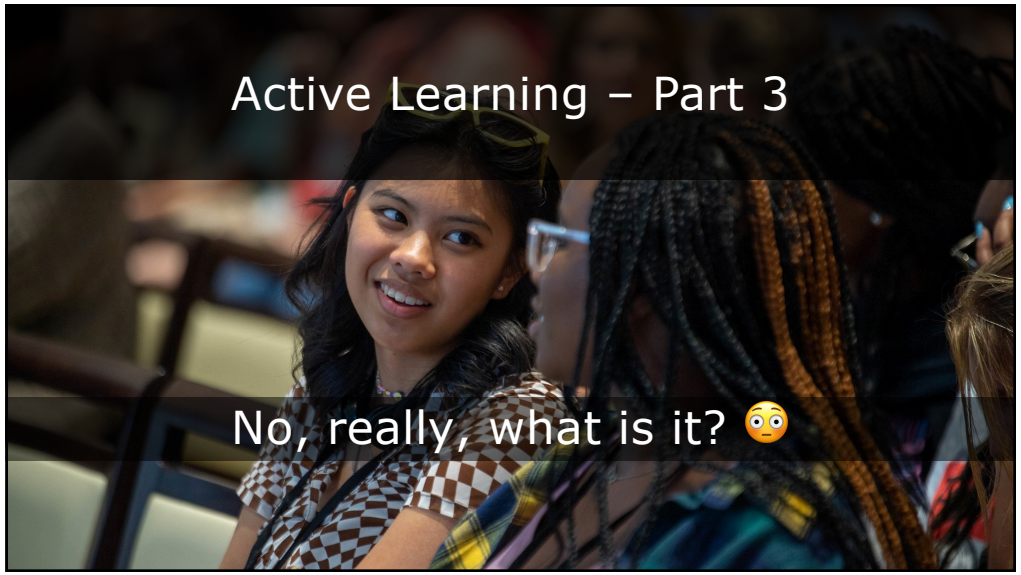
What is Active Learning?

Active learning is not domain specific.

Active learning is not a strategy.

Active learning is not magic.

23



24

Connection → Meaning → Learning

New Knowledge | Prior Knowledge

Meaningful Learning	NK → PK
Elaborative Learning	NK ← PK
Integrated Learning	PK ↯ PK

(Agarwal et al., 2021; Dunlosky et al., 2013; Norris & Kalm, 2021)

25

Processing Connection → Meaning → Learning

26

Active Learning

Processing → Connection → Meaning → Learning

Active learning fosters deep & flexible knowledge through cognitive, social, behavioral, and affective *processing* of one's knowledge and experience.

27

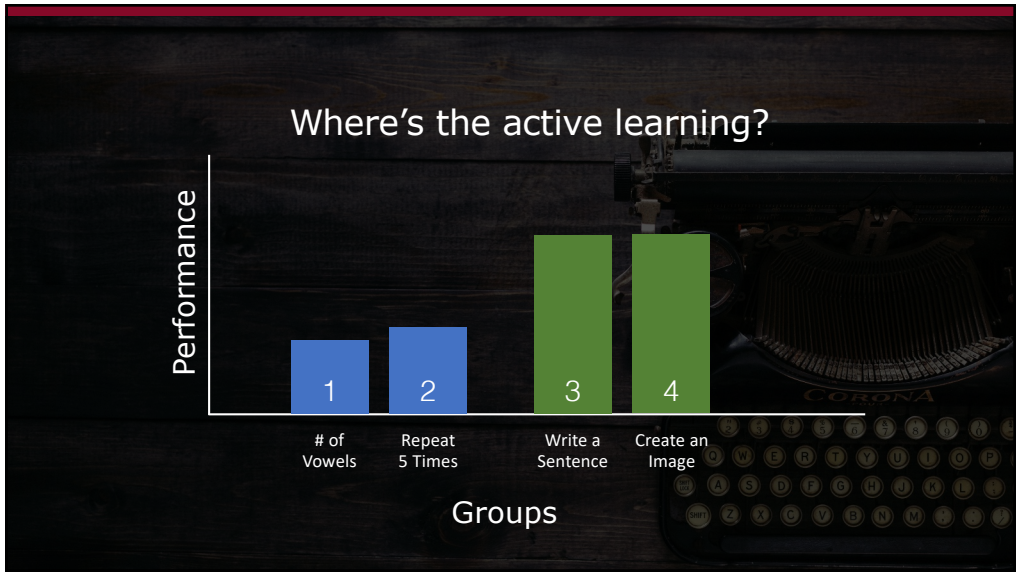
28

29

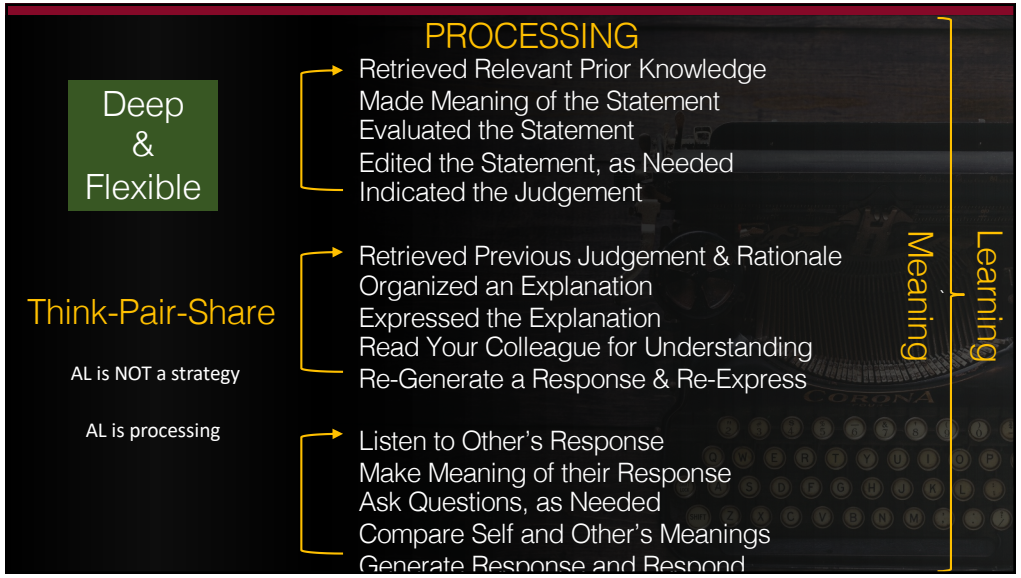
30


Let's See What You Remember
That's it!

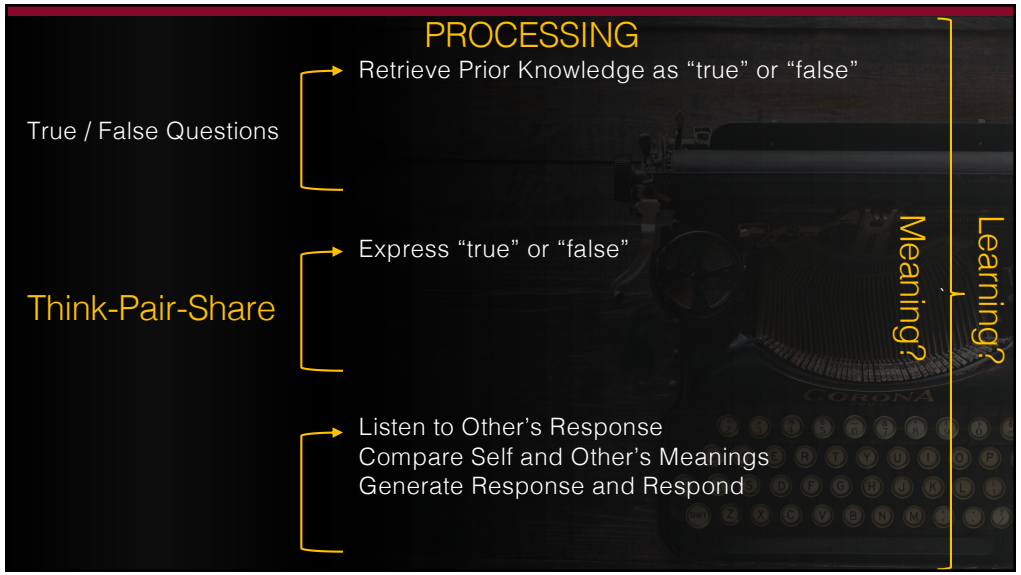
31


Where's the active learning?
Performance
1
2
3
4
# of Vowels
Repeat 5 Times
Write a Sentence
Create an Image
Groups

32


PROCESSING
Deep & Flexible
Retrieved Relevant Prior Knowledge
Made Meaning of the Statement
Evaluated the Statement
Edited the Statement, as Needed
Indicated the Judgement
Think-Pair-Share
AL is NOT a strategy
AL is processing
Retrieved Previous Judgement & Rationale
Organized an Explanation
Expressed the Explanation
Read Your Colleague for Understanding
Re-Generate a Response & Re-Express
Listen to Other's Response
Make Meaning of their Response
Ask Questions, as Needed
Compare Self and Other's Meanings
Generate Response and Respond
Meaning
Learning

33


PROCESSING
True / False Questions
Retrieve Prior Knowledge as "true" or "false"
Think-Pair-Share
Express "true" or "false"
Listen to Other's Response
Compare Self and Other's Meanings
Generate Response and Respond
Meaning?
Learning?

34

Active Learning – Part 5

35

Active Learning

Processing→Connection→Meaning→Learning

- Retrieval Effect
- Spacing Effect
- Generation Effect
- Production Effect
- Enactment Effect

Intuition

What we process we learn.

36

Closure

37

What is active learning?

(In your own words.)

38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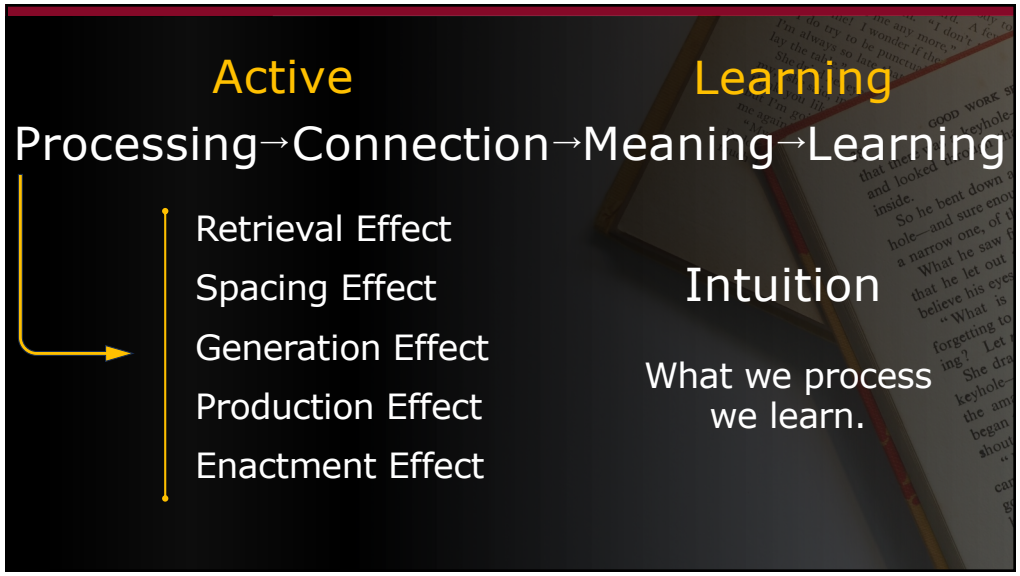
39


Teaching for Active Learning

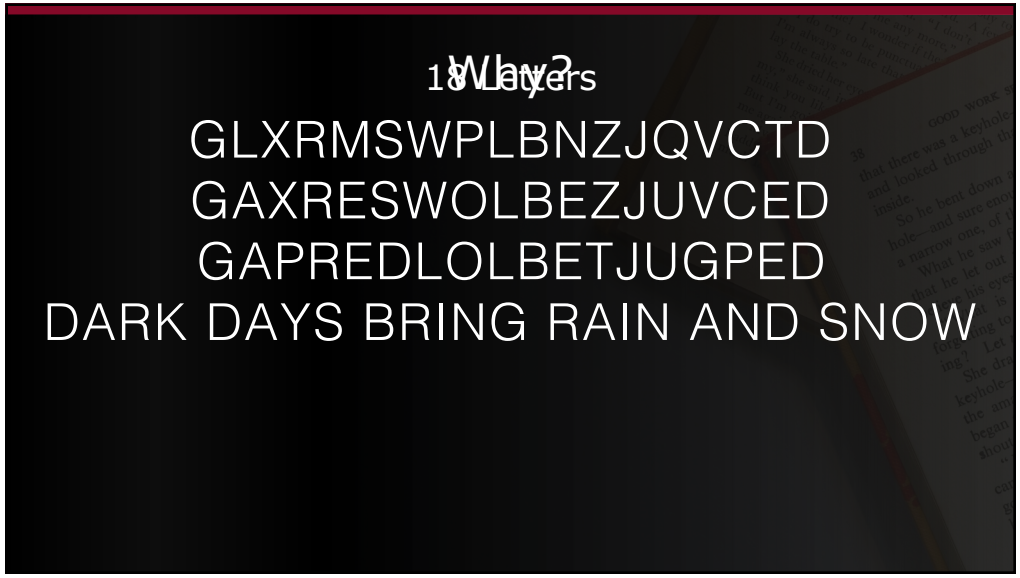
40


Cognitive
#1
Behavioral
#2
What we process we learn.
Affective
#4
Social
#3

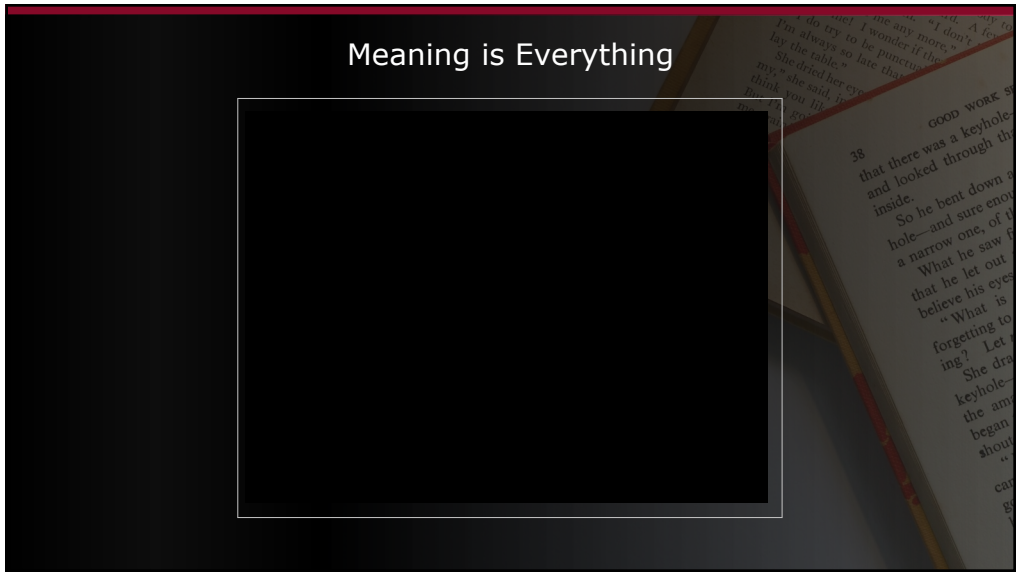
41


Active
Learning
Processing→Connection→Meaning→Learning
Retrieval Effect
Spacing Effect
Generation Effect
Production Effect
Enactment Effect
Intuition
What we process we learn.

42


Why?
18 Layers
GLXRMSWPLBNZJQVCTD
GAXRESWOLBEZJUVCED
GAPREDLOLBETJUGPED
DARK DAYS BRING RAIN AND SNOW

43


Meaning is Everything

44

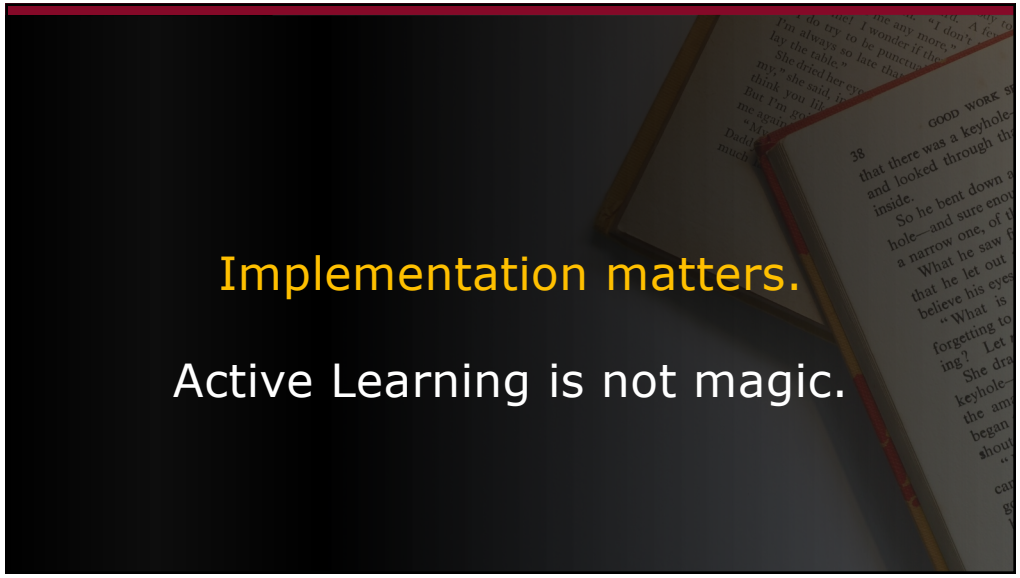
45

From the Student's Perspective:

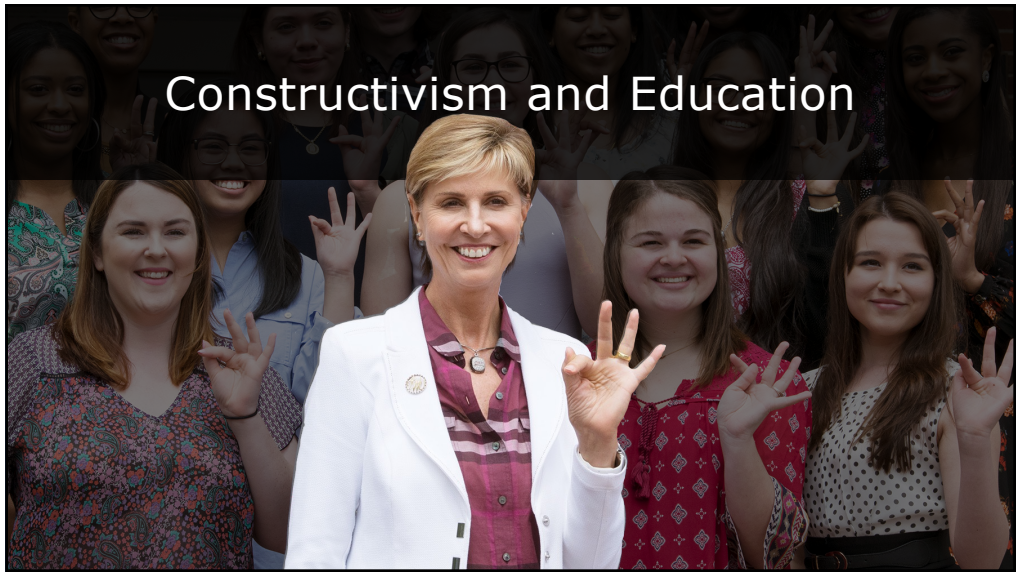
1. Active learning seems like a lot more work.
2. I know how to lecture + test, leave me alone.
3. If I don't understand the material the first time
   - I'm not smart enough, or
   - you're not a good enough teacher.

(Avargil et al., 2013; Bernstein, 2018; Deslauriers et al., 2019)

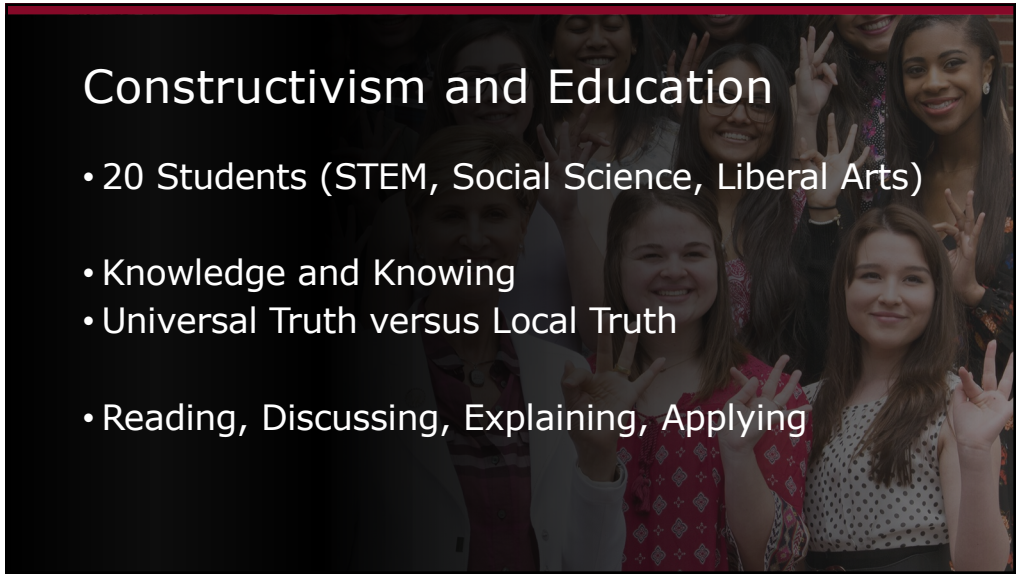
46


Implementation matters.
Active Learning is not magic.

47


Constructivism and Education

48


Constructivism and Education
• 20 Students (STEM, Social Science, Liberal Arts)
• Knowledge and Knowing
• Universal Truth versus Local Truth
• Reading, Discussing, Explaining, Applying

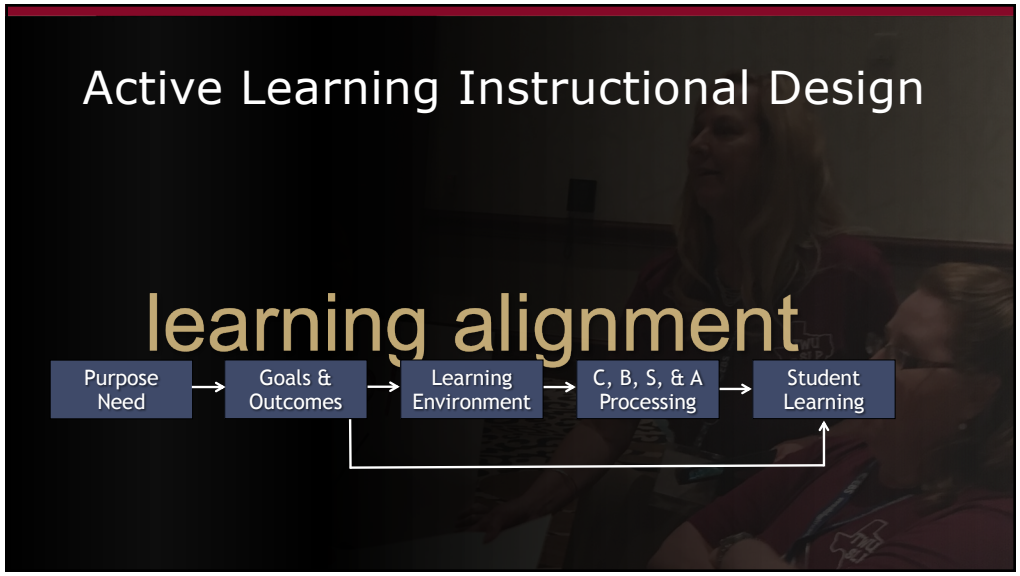
49


Active Learning Course Components
Plan for Processing
Cultivate Meaning
Foster Engagement
Encourage Reflection

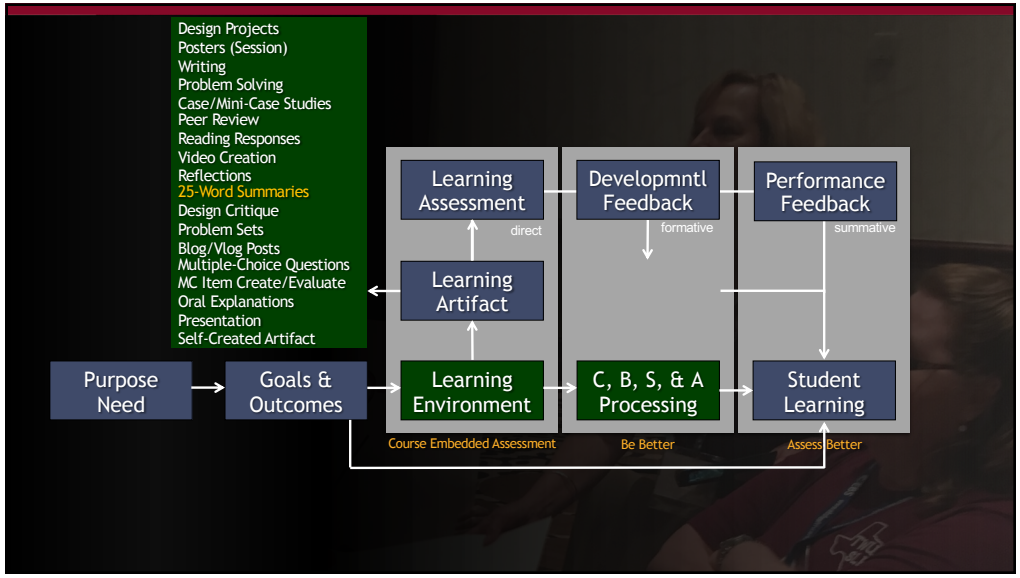
50


Plan for
Processing
Cultivate
Meaning
Foster
Engagement
Encourage
Reflection

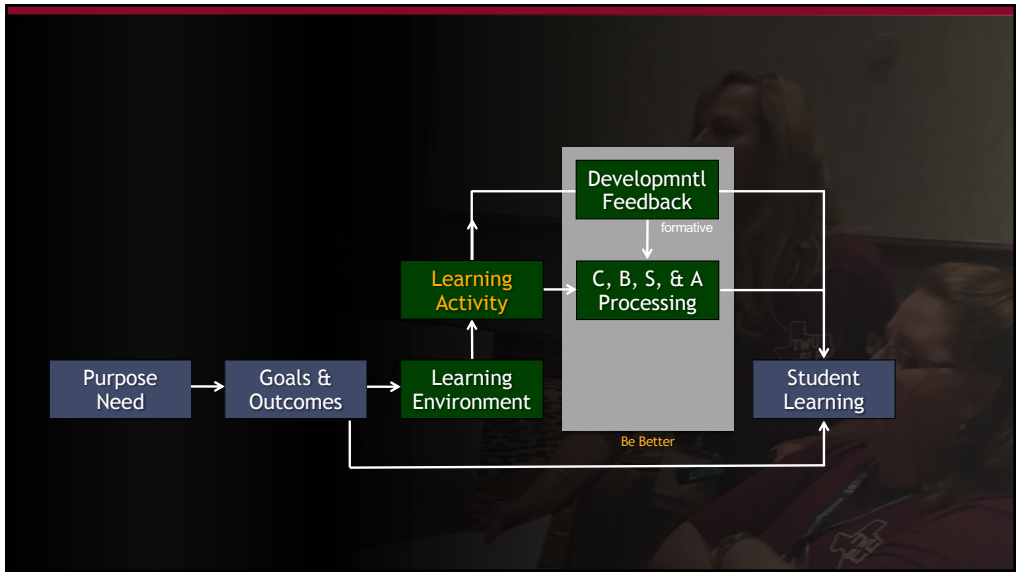
51


Active Learning Instructional Design
learning alignment
Purpose
Need
Goals &
Outcomes
Learning
Environment
C, B, S, & A
Processing
Student
Learning

52


Design Projects
Posters (Session)
Writing
Problem Solving
Case/Mini-Case Studies
Peer Review
Reading Responses
Video Creation
Reflections
25-Word Summaries
Design Critique
Problem Sets
Blog/Vlog Posts
Multiple-Choice Questions
MC Item Create/Evaluate
Oral Explanations
Presentation
Self-Created Artifact
Learning Assessment
direct
Developmntl Feedback
formative
Performance Feedback
summative
Learning Artifact
Purpose Need
Goals & Outcomes
Learning Environment
C, B, S, & A Processing
Student Learning
Course Embedded Assessment
Be Better
Assess Better

53


Developmntl Feedback
formative
Learning Activity
C, B, S, & A Processing
Purpose Need
Goals & Outcomes
Learning Environment
Student Learning
Be Better

54

Learning Effects & Instructional Design

- Retrieval Effect
- Spacing Effect
- Generation Effect
- Production Effect
- Enactment Effect

55

Retrieval + Spacing, + Generation

1. Read Article
2. Write Summary
3. Summary Feedback
4. Complete Priming Quiz
5. Engage Activity
6. Daily Evaluation
7. Review Next Week
8. Complete Chart

56

25-Word Summaries

- 1-2 Readings per Class (Chapter, Article)
- Write a 25-Word Summary (essential meaning)

- Developmental Feedback of 2-3 Paragraphs
- Grading Based on Scoring Rubric
- Due Tues; Grade/Return on Wed; Class Thurs

- 70% of Course Grade

57

25-Word Summaries

Student Summary
A postmodernism concept of multiplicity, dynamic, and holistic construction of knowledge is favorable in deconstructing the current system, rather, modern concept of a fixed reality. [25 words]

Instructor Feedback
The summary has captured some essential ideas from the reading, although the expression of these ideas needs a bit of refinement. The idea that a postmodernist view of knowledge involves multiple perspectives, dynamic and changing knowledge, and contextually bound value is well captured in the summary. Highlighting the relation to a modern perspective is also nice. The challenge is creating a 25-word summary were every word counts and that the representation of the ideas is both clear and concise.

In the first half of the sentence dealing with postmodernism, the phrase "multiplicity, dynamic, and holistic," is a challenge to decipher. How might this be rephrased to be clearer? Perhaps something like, "in postmodernism, knowledge is viewed as dynamic and holistic, involving multiple perspectives." The second half of the sentence, while capturing a central idea from the reading, "modern concept of a fixed reality," could also be made clearer.

Part of the challenge of the last part of the sentence is that the focus shifts from knowledge to reality, "construction of knowledge" versus "modern concept of a fixed reality." It would be clearer to maintain the focus on knowledge and simply contrast post-modernism's multiple perspectives and dynamic/holistic knowledge with modernisms fixed, objective knowledge. In this case you can end up with a summary such as, "in postmodernism, knowledge is viewed as dynamic and holistic, involving multiple perspectives, while modernism views knowledge as objective and fixed." This revised summary would not capture everything that you included in your summary. The idea of "deconstructing the current system" would still need to be integrated into the revised summary. In addition, the revised summary is not perfect (I'm pretty sure it can be shortened without the loss of meaning, but that will take a bit more time), it's just a way of thinking about how you might create a parallel structure in the summary that will make it easier to comprehend.

58

Oral Explanations

- 1 Explanation per Chapter (specific foci provided)
- 5-10 Minute Oral Explanations (essential meaning)

- Developmental Feedback of 5-10 Minute Oral Explan
- Grading Based on Scoring Rubric
- Due Sun; Grade/Return on Mon; Class Tues

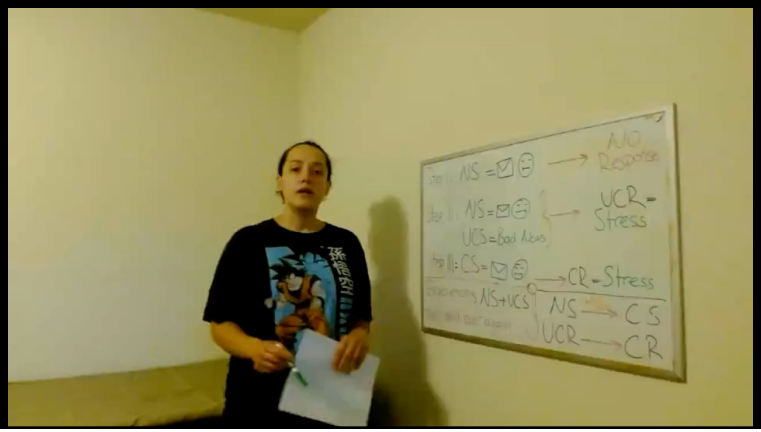
- 50% of Course Grade

59

Oral Explanation

60

Oral Explanation



61

Reading Responses

- 1-2 Response per Class (Article)
- 4 Questions (RQs, Method, Results, Discussion)

- Developmental Feedback of 2-3 paragraphs
- Grading Based on Scoring Rubric
- Due Sun; Grade/Return on Mon; Class Tues

- 84% of Course Grade

62

63

In-Class Activities

- Clear Group Directions
- Individual Think Time
- Small Group Interaction Time
- Large Group Reporting Out

64

In-Class Activity

Social Constructionism

List three events, language uses, or social institutions, that you know personally, that have a history (and a little about that history).

These could be global, national, local, or familial events, language uses, or social institutions of which you are familiar.

65

In-Class Activity

What did Roediger & Karpicke (2006) find?

	5 Minutes	1 Week
S S S S	83%	40%
S S S T	78%	56%
S T T T	71%	61%

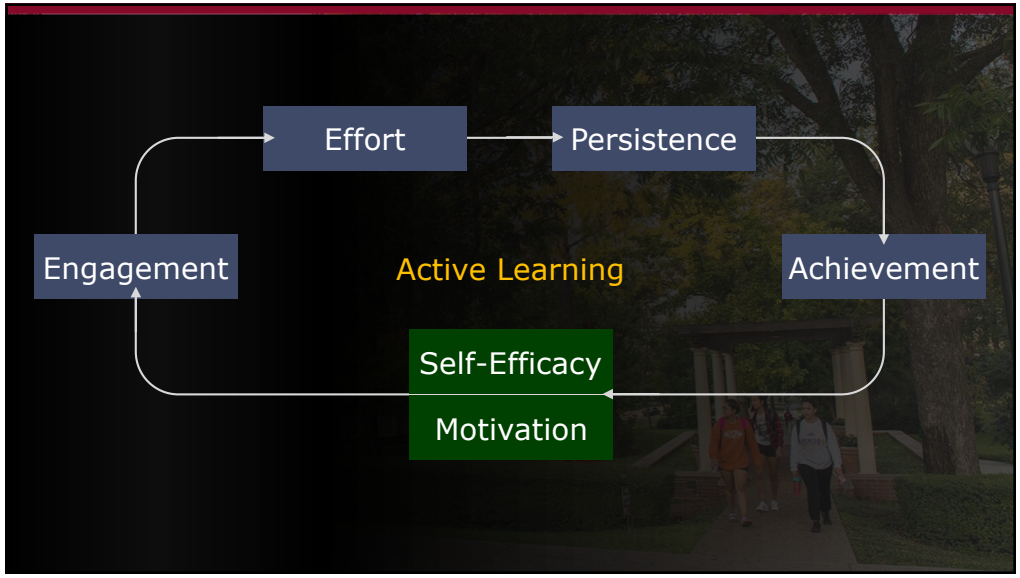
66

67

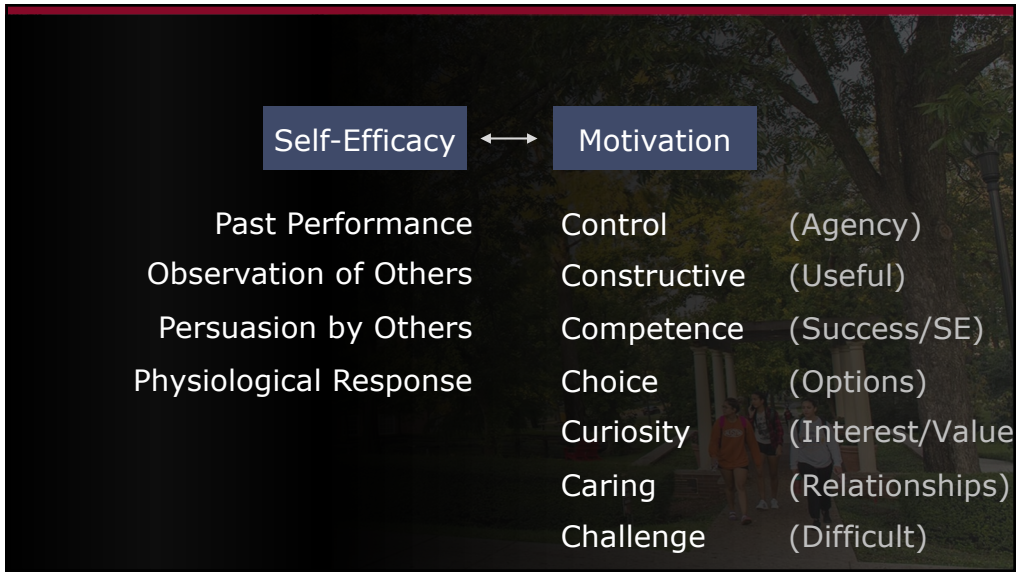
Motivation & Engagement

Motivation	The intent to act.
Engagement	Acting.
Self-Efficacy	Belief in successful action.

68


Effort
Persistence
Engagement
Active Learning
Achievement
Self-Efficacy
Motivation

69


Self-Efficacy
Motivation
Past Performance
Observation of Others
Persuasion by Others
Physiological Response
Control (Agency)
Constructive (Useful)
Competence (Success/SE)
Choice (Options)
Curiosity (Interest/Value
Caring (Relationships)
Challenge (Difficult)

70

71

Foster Engagement

- Control: (choices) — Summary Cycle, Group Work, Q & A, Opportunities to Voice
- Useful: (relevant) — Theory + Practice, Applied Group Work, Readings & Discussions
- Caring: (relationships) — Day 1 Intros, Quiz, Name Plates, Always Call by Name, Greet, Evaluation + Feedback

72

73

Encourage Reflections

1. Self-Focused / Self-Applied Activities
2. ddd

74

Daily Course Evaluations

Complete in 48 hours; Report back next class

1. What aspects of the content addressed in class are still confusing?

2. What elements of the instruction were particularly effective in stimulating learning?

3. Other comments/thought?

75

Confusing?

I'm kind of understanding the terms and very abstract things you explained. However, today my brain hurt so much. I think if you could provide us with more examples would be better.

76

Stimulating?

I loved that you addressed/invited the questions from the class on such deep/new/complex topics, rather than powering through the slides for the sake of "coverage".

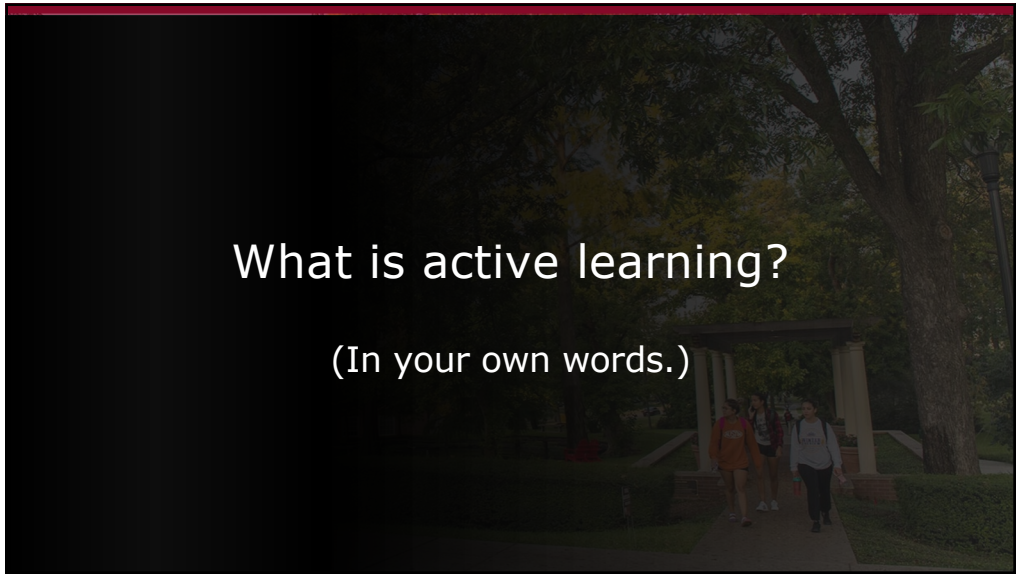
77

Comments?

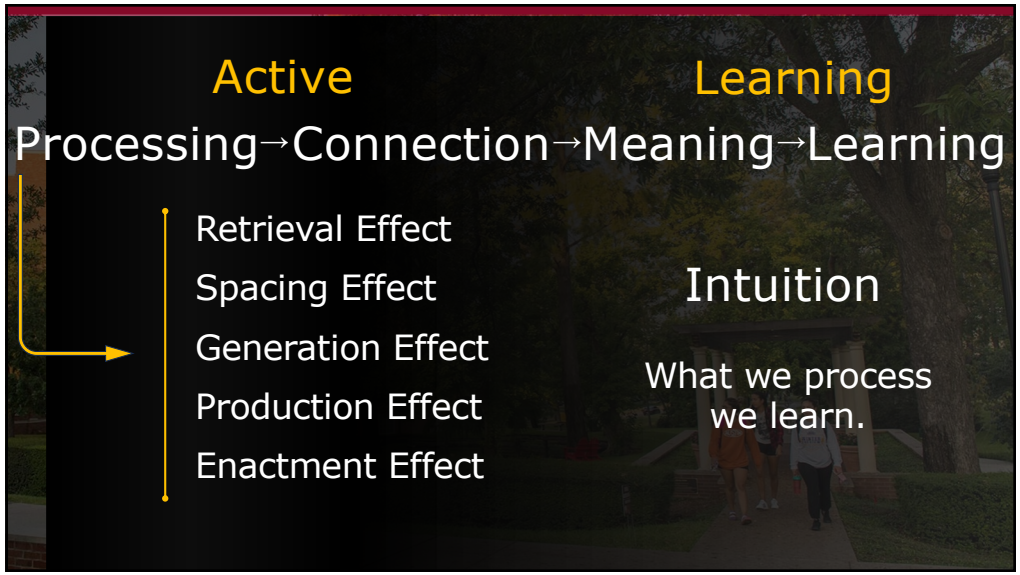
I really liked this article! It made sense and I knew exactly what it was talking about based on my own life experiences.

This week's article reminded me of the Oprah interview with Meghan Markle: "Were you silenT or silencED?"

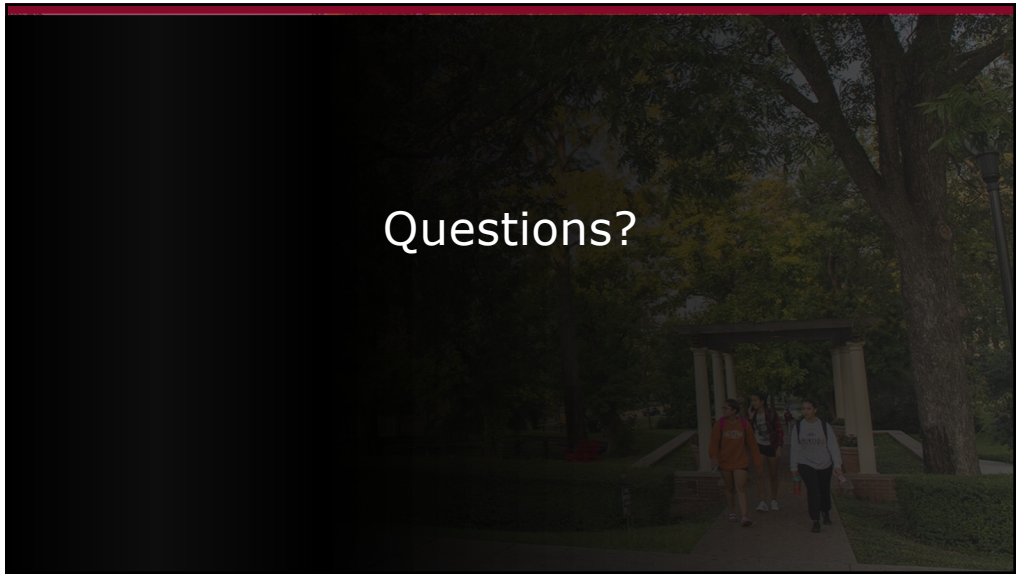
78


What is active learning?
(In your own words.)

79


Active
Learning
Processing→Connection→Meaning→Learning
Retrieval Effect
Spacing Effect
Generation Effect
Production Effect
Enactment Effect
Intuition
What we process we learn.

80


Questions?

81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82

Learning Effect	Definition	Effect Size
Elaboration Effect	Learners tend to remember information better when they engage in deeper, more meaningful processing of new information, and actively make connections between new and prior knowledge.	Medium[1] (*g* = .55)
Retrieval Effect	Learners tend to remember information better when they actively recall the information from memory, rather than simply re-reading or re-studying the information.	Medium[2] (*g* = .61)
Generation Effect	Learners tend to remember information better when they actively generate it themselves, rather than passively receiving it through reading or a presentation.	Medium[3] (*d* = .40)
Spacing Effect	Learners tend to remember information better when they engage in study sessions or practice trials that are spaced out, or distributed, over time, rather than massed into a single session.	Large[4] (*g* = .74)
Interleaving Effect	Learners tend to remember information better when they alternate between topics under study, especially when they have similarities that might be confused, rather than focusing on one topic at a time.	Medium[5] (*g* = .42)
Enactment Effect	Learners tend to remember information better when they engage in physical actions related to the information, rather than simply observing the action or reading about it.	Large[7] (*g* =1.23)
Production Effect	Learners tend to remember information better when they read words aloud (or type, write, or spell words or phrases), rather than reading words silently.	Medium[6] (*g* = .50)

Citations: [1] Bisra et al. (2018); [2] Adesope et al. (2017); [3] Bertsch et al. (2007); [4] Latimier et al. (2021); [5] Brubnmair and Richter (2019); [6] Roberts et al. (2022); [7] Fawcett (2013)

83