

# Constructivism, Active Learning

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# Constructivism

- All knowledge is **interpreted** through the lens of what is already known.
- New information causes us to add, modify, or discard old or new information.
- This is a very **active, reflective** process.

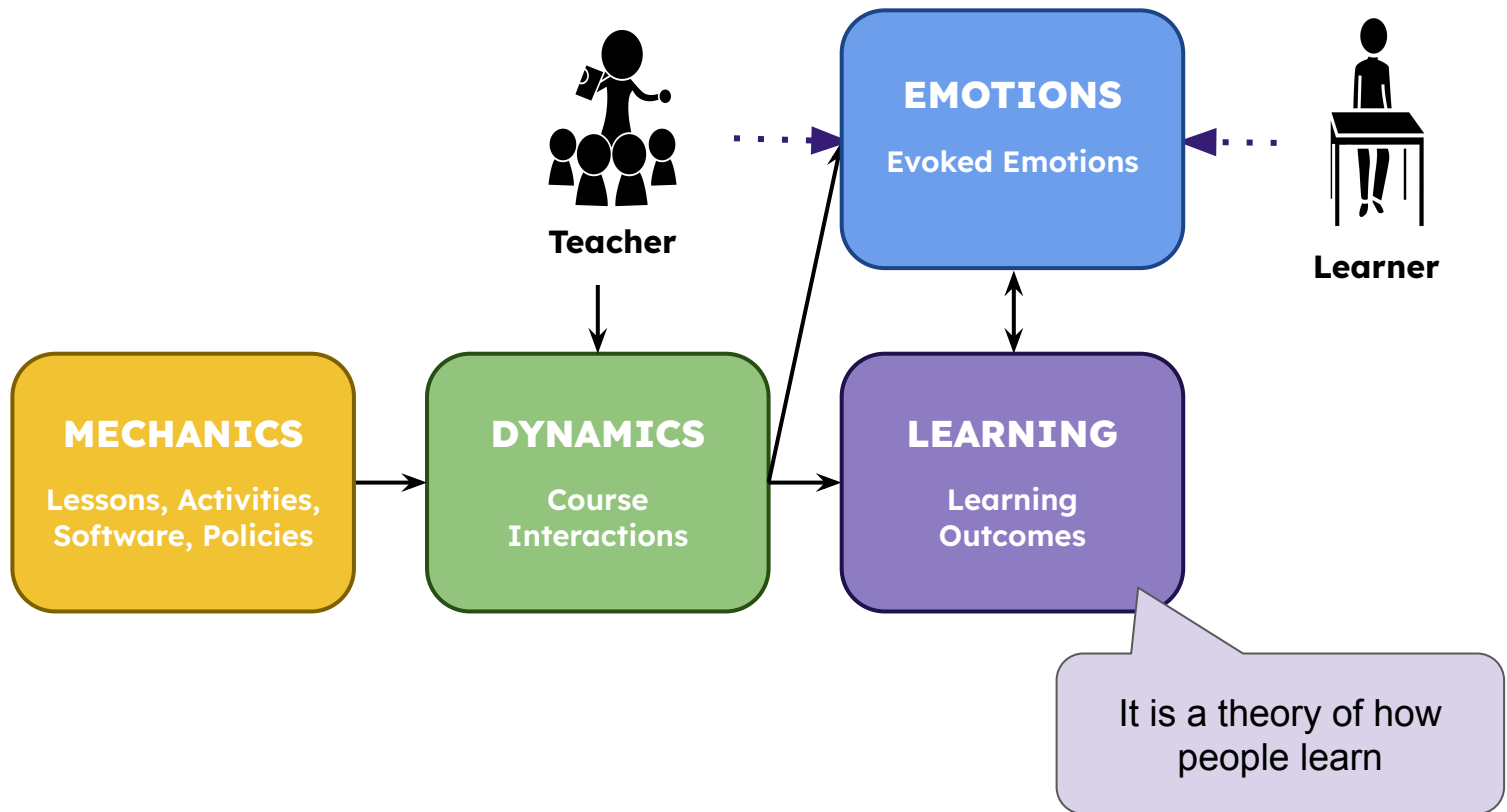
# The individual matters

- Their previous knowledge provides a **lens** through which new knowledge is understood.
- Different students may interpret the new information differently depending on their previous knowledge.
- “The world is round.”
  - Sphere?
  - Pancake?

# Teacher's Role

- Relate new knowledge to existing knowledge
- Provide active opportunities for students to integrate knowledge

# How does Constructivism fit into MDEL?



# Guided Reciprocal Peer Questioning

- Share with your neighbor some examples of constructivism in your education: 8 min
- Each person generates two or three thought-provoking questions about the material: 2 min
- Discuss those questions & identify any questions for class discussion: 5 min
- Class Discussion: 15 min
- Record your questions in Gradescope

# Breakout #1: Generic Questions

- What are the strengths and weaknesses of...
- How does ... affect ... ?
- Explain how ... helped you learn.
  
- What you are turning in:
- List of 2-3 questions with context for each
  - Related to either something that came up in discussion from people's experiences or from the readings themselves
- You may turn in as group or individual – your choice

# What is Active Learning?

Often very collaborative

Includes an assessment of the learning

More problem solving than passive learning

Reflection

Deliverable



# What is Active Learning?

- Really thinking about something (analyzing, synthesizing, evaluating) rather than passive (listening) or memorizing
- Results in new knowledge
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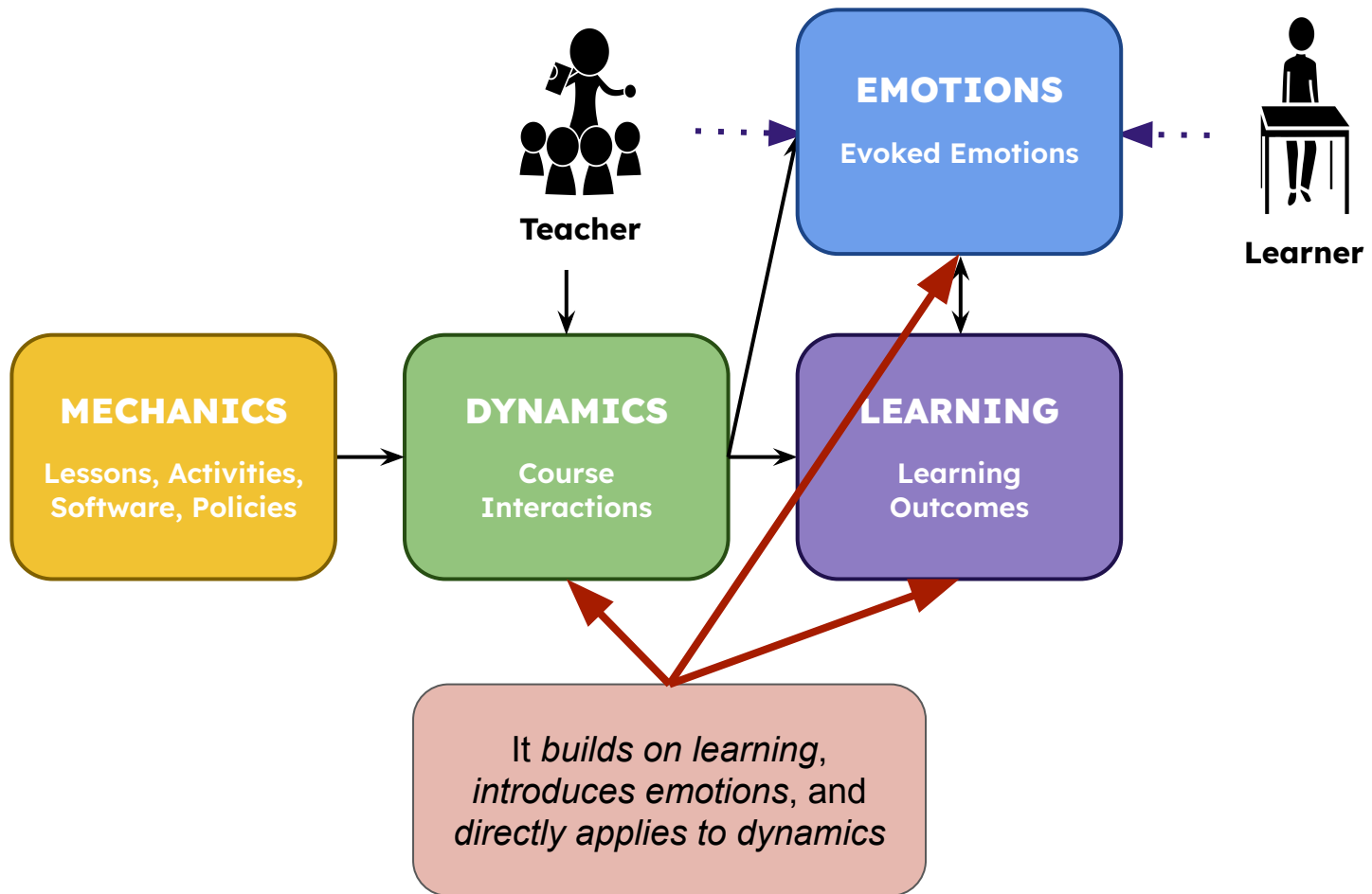
# Common attributes of Active Learning Activities

- Collaborative (because discussing your thoughts leads to deeper thinking)
- Concrete deliverable
- Some structure provided
- Reflective last step to explicitly integrate the observations in the active learning activity

# How does Active Learning occur?

- Through facilitated activities
  - Active learning rarely occurs spontaneously
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# How does Active Learning fit into MDEL?



# Constructivism vs Active Learning

- Constructivism is a theory of what happens in brain
  - Construct understanding and knowledge through **experiencing** things and **reflecting** on them
- Implies teaching strategies like active learning
  - Constructivism is still true whether or not learning is active
  - Requires reflecting beyond active learning

# Constructivism vs Active Learning

- Active Learning is a teaching strategy
  - Find ways to engage students in their learning
  - Give them opportunities to construct their own knowledge
  - On their own through structured tasks
  - In groups through discussions or structured tasks

# Guided Reciprocal Peer Questioning

- Share with your neighbor some examples of active learning in your education: 8 min
- Each person generates two or three thought-provoking questions about the material: 5 min
- Discuss those questions & identify any questions for class discussion: 5 min
- Class Discussion: 15 min
- Record your questions & answers

# Breakout #2: Generic Questions

- What are the strengths and weaknesses of...
- How does ... affect ... ?
- Explain how ... helped you learn.
  
- What you are turning in:
- List of 2-3 questions with context for each
  - Related to either something that came up in discussion from people's experiences or from the readings themselves
- You may turn in as group or individual – your choice



Warm Up:

Where did you go to high school?

How would you describe the environment around your high school?

How would you describe the environment within your high school?

When you walked into your first classroom, what do you see?

## Part 1:

There are two schools, School A & School B, in the same city.

There are the same number of kids who go to both schools.

In School A, every classroom has six boxes of school supplies, such as books, calculators, art supplies, and notebooks, to use when kids are learning.

In School B, every classroom has one box of school supplies.



School A



School B

**Why do you think School A has more supplies than School B?**

Part 2:

A **computer decided** how much supplies each school should get.

- a. What do you think of a computer making that decision?
- b. Why do you think a computer decided to give School A more supplies than School B?

Part 3:

School A is in neighborhood A and School B is in neighborhood B.

The **computer made its decision using this rule:**

*For every \$100 the neighborhood gives to the school, every classroom gets an extra box of school supplies.*

- a. What do you think of the rules the computer used?
- b. How do the rules impact different people?
- c. What are the pros and cons of using a computer to make that decision?

Part 4:

The **computer used historical data** about how much neighborhoods gave to decide that each neighborhood should give \$100 for each box of school supplies

- a. What do you think of the data that the computer used?
- b. How fair is it that the computer used historical data?  
Why?

Part 5:

The **team** who designed the data and rules that the computer used **was made up of all white people.**

a. What do you think of this team?

What if the team was made up of all black people?

b. What do you think of this team?

What if the team was made up of people from different races?

c. What do you think of this team?

What should the team look like?

d. Which team is the most fair? Why?

# Slow-Reveal Activity

**Was this realistic?**

Detroit schools

Local fundraising

Property taxes



# Reflect on Activity Design

What do you think the goal was?

How did the structure encourage you to think deeply?

Was the slow reveal useful?



# Slow-Reveal Activity

Goal: Help students think critically about how computers make “unbiased” decisions that affect populations differently

# Slow-Reveal Activity

How was constructionism used?

How was active learning used?

Interested in learning more?

ICER 2023 Best Paper: Jean Salac, et. al.

TED Talk: “Weapons for Math Destruction”