# Evidence Based Teaching Across Disciplines

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# Objectives and Outcomes

After attending this session, you will be able to:

- Describe the Scholarship of Teaching and Learning as an investigative process
- Identify evidence-based teaching practices that are appropriate across disciplines
- Explore ways to investigate evidence-based strategies

# *Poll: What is evidence-based teaching?

- List evidence based teaching strategies you've heard about or used.
- "the advice is supported by empirical research evidence showing how to help people learn" (How Learning Works)

# Why are we the teacher?
# What do we want our students to gain?

Experts vs Novices

- Meaningful patterns of information - chunking, making connections
- Organization of knowledge - concept map - how it's all connected, makes more connections,  organized by concepts not facts or memorization
- Context and Access to knowledge - know when knowledge is useful
- Fluent retrieval - allows quicker access to information (Think retrieval practice)
- Teaching  - Can you imagine what a novice knows and doesn't know?
- Adaptive expertise - approach learning flexibly, keep learning, recognize what you know and what you don't

Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people learn* (Vol. 11). Washington, DC: National academy press.

# Metacognition

- Thinking about our thinking

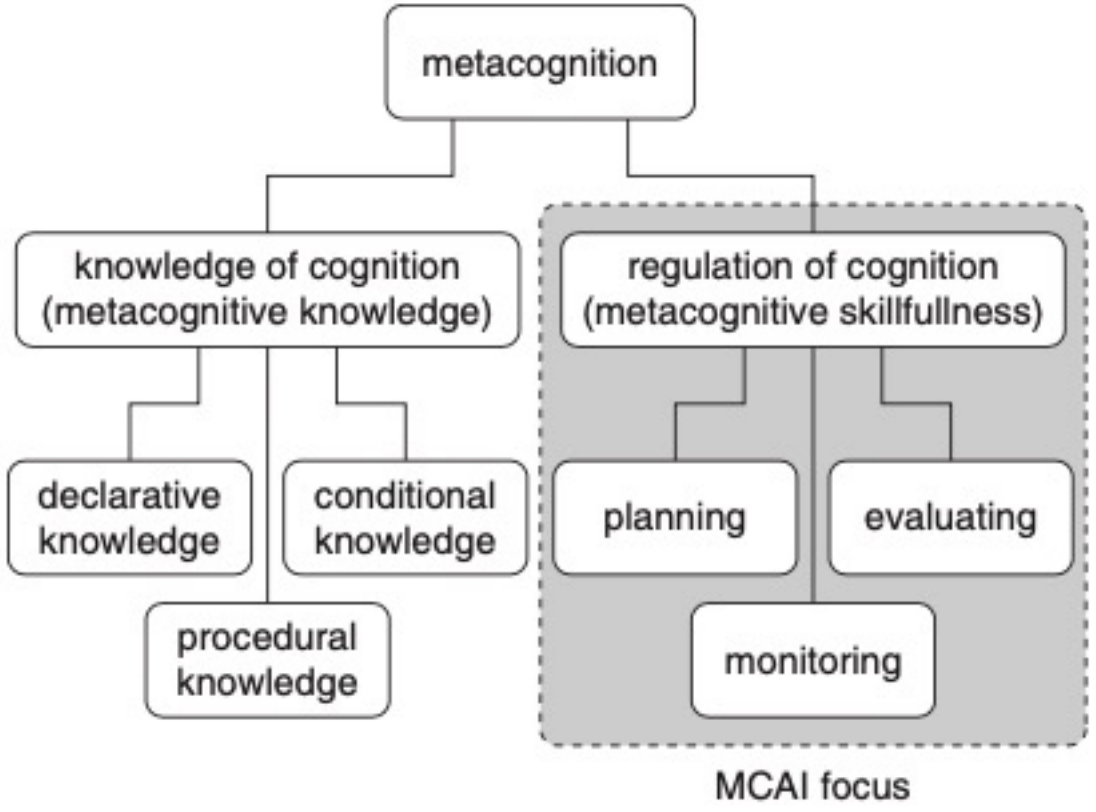


Figure 1. Components of the theoretical model for metacognition.

Cooper, M. M., & Sandi-Urena, S. (2009). Design and validation of an instrument to assess metacognitive skillfulness in chemistry problem solving. Journal of Chemical Education, 86(2), 240 – 245

# Transfer of Knowledge and skills in learning

- Mastery - how well do you know it?
- Understanding
- Feedback – relevant feedback to improve your understanding
- Motivation – why am I learning this?
- Context – What context is this information in?
- Representations – How can I show this information?

- Active vs Passive Approaches
  - How am I engaging students?
- Metacognition
  - How am thinking about what I'm doing?
- Previous Experiences/Knowledge
  - Do your students have the knowledge you think they might have?
- Cultural practices
  - Different cultures may learn different ways

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# *Retrieval Practice

- Write down 2 things you remember from the last few slides. Ideally it should be in sentences, but you can start with two short phrases.

# Basics of Human Cognition

- Perception: students bring different previous knowledge and experience to the classroom
- Attention: how do we keep students' attention?
  - Cognitive Load Theory: our working memory can only handle so much at one time, affects learning
  - Only so much attention
  - Affected by interest, length of time, type of task, difficulty

Weinstein, Y., Sumeracki, M., & Caviglioli, O. (2018). *Understanding how we learn: A visual guide*. Routledge

# Basics of Human Cognition

- Memory:
  - not a library,
  - reconstructive
- How do we get information into long term memory: encode, consolidate, storage and retrieval.

Weinstein, Y., Sumeracki, M., & Caviglioli, O. (2018). *Understanding how we learn: A visual guide*. Routledge

# *Breakout Rooms: Group Chat (5 minutes)

- Talk about the ideas from the previous slides.
- Choose one person to be spokesperson

1. How do you think these concepts relate to how you teach?
2. Provide at least one example from your course.

Report out:

Each group – 1 minute

# How do we use this knowledge about human learn to our advantage (and our students) in the classroom?

Strategies for Effective Teaching

# Strategies for Effective Teaching

From Understanding how we learn

And Powerful Teaching

- Retrieval Practice
- Spaced Practice
- Interleaving
- Dual Coding
- Concrete Examples
- Elaboration
- Feedback Driven Metacognition*

How learning Works:

- Concept Maps
- Peer Review
- Self Reflection
- Scaffolding
- Exam Wrappers
- Jigsaw

# Report Out on Strategies

Each group 2 minutes

1. Describe the 1-2 practices
2. What types of activities might you incorporate?
3. How could you demonstrate this in your classroom?
4. Provide one example of how you think this might work in the classroom.

# What is SoTL?

- Scholarship of Teaching and Learning
- Explain the process of how to do a project – steps, provide a handout
- “treating teaching as a form of inquiry into student learning” (Williams, 5-6)
- SoTL is reciprocal
- goals of SoTL include learning something about our classroom that we didn’t know before, thereby helping faculty implement new strategies to foster student learning
- Can be a small change!
- Have you ever tried to do “research” in your classroom?

# Short presentation by someone who has done SoTL.

- Dominique Svarc – Accounting - Dual coding – stories to understand terminology in accounting
- Julie Jordan – Math  - retrieval practice
  - Frequent low-stakes quizzing
  - Helped students who participated
  - Data: quiz scores
- Faiza Ashgar – Chemistry, retrieval practice.
- Robert Allare – History, spaced practice
  - Quiz students twice on the same topic
  - Does it affect students' understanding of the topic?

# *Poll

- Poll: Based on what you learned here, what type of question might you ask about your course?

# How to do a research project!

1. Identify an area of interest in your classroom, start small!
2. Develop a research a question
3. Do a literature review. – has someone else done this before?
4. Choose a design and types of data to be collected
    1. Qualitative – Perceptions of your classroom, how do students perceive strategy?
    2. Quantitative – specific changes, how does strategy impact student scores?
5. Collect data
    1. IRB? If your research project is only internal use, no need, but if you intend to present at any time, you will need approval
6. Analyze data
7. Draw conclusions, write a report
    1. Generalization, Bias?
8. Present and show others what you've done!

# Types of Data

- Surveys – example – mid term survey
- Tests – from the course, or a specific question
- Interviews
- focus groups
- artifacts
  - papers,
  - lab reports,
  - assignments from students

# Assessment

- Analyze data
- Look for trends or patterns in the data
- Quantitative data: look at changes in test scores
  - May require statistics to look for significant difference
- Qualitative data: look for themes
  - Interviews, open ended question

# *With your group: Create a plan (15 minutes)

- Describe your question and the teaching strategy you might use
- How might you use this strategy in your classroom to investigate your question?
- Will you implement it for one unit? One assignment, or the remainder of the semester?
- What data might you collect to learn if your strategy had an impact?
- How will you analyze your data?

# *Poll: Reflection on Bias?

- What impact might you have by doing research on your students?
- What bias might you have?

# You are part of a community - Present your research

- Present at Harper Assessment Fair
- Department Meeting
- Discipline Specific Conferences
- Lilly Conference

- Peer Reviewed Journals
- Journal of the scholarship of teaching and learning
- Journal of excellence in college teaching
- International journal for the scholarship of teaching and learning
- Miami conference