APPLYING RESEARCH ON METACOGNITION IN THE CLASSROOM

Carolyn Dufault, Ph.D.,
Washington University School of Medicine
Define metacognition and explain its importance in teaching and learning.

List three fundamental principles for successful instruction in metacognition.

Describe specific ways to integrate metacognition activities into your classroom.

By the end of this session, participants should be able to...
Metacognition — what is it?

- Is metacognition the same as reflection?
  - Think, pair, share!

- Metacognition — Thinking about thinking
  - “Metacognition refers to one’s knowledge concerning one’s own cognitive processes and products or anything related to them.”

- Reflection — May constitute a moment or type of metacognitive activity — and often used synonymously with metacognition.

Flavell, 1976
Retrieval Practice and Metacognitive Errors

Roediger and Karpicke, 2006
Proposed framework for studying and implementing strategies to improve metacognitive accuracy includes:

- Planning
- Monitoring
- Evaluating

Schraw, 1998
Planning
Tasks?
Goals?
Strategies?

Monitoring
What am I doing?
On track?
Changes needed?

Evaluating
Goals reached?
What worked?
Next time?

Adapted from Schraw, 2001 and LaVaque-Manty, 2013
Metacognition in the Classroom

Example 1

Introductory Biology
Critical Thinking and Metacognition

- Example from Introductory Biology course
  - Duke University undergraduates
  - Developed “Critical Thinking in Biology” module
- Students’ learning objectives:
  - Describe a strategy for approaching scientific questions
  - Describe the structure of exam questions that address critical thinking (CT)
  - Apply improved understanding to new CT exam question
  - Analyze own answers — and those of peers — to identify weaknesses in critical thinking

Lemons et al., 2013
Step 1: Analyze structure of scientific questions

- Take-home genetics assignment
- Set of progressively more complex questions
  - First, foundational knowledge (correctly read a genetic pedigree, understand key genetic terms.)
  - Next, apply knowledge to determine inheritance patterns and to formulate an argument to explain observed pattern
- Assignment included guiding material on how to answer the questions.
- Students were given information about why and how to connect foundational knowledge to higher-order reasoning.

Lemons et al., 2013
Step 2: Analyze structure of answers to scientific questions

Students evaluated essays of varying quality with a set of guiding questions

“Many students presume that a best response strategy is to relate everything they know about a subject figuring the odds of getting the right answer will improve with increasing amounts of text.”

Students then evaluated their own essays with same guiding questions

Lemons et al., 2013
Metacognitive Lab Module Design

- Step 3: Apply and transfer understanding to a new scientific problem
  - Answered new question about genetic drift and scrub jays in the United States
  - Exchanged answers for peer-evaluation of responses with a rubric
  - Promoted metacognitive awareness of difference between content knowledge and correct reasoning

Lemons et al., 2013
Step 4: Reflection on classroom exercise

Structured discussion about strategies:

- “How did you approach answering the questions you were given in class today? Could you have found the answers in a textbook?”
- “What are some of the thinking skills you had to use while you were answering the questions?”
- “Did you need to recall information, explain, apply, analyze, or evaluate?”

Lemons et al., 2013
Critical Thinking and Metacognition

- Key Findings and Lessons Learned
  - Compared assignment to similar mid-term question
    - No difference in content accuracy
    - Improvement in average critical thinking scores
  - Student resistance to metacognitive instruction – outside of scope of subject?
    - Suggest metacognitive instruction become a regular part of course, not a one-time offering
  - Would this method work in your course? Why or why not?

Lemons et al., 2013
Metacognition in the Classroom
Example 2

Writing-Intensive Political Science and Psychology Courses
Instructors’ goal: Improve students’ understanding of their writing process

- Targeted reflection on planning, monitoring and evaluation stages.
  - Planning: Guided reflection on what was already known and what was needed to complete assignment
  - Monitoring: Students provided “think-aloud” comments in the margins of their texts.
  - Evaluating: Students summarized what worked, what didn’t and what they planned to do next time.

LaVaque-Manty & Evans, 2013
Targeted Reflection in Writing

- Key Findings and Lessons Learned
  - Students enjoyed in-class discussion of similarities and differences between planning and evaluation strategies.
  - Students acquired new vocabulary for peer-review.
  - Metacognitive intervention required “considerable time” for instructors to introduce and explain:
    - Notes on the syllabi
    - Lecture slides and discussion
    - Handouts
  - Would this method work in your course? Why or why not?

Lemons et al., 2013
Planning
- Tasks?
- Goals?
- Strategies?

Evaluation
- Goal reached?
- What worked?
- Next time?

Monitoring
- What am I doing?
- On track?
- Changes needed?

Adapted from Schraw, 2001 and LaVaque-Manty, 2013
Metacognition and Instruction

Three fundamental principles for successful metacognitive instruction:

1. Embedded instruction
2. Informing learners about metacognitive activities
3. Frequent, spaced metacognitive activities

(Veenman, Van Hout-Wolters, Afflerback, 2006)
Contact Information

Carolyn Dufault, Ph.D.
Education Specialist
Washington University School of Medicine

defaultc@wusm.wustl.edu

http://wusmeducation.wusm.wustl.edu/Pages/Welcome.aspx
New Pedagogies and Practices for Teaching in Higher Education

using reflection and metacognition to improve student learning

Across the Disciplines, Across the Academy

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