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**Cognitive Wrappers**

Using Metacognition and Reflection to Improve Learning

**A. Research on Learning**

Our knowledge of intelligence, learning, the brain has exploded in the last 30 years. One of the most important discoveries is that metacognition or “thinking about your thinking” can improve learning: students with math anxiety who write about it before the exam, perform better than those who just take the exam. Metacognition and reflection can be used to improve study habits and exam performance, but they are essential if we are to create critical thinkers.

From Socrates “self-examination” to William James’ “introspective observation” and Jean Piaget’s “directed thought” self-regulation is the foundation of critical thinking. In *How We Think* (1910), John Dewey describes it as “*Active, persistent and careful consideration of any belief or supposed form of knowledge in light of the grounds that support it, and the further considerations to which it tends*.” (p. 6) For Dewey, our job is to find problems and “forked-road situations.” The critical thinker will be able “to maintain the state of doubt and to carry on systematic and protracted inquiry.” (p. 13). This “tolerance for ambiguity” is highly desired by employers and the ability to hold two opposing ideas at once without making up your mind would make an excellent graduation requirement.

Self-regulation, however, begins with self-awareness, noticing and active-monitoring. The Illinois Initiative on Transparency in Learning and Teaching has demonstrated that discussing the rational of assignments, connecting “how people learn” data with activities and debriefing grades, tests and assignments in class, significantly improve student learning, increase retention and are especially beneficial to under-represented groups, transfer students and non-traditional students. Learning or cognitive wrappers, provide a quick and easy way to improve student learning, connect learning and thinking habits across disciplines

Note that metacognition is a complex set of skills including self-awareness (knowing your strengths and weaknesses), understanding learning goals, planning an approach to learning, monitoring, evaluating performance, reflecting and adjusting. Metacognition (like critical thinking) is often discipline specific and is best learned with subject content: generic study skills courses have not proven effective. Repeated exposure to transparently announced and labeled critical thinking in different contexts, however, greatly helps students to create more transferrable thinking skills.

John Dewey (1910), *How We Think*, Boston: Heath.

Marsha C. Lovett, (2013), “Make exams worth more than grades: Using exam wrappers to promote metacognition” in *Using reflection and metacognition to improve student learning*, Kaplan, m, Silver, N, Lavaque-Manty, D., Meizlish, D., ed. San Francisco: Sterling, VA: Stylus. [www.learningwrappers.org](http://www.learningwrappers.org)

Mary-Ann Winkelmes (2013), “Transparency in teaching: Faculty share data and improve students’ learning” *Liberal Education* 99/2 (Spring 2013), 48-55. See also Illinois Initiative on Transparency in Learning and Teaching, for <http://go.illinois.edu/transparentmethods>

**B. Wrapper Basics**

Wrappers are a very short survey (online or a single sheet of paper) given to students with assignment or exam feedback. They consist of four parts:

**Rationale**: This is only to help you improve.

**Reflection**: How did you prepare for this exam?

**Comparison**: What kinds of mistakes did you make?

**Adjustment:** How will you prepare differently next time?

Wrappers work best when they are discipline specific, but used *simultaneously* in *different* contexts in *different* classes. How is studying for an art history exam different than practicing for a lesson or doing calculus homework? Students need *both* to understand that (a) self-regulation is a part of improving each of these activities and (b) the adjustments will be different for each type of learning.

Wrappers should be brief, easy, flexible and specific to both the discipline and the specific task at hand. The idea is to help students understand that *they* need to understand their strengths and weakness, assess their own performance, identify strategies that work *for them* and make adjustment. This self-regulation is important for its own sake, as a performance enhancer, but also as a key element of critical thinking.

**C. Template**

Here are questions for multiple situations. This needs to be short, so please only select one of each type of question and tailor to your unique situation. More templates (math and science) at [www.learningwrappers.org](http://www.learningwrappers.org)

**Rationale:**

This assignment/activity/exam and this feedback was designed to help you/give you practice/improve your… XYZ (achieve what learning outcome?) (So do the activities and feedback really support the goal?)

This form will help you evaluate your own preparation and performance for this assignment/exam/lesson/activity/class session and allow you to adjust your study/practice habits in the future. Your responses will have no effect on your grade and are solely to help you improve. Being brutally honest with yourself here is a useful and important part of self-examination

Ask in advance (i.e. give the wrapper with the homework):

The goal of this assignment/homework/reading/exam is to give you practice with X or to help you analyze your Z. Before you begin, rate your awareness of Y or think about Z.

This form is designed to help you prepare more fully for class. Did you participate fully in class today?

**Reflection**:

1. How much total time did you spend preparing (or writing/reading/reviewing)?

2. When? How did you spread out your preparation?

2. How did you prepare for this exam/lesson/activity/class session?

2. How much time did you spend reviewing X, Y, or Z?

2. What % of your preparation was done alone/groups?

2. What % of your preparation time was spent on each of these activities?

 Reading textbook section(s) for the first time \_\_\_

 Re-reading textbook section(s) \_\_\_

 Reading/studying other materials \_\_\_

 (From where?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)

 Re-reading and taking notes \_\_\_

 Finding online content \_\_\_

 Thinking \_\_\_

 Preparing \_\_\_

 Researching \_\_\_

 Drafting \_\_\_

 Editing \_\_\_

 Brainstorming or Conceptualizing \_\_\_

 Experimenting \_\_\_

 Sharing Ideas with others \_\_\_

 Practicing technique \_\_\_

 Working on new material \_\_\_

 Focusing ideas \_\_\_

 Solving problems for practice \_\_\_

 Reviewing homework solutions \_\_\_

 Reviewing your own notes \_\_\_

 Reviewing concepts and ideas \_\_\_

 Reviewing other materials (which?)  \_\_\_

 Other  (Please specify: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ )

**Comparison**:

Now that you have listened to my feedback, the feedback of your classmates, looked over your graded exam, read my response to your paper etc.

3. What kinds of mistakes did you make?

3. Estimate the points you lost due to

 Trouble understanding a concept (or list specific concepts) \_\_\_

 Trouble remembering lines/formulas/structures \_\_\_

 Trouble with definitions \_\_\_

 Trouble with technique \_\_\_

 Not concentrating/focused enough \_\_\_

 Careless mistakes \_\_\_

 Lack of preparation \_\_\_

 Not being able to formulate an approach to the problem \_\_\_

 Arithmetic/grammatical errors \_\_\_

 Unclear expectations \_\_\_

 Reviewed the wrong material \_\_\_

 Not practicing enough \_\_\_

 Anxiety (and specifically over what?) \_\_\_

 Other \_\_\_

3. After having completed this assignment, rate each of the following statements in terms of how true it is for you on a scale from 1-5

 (similar list)

**Adjustment:**

4. Name at least three things you will do differently next time in preparing. Be specific. For example, will you spend more time, start your preparation earlier, change a specific study habit, try a new one (if so, try to name it), sharpen some other skill (if so, name it), participate in more review opportunities or something else?

4. What study /practice strategy worked best/worst?

4. Students sometimes have difficulty drawing appropriate force-body diagrams and applying Newton’s second law appropriately. Was either of these a difficulty for you (check question 2 on the exam)? If so, try to self-assess your understanding: Identify what aspect of these skills are causing you difficulty and what you can do to improve your ability to solve problems using these skills.

4. What aspect(s) of your preparation for this exam/session seemed different from your exam/session 1 preparation? Did these changes have any effect?