



## DUNNING-KRUGER EFFECT

Example problem:

Imagine that an illustration represents a curved tube lying horizontally on a table.

Identify the trajectory a ball would take after it had traveled through the tube.

When looking only at the confidence of people getting 100% vs. 0% right, it was often impossible to tell who was in which group.

Williams, Dunning, Kruger, 2013, Journal of Personality and Social Psychology, v. 104(6), p.976-994  
Pacific Standard Magazine, We are all confident idiots, David Dunning, October 27, 2014

## IMPORTANCE OF STUDENT REFLECTION

Students completed a task (e.g., logical reasoning test) and estimated how their score would compare with other students.

Low scoring students

- overestimated their own skill level
- failed to recognize skill in others
- failed to recognize the degree of their insufficient knowledge
- recognized their lack of skill, *only if they were trained to improve*

Dunning et al., 2003, Current directions in psychological science, v.12 #3, p.83-87

Which of the following study strategies do your students use most frequently? (Pick 3)

1. Self-explanation - explaining part(s) of their learning process, thus merging new information with prior knowledge
2. Summarization - writing a summary of material from class or readings
3. Practice testing - practice activity completed outside of class, can involve practice problems or even simple flashcards
4. Highlighting, underlining what they determine to be the important parts of the text as they read
5. Rereading - reading material that they have already read at least once before
6. Retrieval practice - reviewing material, practicing recall and retrieval of material by writing down as much information as possible
7. Distributed practice - distributing learning over time, typically days apart
8. Keyword mnemonic - associating an image that has some easily recognizable relation to the word that they are trying to remember

Dunlosky et al., 2013, Psychological Science in the Public Interest, v.14, #1, p.4-58.

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2, 4, 5, 8 → little evidence of consistent learning  
1 → moderate evidence of learning  
3, 6, 7 → considerable evidence of effective learning

Dunlosky et al., 2013, Psychological Science in the Public Interest, v.14, #1, p.4-58.

## WHY DOES FORMATIVE ASSESSMENT WORK?

Students completed a short reading assignment. Group X studied the passage twice (7 minutes each time). Group Y studied the passage once (7 minutes) and then took a recall test. Two days later, both groups were tested on their recall of information. Predict the result.

- A. Group X scored higher on the test.
- B. Group Y scored higher on the test.
- C. There was no difference in test score.

Roediger & Karpicke, 2006, Perspectives in Psychological Science, v. 1, p.181-210.

## “TESTING”-ENHANCED LEARNING

120 college students complete a reading assignment (~250 words)

- Group X studied the passage twice (7 minutes each time)
- Group Y studied the passage once and then took a test
- Both groups then tested at 5 minute, 2 day, and 1 week intervals
- Group Y retained more knowledge after 2 days, 1 week

Roediger & Karpicke, 2006, Perspectives in Psychological Science, v. 1, p. 181-210.

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## RETRIEVAL PRACTICE

### WHAT IS RETRIEVAL PRACTICE?

- Review material for initial study period
- Put material away and on a blank piece of paper practice retrieval by recalling and writing down as much information as possible.
- Review material and practice retrieval again
- Do it the first time during or within a few hours of original lesson
- Repeat retrieval process at regular intervals prior to exam (e.g., weekly)
- Strengthened by interleaved practice?

## MODELING RETRIEVAL PRACTICE

Model student learning strategies in class a few times before expecting students to do them on their own

- Practice retrieval by recalling and writing down as much information from today's lesson as possible.
- Compare your notes to those of your neighbors, add any missing items.

## STRATEGIES THAT SUPPORT STUDENT LEARNING

### Create an environment that fosters learning to learn<sup>1</sup>

- Encourage self-comparison over social comparison (e.g., reflective prompts, exam wrappers)

### Provide opportunities for students to self-evaluate their learning

- Mastery Quizzes
- Knowledge Surveys
- Learning Journals
- Exam Wrappers
- Reading Reflections
- Minute papers

<sup>1</sup>Based on research findings from Zimmerman, B. J. (1989); Kaatje Kraft, pers. comm.

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## MASTERY/PRACTICE QUIZZES

Low stakes or no stakes online quiz intended for students to practice answering questions on key concepts.

- Uses a databank of questions that are selected by random or semi-random process
- Can be taken for no grade or can be taken multiple times with only highest score to count
- Allows students to become familiar with new vocabulary and concepts
- Students can identify challenging or easy concepts, become more strategic in allotting study time, effort

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## KNOWLEDGE SURVEYS

Students complete a knowledge survey before and after a lesson, module, or part of a course

- Survey questions may focus on content and/or tasks representing different levels of Bloom's Taxonomy

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## KNOWLEDGE SURVEYS EXAMPLES

### Continental drift

0. I don't know what this is.
1. I have heard of this but I can't describe it.
2. I can give a general description of this.
3. I can give a description of this and how it relates to Pangaea.
4. I can explain this and describe the observations used by Alfred Wegener to describe the assembly of Pangaea.

*How confident are you that you can explain Wegener's continental drift hypothesis and his supporting observations. (Place a mark along the line to indicate your level of confidence.)*

Not confident ←————→ Very confident

*How confident are you that you can explain Wegener's continental drift hypothesis and his supporting observations.*

Not confident 1 2 3 4 5 6 7 Very confident

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## READING REFLECTIONS

After completing the reading assignment, write brief responses (i.e., at least several sentences) to 2 out of 3 questions:

1. What is the main point of this reading?
2. What information did you find surprising? Why?
3. What did you find confusing? Why?

K. Wirth, <http://serc.carleton.edu/NAGTWorkshops/metacognition/activities/27560.html>

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## MINUTE PAPER/MUDDIEST POINT

A short informal writing assignment that typically occurs at the end of a lecture. Write for one minute on the following question:

What is the most important concept that we discussed today?

OR

What was the most confusing point presented in today's lesson?

OR

What one idea that we talked about today in class most interested you and why?

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## LESSON DESIGN

Review the lesson design rubric and the information you have already created on your topic.

Fill in information to outline a complete lesson that includes:

- *Preclass assignment*
- *Learning objectives*
- *Formative assessments*
- *Instructional strategies*
- *Metacognition activity*

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## DAY 3 WORKSHOP OBJECTIVES

*How confident are you that you are able to:*

1. *Describe the characteristics of a "high structure" course*
2. *Reorganize their course to adopt a version of the "flipped" class format*
3. *Explain the Dunning-Kruger effect*
4. *Describe the characteristics of less effective and more effective examples of student study strategies*
5. *Create assignments that could be used in their own classes to help students assess their level of knowledge*

Not at all confident 1 2 3 4 5 6 7 Very confident

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## WORKSHOP GOALS

*How confident are you that you are able to:*

1. Identify the key ingredients of an effective course that promotes student learning.
2. Generate a sample lesson that is reasonable in the context of your course and doesn't significantly increase preparation time and grading load.
3. Leave with a template for redesigning lessons that includes strategies to enhance learning before, during, and after class.

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## POST KNOWLEDGE SURVEY

*How confident are you that you could create a lesson on a topic that would maximize student learning across a range of populations?*

Not confident   1   2   3   4   5   6   7   Very confident

Any Questions?

