Misconceptions about Learning

Framing the Active Learning Classroom

Objectives

To persuade students that they have misconceptions about learning, and that they need to change the way that they study.

Activities

The following is excerpted and paraphrased without permission from the article cited at right. Materials for running the activity are included in the archive.

I pose the following question to the students:

Which of the following is the MOST important ingredient for successful learning?

1. The intention and desire to learn
2. Paying close attention to the material as you study
3. Learning in a way that matches your personal learning style
4. The time you spend studying
5. What you think about while studying

(Note that this could be used as a clicker question). Usually most of the group is split among alternatives one through four, with relatively few people choosing five.

Instead of telling the group the correct answer, I let them discover it through a demonstration of levels of processing and learning.* Students listen to a list of words. For each word, they carry out an orienting task that creates either deep or shallow processing:

- One group rates the pleasantness of each word ("Is the word pleasant?"
- Another group checks each word for the presence of an E or G ("Does the word contain an E or G?").

The group that did pleasantness ratings, the deeper processing orienting task, virtually always remembers strikingly more words.

For large groups, say over 40, I use a 2 × 2 between groups factorial design with levels of processing (deep or shallow) as one variable and intent to learn (intentional or incidental) as the other. Before the presentation, I divide the room into quadrants and assign conditions to each one. Everyone in a quadrant gets the handout for the assigned condition. In addition to instructions, each handout has a grid with 24 rows of two columns, one column is headed "Yes" and the other "No." I then read the list of 24 words shown in Figure 1. For each word, everyone carries out their assigned orienting task by checking the "Yes" or "No" box after each word.

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Materials & Resources

Materials are included in the downloaded archive.

From article, "Improving classroom performance by challenging student misconceptions about learning," S. L. Chew, APS Observer, 23(4), April 2010. Online at http://bit.ly/oFEkRu.

See original article for citations mentioned within.

See also the author's popular "How to Get the Most Out of Studying Video Series: http://bit.ly/nxKAuy

Classroom Context

Psychology course, but broadly applicable.

Time Requirement

20 minute

Group 1: Memorize + Rate Pleasantness	Group 2: Memorize + Check for E, G
Group 3: Don't Memorize + Rate Pleasantness	Group 4: Don't Memorize + Check for E, G

Word list for demonstration:

(1) Evening	(13) Cold
(2) Country	(14) Love
(3) Salt	(15) Bargain
(4) Easy	(16) War
(5) Peace	(17) Hate
(6) Morning	(18) Wet
(7) Pretty	(19) Rich
(8) Expensive	(20) Nurse
(9) Poor	(21) Pepper
(10) Doctor	(22) Hard
(11) City	(23) Ugly
(12) Dry	(24) Hot

After I present all the words, I ask everyone to recall as many words as they can, which always elicits groans from the incidental learning groups not forewarned about the recall test. Lastly, I have students count the total number of words they recalled; I do not check for accuracy of scoring.

Next, I explain levels of processing, orienting tasks, and the four conditions. I then describe three hypotheses about how the results might turn out. First, if intent to learn is critical, then those who were forewarned about the recall test (the two Intentional groups) should do better than those who were not (the incidental groups), regardless of level of processing. Second, if depth of processing is important, then those who rated the pleasantness of words (the two deep groups) should recall more than those who did E/G checking (the shallow groups), regardless of whether they knew about the recall test. Third, if both level of processing and intent to learn are important, then the group that did pleasantness ratings and was warned about the recall test (the deep/intentional group) should do better than the other three conditions. I survey the students to see which hypothesis they believe will be supported. Usually the vote is split, with a preference toward the joint effects of deep processing and intentional learning.

Everyone is now eager to see the results. For large groups, I have everyone stand. I instruct people to remain standing if they recalled at least three words and sit down if they did not. I then ask about six words and proceed upward by threes. People will start sitting down starting at nine, and it becomes obvious at about 12 to 15 that the shallow processing groups recalled very few words, regardless of whether they were warned or not. The majority of people standing did deep processing, and there should be equal numbers of people who were warned or not warned about the recall task. The results show that level of processing is much more important than intent to learn.

The intent to learn with shallow processing leads to poor performance, whereas deep processing without the intent to learn still leads to good recall. I ask if people noticed the words were in pairs. The deep processing groups invariably notice it and use it in recall. People in the shallow processing groups often do not notice it at all.

About this Project

This is one of a set of materials compiled for instructors to draw upon in order to frame non-traditional modes of classroom teaching for their students. Our hope is that these materials can help reduce any student resistance to such techniques.

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Other materials available online at www.colorado.edu/sei/fac-resources

After the demonstration, we return to the question regarding the most important ingredient for successful learning. The levels of processing demonstration showed that the desire to learn, paying close attention, and the time spent studying may be necessary, but they are not sufficient for learning. The shallow and deep processing groups were matched on time and attention. The third alternative addresses learning styles because many students believe in them, such as being a visual or kinesthetic learner, but current formulations of learning styles have weak if any research support (Coffield, Moseley, Hall, & Ecclestone, 2004). That leaves alternative five, what a student thinks about while studying, as the correct answer. Time studying and intent to learn are only effective if they cause students to use deep processing during study. Students may spend a huge amount of time studying and be highly motivated, but if they use shallow study strategies, they will not learn. Many entering students have ineffective, shallow study strategies, such as rote memorization of isolated facts.

** In the Levels of Processing framework, memory is conceptualized as a continuum of levels going from shallow to deep (Craik, 2002). Depth of processing depends on how a learner encodes or rehearses information. Shallow levels involve encoding of meaningless physical characteristics such as spelling or font. Intermediate levels involve acoustic information such as rhymes. Deep levels involve distinctive semantic analysis. The deeper information is processed, the more likely it is to be recalled later. Although the Levels of Processing framework is no longer considered a viable model of memory, it still serves as a powerful heuristic for helping students to improve their study effectiveness.*

Effectiveness

Uncertain, but developed by U.S. Professor of the Year in 2011. An instructor in economics (Bill Goffe) mentions that this did not have a large impact in his own class, and hypothesizes that it is important to draw the results of the experiment back to ideas about studying, spending more time on reflection. Nathaniel Lasry used this in a workshop with adult learners, and reports that it was incredibly effective. Stephanie Chasteen used this in a non-majors physics course, and students seemed to have difficulty understanding the point of the exercise – considering how to present and make sense of the results is important.