

**Teaching Narrative on Group Learning in the Classroom: Daily Group Quizzes**

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*Teaching Goal:* To increase the amount of active learning done during class in my BIOL210 Cell Biology course and to encourage students to read the text assignments before class. This core course for the biology major includes many abstract concepts and as a pre-req for 11 other courses, it's critical that students also master the course vocabulary. I'd tried one-minute papers at the end of class and weekly summary statements, but both these options allow students to avoid reading the text assignments before coming to class.

*Description:* The following is from the course syllabus. I have also attached a copy of the first DGQ from this term.

Daily Group Quizzes:	<p>I'm using this active learning method for the 4th year-- it was originally developed by professors at other small colleges. DGQs are a way to get students to stay on top of the readings while simultaneously helping them learn to <b>use</b> the material. The first 25 minutes of <u>each</u> non-exam class period (starting week 2) will be group quiz time. Students will work in pairs or trios to complete a quiz on material from that day's reading assignment and the format will include double-tiered multiple choice and fill-in-the-blank questions. <b>BONUS FEATURE:</b> When they hand in a completed copy of the quiz, each group can identify <b>2</b> questions they want to look up in the text -- I will give them another copy of the quiz and they have 5 minutes more to review the material and submit a revised answer if they wish.</p> <p>Students in a group may confer over the answers -- in fact, quiet discussion is encouraged! However, yelling answers aloud or performing other suggestive signaling behaviors will result in a failing grade for the entire class for that quiz. Finally, the same students may not work together on more than half the daily quizzes -- in this way you'll learn to communicate w/ at least 2 of your peers. I will drop the lowest 3 quiz grades for each student at the end of the term to compensate for illness and other absences. There are no make-up quizzes.</p>
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*Comments:* A student's average score on the Daily Group Quizzes (minus the three lowest) accounts for 15% of their class grade. On the first day of class, I introduce the idea of active versus passive learning and cite research showing that active learners retain more of the information they learn during a term and then I introduce DGQs as an active learning method. I remind them during the term that DGQs are not used to to assess their knowledge (exams are for that), but DGQs evaluate how well prepared they are for class and give them practice using the terminology.

*Comments cont'd.:* Since I first started using DGQs in 2004, many students have complained on their SRIs about having to read the book, but many times these complaint are followed with "I never realized how much I could learn from reading the book" or "This is the first class that I ever read all the assignments for." I have anecdotal evidence that students are retaining more material, or at least recognizing it more often in upper-level courses, given a noticeable increase in unsolicited comments to this effect from students in the past four years (I've taught the course for ten years total).

I modified the DGQ format in 2006 by allowing each group to turn in a completed quiz within the first 20 minutes of class with the two questions they are least sure of marked. I give them a second copy of the quiz and they have 5 more minutes to look up the concept in their books – no notes, books only. They can revise their answers if they wish or leave them as is – if they had a correct answer and don't change, they receive full credit; if they were correct and change to an incorrect answer, they lose half credit; and if they were wrong and change to a correct answer, they get full credit. Even with this "bonus," DGQ averages tend to be around 83% overall for the class (with the three lowest dropped).

This idea comes from the book *The Art of Changing the Brain*, by James Zull, a neurobiologist at Case Western Reserve University whose research seeks to explain the connection between brain structure, brain physiology, and learning. Zull suggest that the brain chemistry at the moment when someone thinks they might be mistaken is poised for learning, but that this critical moment is fleeting. He suggests that these teachable moments should be used when possible – that by the time an exam is graded and returned, the brain chemistry for cementing that concept is no longer poised in just the same way.

I'm attempting to use this teachable moment by asking students to decide as a group what they are least sure of and then have them immediately check those answers in the text. This process seems to work well as both a morale and discussion booster: stop by my class sometime and listen to group members actively explaining their reasoning to their peers. I especially like it when a group member strides confidently to the front of the room with the initial quiz and says his/her group is only going to look up ONE question today!

Finally, I return graded quizzes first thing the next class period and make sure that everyone gets a copy of the quiz – which they can then use for review before the exam.

#### Selected References:

Swiderski, S. 2007. *Active Learning: A Perspective from Cognitive Psychology*, in *The Teaching Professor*, March, p 7. <http://cte.udel.edu/PDFs/TeachingProfessor/TP0703.pdf>

Zull, J. 2002. *The Art of Changing the Brain: Enriching the Practice of Teaching by Exploring the Biology of Learning*. Stylus: Sterling, VA.

**Daily Group Quizzes:  
Appendix A**

BIOL210 Group Quiz #1  
9-3-2008

Names: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Your names signed above confirm that: "In compliance with the Augustana Honor Code, we have neither given nor received unauthorized aid on this piece of work."

For # 1-6: Choose the single best answer and place its letter in the blank to the left of the question.

- \_\_\_\_ 1. Which of the following best describes the bonds between Hs and Os in water?
- a) Intermolecular hydrogen bonds in which oxygen has possession of the e<sup>-</sup>s most of the time.
  - b) Intramolecular covalent bonds in which oxygen has possession of the e<sup>-</sup>s most of the time.
  - c) Intramolecular covalent bonds in which hydrogen and oxygen share e<sup>-</sup>s equally.
  - d) Both a) and b).
- \_\_\_\_ 2. The types of bonds described above that are present between Hs and Os in water give water the ability to:
- a) dissolve polar substances through hydrogen bonding.
  - b) interact with charged portions of hydrophilic molecules.
  - c) readily change pH when acids or bases are added to it.
  - d) all of the above.
- \_\_\_\_ 3. Which of these terms best describes a fatty acid that contains **at least one** C=C (carbon-carbon double bonds)?
- a) polar
  - b) lipid
  - c) saturated
  - d) unsaturated
- \_\_\_\_ 4. Which of the following describes the function of fatty acids having the structure detailed above (e.g., containing **at least one** C=C)?
- a) Fatty acids like this have kinks in their tails, which prevents them from packing closely: fats like this stay fluid at cold temperatures.
  - b) Fatty acids like this have kinks in their tails, which prevents them from packing closely: fats like this solidify at cold temperatures.
  - c) Fatty acids like this have very straight tails which allows them to pack closely, so fats like this stay fluid at cold temperatures.
  - d) Fatty acids like this have very straight tails which allows them to pack closely, so fats like this solidify at cold temperatures.

- \_\_\_\_\_ 5. Which of the following types of reactions is used when joining organic monomers to form biological macromolecules?
- a) hydrolysis
  - b) condensation
  - c) catabolic
  - d) isomerization
- \_\_\_\_\_ 6. Which of the following is not one of the small organic molecules (e.g., subunits of biological macromolecules) found in a cell?
- a) nucleic acids
  - b) fatty acids
  - c) amino acids
  - d) monosaccharides

For # 7- 11: Please fill in each blank with the word that best completes the sentence.

7. Hydrophobic molecules are relatively rare in the aqueous cytosol because they physically cannot form \_\_\_\_\_ bonds and do not interact with or dissolve in water.
8. The subunits of the biological macromolecules known as proteins are called amino acids which are joined together by strong, covalent \_\_\_\_\_ bonds.
9. In general, individual ring-shaped \_\_\_\_\_ will be illustrated in our textbook as small blue hexagons or pentagons.
10. Two types of modified lipids, the \_\_\_\_\_ and the glycolipids, are the primary components of the self-sealing lipid bilayer which is the basis of all cellular membranes.
11. One very special nucleotide is used for more than just building DNA and RNA: \_\_\_\_\_ is more often used to transfer energy between catabolic and anabolic reactions in a cell.