

Discussion Questions – Collaborative Learning

Learning Outcome: Students will use group discussion to master a given topic.

Summary: Students are assigned independent reading to learn about a specific topic, and then answer discussion questions on this topic in a group. Critical reading and thinking, group work, and communication are all enforced with this technique. This technique is used to teach a specific topic to students in lieu of a standard lecture.

Procedure:

1. Students are assigned reading material ahead of class. Students should independently learn and study the material.
2. Discussion questions are designed and printed by the professor before class. Questions are distributed to students in class at the beginning of the exercise. (Questions can be given ahead of time for a more advanced course, if desired.)
3. Students are immediately given time to discuss the questions in small groups and write down appropriate answers.
4. Questions are then discussed with the entire class, giving students the opportunity to hear from other groups.
5. Completed discussion sheets can be collected for a participation, completion, and/or correctness grade.

Example Application: This technique was used multiple times to teach a variety of topics in a 'Biology of Food' in a Freshman Seminar course. Topics covered by this method included cellular respiration, the biological basis for taste, and fad diets. A formal lecture was not given on these topics, but a few slides may have been presented for illustrations.

Outcome and Impressions: This technique worked beautifully and students seemed to enjoy it. This technique offers a great alternative to a straight lecture on science topics. Topics that lend well to this "flipped" teaching method may include topics that students find "dry" or difficult to comprehend, as well as topics for which a casual discussion is more appropriate than a typical lecture. An example of each is attached on the following pages ('cellular respiration' for the former, and 'fad diets' for the latter).

Cellular Respiration Discussion Questions

1. Why do all organisms need ATP?
2. What is the overall equation for cellular respiration?
3. How is cellular respiration related to breathing?
4. Why do the reactions of respiration occur step-by-step instead of all at once?
5. How are photosynthesis and cellular respiration interrelated?
6. Birds and mammals are endotherms: they maintain a constant internal body temperature. An endotherm that gets too cold will increase its metabolic rate to generate heat. An ectotherm such as a lizard or snake, on the other hand, allows its body temperature to fluctuate with the environment. If you own a pet rat and a pet snake of equal weight, which will require more food and why?

7. Edgar is making bread. He begins by adding yeast to sugar and hot water; the mixture begins to bubble. What is happening? How would the outcome change if he forgot to add the sugar?

8. A student runs 5 kilometers each afternoon at a slow, leisurely pace. One day, she runs 2 km as fast as she can. Afterward she is winded and feels pain in her chest and leg muscles. She thought she was in great shape! What, in terms of energy metabolism, has she experienced?

9. Nearly all human societies use fermentation to produce alcoholic drinks such as beer and wine. The technology dates back to the earliest civilizations. Suggest a hypothesis for how humans first discovered fermentation. In preindustrial cultures, why do you think that wine was a more practical beverage than the grape juice from which it was made?

Fad Diet Discussion Questions

1. What is a fad diet?
2. How can a person recognize a fad diet?
3. Why are fad diets not advised? Be specific; give multiple reasons.
4. Why do fad diets seem attractive at first glance?
5. What are the potential long-term consequences of a fad diet?
6. Why do many fad dieters find it difficult to maintain the fad diet plan long term?