



Group Verbal Gateway Quizzing To Promote Understanding of Cardiovascular Anatomy

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Abstract

It is common practice to dissect organs such as the heart, brain, and kidney in human anatomy and physiology laboratory classes. Students who do not have a good understanding of organ anatomy before the dissection do not fully appreciate the dissection and have a difficult time identifying structures on the specimen. They also have a more difficult time connecting anatomical structures to physiological functions. Lab manuals used in most classrooms use practices such as labeling figures or sketching models as a way of preparing students for dissections, which does not promote group work or verbal communication. This approach uses verbal gateway quizzes administered before the specimen dissection in the anatomy and physiology laboratory. Students are split into groups of 3-4 and given an anatomical model and a list of structures to identify. Students must work together to identify and learn the structures and state its function. Verbal graded identification quizzes are administered by the professor and must be passed by the entire group for the students to begin the dissection. The use of verbal gateway quizzes creates a collaborative learning environment that engages students and promotes mastery of the anatomy and physiology of the given specimen.

Introduction

Dissection is a tool used in the anatomy and physiology lab to provide students with an experiential and real-world approach to learning structure and function of organs. Instructor observation indicates that without previous anatomical and physiological knowledge of the dissection specimen, students are not as engaged during the dissection. This approach aims to provide students with tools to learn collaboratively to prepare for the in-lab dissection and ensures that learning is achieved through gateway quizzing. This will improve understanding of organ anatomy and physiology.

Materials

Materials are listed per group of three to four students.

- Lab manual with a list of structures to be identified (figure 1)
- Heart model
- Blank notecards
- Sheep heart for dissection
- Dissection materials and PPE

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|---------------------------------------|--------------------------------------|
| 1. General structures | 4. Cardiac veins |
| a. Mediastinum | a. Small cardiac vein |
| b. Apex of the heart | b. Middle cardiac vein |
| c. Base of the heart | c. Great cardiac vein |
| d. Atrioventricular sulcus | d. Coronary sinus |
| e. Interventricular sulcus | 5. Interatrial septum |
| f. Pericardium | a. Fossa ovalis |
| (1) Fibrous pericardium | 6. Interventricular septum |
| (2) Serous pericardium | 7. Right atrium |
| (a) Parietal pericardium | a. Opening of the superior vena cava |
| (b) Visceral pericardium (epicardium) | b. Opening of the inferior vena cava |
| (c) Pericardial cavity | c. Opening of the coronary sinus |
| g. Myocardium | d. Right auricle |
| h. Endocardium | e. Pectinate muscles |
| 2. Great vessels | 8. Right ventricle |
| a. Superior vena cava | a. Trabeculae carneae |
| b. Inferior vena cava | 9. Left atrium |
| c. Pulmonary trunk | a. Left auricle |
| d. Right and left pulmonary arteries | b. Openings of the pulmonary veins |
| e. Pulmonary veins | 10. Left ventricle |
| f. Aorta | a. Trabeculae carneae |
| 3. Coronary arteries | 11. Atrioventricular valves |
| a. Right coronary artery | a. Tricuspid valve |
| b. Right marginal artery | b. Mitral valve |
| c. Posterior interventricular artery | c. Chordae tendinae |
| d. Left coronary artery | d. Papillary muscles |
| e. Anterior interventricular artery | 12. Semilunar valves |
| f. Circumflex artery | a. Pulmonary valve |
| | b. Aortic valve |

Figure 1: List of structures to be identified on the heart model and sheep heart specimen. From Amerman (2010), pg. 455

Methods

Students are separated into groups of three to four. Groups use their lab books and list of structures to prepare for the verbal quiz. Students are informed that they are to collaboratively learn the function (or description) and identify each structure on the list and that the entire group must pass the verbal quiz before they can move on to the dissection portion of the class. They are provided with a heart model and blank note cards (for flashcards) and told that it will take between one to two hours for them to prepare for the verbal quiz.

The students work through the list and learn all structures and functions together. Groups used different methods, but often they divided the terms between group members to make flashcards, which they used to study as a group. As the students collaboratively learn, the instructor circulates to assist with identification or answer questions. The instructor also encourages collaboration if groups begin working independently.

Methods

It is critical that the instructor lets the group know that everyone in the group must be confident and prepared for the verbal quiz. When the group feels that they are ready to be quizzed the instructor will verify that each student is prepared for the quiz. If the instructor feels as if a student is reluctant and may be taking the quiz before he or she is ready, the instructor should tell them to study for another ten minutes before circling back around to that group.

The verbal quiz is administered to each student individually, and the group is restricted from helping. The instructor randomly selected three structures for each student to identify on the model and provide a verbal description. Students earned two points per structure: one for correctly identifying the structure and one for providing the correct description. Students were also awarded a point if all students in the group got all structures correct. If all students pass the verbal quiz, they are then allowed to dissect the sheep's heart. If all students do not pass the entire group is required to review the heart until all members of the group can pass the verbal quiz. Groups are required to study for an additional 10 minutes minimum.

During the sheep heart dissection, the instructor assisted and answered questions. Once the students finish the dissection the instructor asks the students to point out the structures that were studied on the model on the dissected heart. Functions are reviewed as well. Afterwards, students are instructed to clean up and lab is concluded.

The following week of lab, students were given a quiz over the anatomy of the heart. Students are asked to identify ten structures from the heart that were studied in lab the previous week. Results were compared to the scores of students who did not complete verbal gateway quizzing

Results

Instructor observation indicated that student interactions increased both during the study period for the gateway verbal quiz, and during the dissection itself. Students also appeared to be more engaged and active in the learning process. Instructor observation also suggests that students spent more time with the dissection specimen when compared to students that did not complete gateway quizzing. During the dissection, students appeared to have a better understanding of the dissection instructions and asked less questions about the procedure instructions and asked more questions about anatomical structure and function. Students scores on follow up quizzes indicate that students gained a better understanding of cardiovascular anatomy compared to students that did not participate in gateway quizzing through a student T-Test (figure 2).

Figure 2a: Comparison of Student Quiz Scores With and Without Gateway Verbal Quizzing

	Control Group	Treatment Group
Mean	6.7889	7.9219
Variance	8.2721	4.2361
Stand. Dev.	2.8761	2.0582
n	45	32
t	-2.0149	
d.o.f	75	
critical value	1.994	

Figure 2b: Comparison of Student Quiz Scores With and Without Gateway Verbal Quizzing

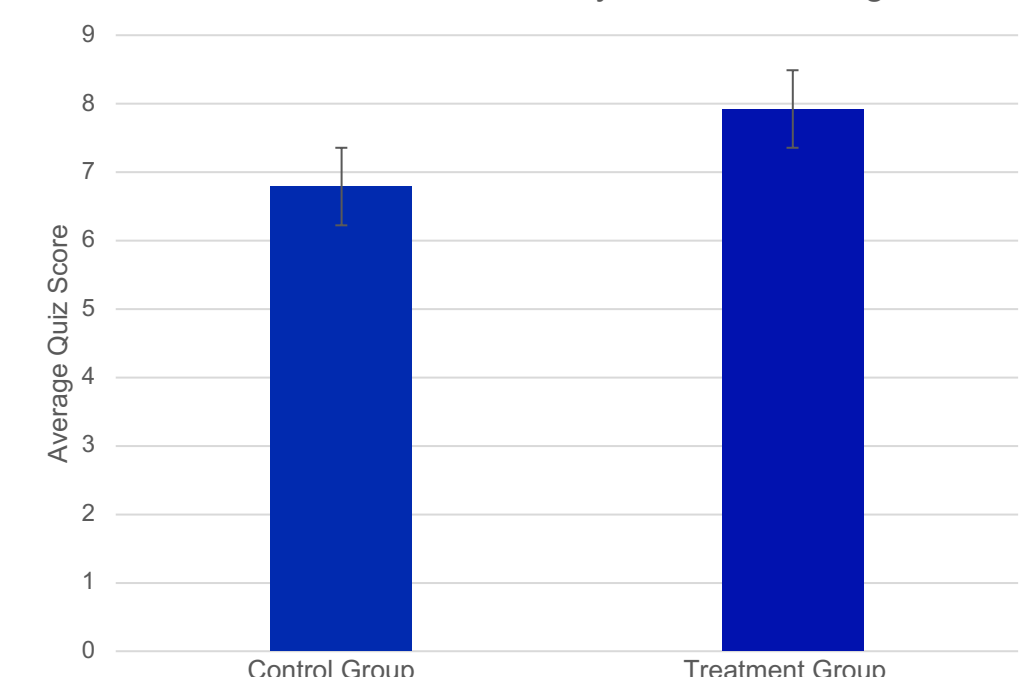


Figure 2: Comparison of student quiz scores (out of ten points) with and without gateway verbal quizzing. Students t-test show a significant difference at $p = .05$

Discussion

The use of verbal gateway quizzes prior to the sheep heart dissection creates a collaborative learning environment that engages students and promotes mastery specimen anatomy and physiology. This method should be used with dissection of all organs in the anatomy and physiology lab.

References

Amerman, E. C. (2010). Exploring anatomy & physiology in the laboratory (3rd. Edition). Englewood, CO: Morton Pub.