AND THE BEAT GOES ON

Subject Matter: Science, Health
Grade Levels: 9-10
Time Allotment: Four 50-minute class sessions
Master Teacher: Joy LeaMaster

Overview

This lesson provides students with an opportunity to learn about the heart and the rest of the circulatory system. They will acquire vocabulary about the circulatory system, learn more about the circulatory system by watching video clips and ultimately perform an online heart transplant surgery.

Learning Objectives

Students will be able to:

- Describe the function and workings of the circulatory system.
- Identify the main parts of the circulatory system.
- Identify the types of blood vessels found in the human circulatory system.
- Define key vocabulary terms associated with the circulatory system.

Oregon Standards Available at:

http://www.ode.state.or.us/cifs

Life Science - Organisms

- Describe and explain the structure and functions of an organism in terms of cells, tissues and organs.

Media Components

Video

Check the link at http://www.opb.org/edmedia/trs/ to find access to the video(s) from unitedstreaming™ referenced in this lesson plan.

- "Pumping Life: The Heart and Circulatory System" (22:00)
    - **Clip:** "The Wonder of the Heart and Circulatory System" (01:12)

- "Human Body Systems: The Circulatory System" (23:00)
  - **Clip:** "Introduction to the Circulatory System" (00:58)
  - **Clip:** "The Heart" (04:33)
  - **Clip:** "The Blood Vessels" (04:17)
  - **Clip:** "Blood Pressure" (01:47)
  - **Clip:** "Blood" (04:11)
  - **Clip:** "Video Quiz: The Circulatory System" (04:04)

Web

- **Electric Heart Operation: Heart Transplant or How to Transplant a Heart in Nineteen Easy Steps**
  Learn the basic steps a heart surgeon performs in a heart transplant.
  http://www.pbs.org/wgbh/nova/eheart/transplant.html

Materials

Per Student:

- The Circulatory System: Vocabulary Handout
  (Check the link at http://www.opb.org/edmedia/trs/ to find access to the blackline master(s) from unitedstreaming™ referenced in this lesson plan.)
- The Circulatory System: Video Quiz Handout
  (Check the link at http://www.opb.org/edmedia/trs/ to find access to the blackline master(s) from unitedstreaming™ referenced in this lesson plan.)

Per Class and/or Group:

- Overhead transparencies of The Circulatory System: Video Quiz and The Circulatory System: Vocabulary handouts. (Check the link at http://www.opb.org/edmedia/trs/ to find access to the blackline master(s) from unitedstreaming™ referenced in this lesson plan.)

Prep for Teachers

Make copies and overheads of The Circulatory System: Vocabulary handout (found on page 2 of the blackline master for the video, "Human Body Systems: The Circulatory System") and The Circulatory System: Video Quiz handout (found on page 1 of the blackline master for the video, "Human Body Systems: The Circulatory System"). (Check the link at http://www.opb.org/edmedia/trs/ to find access to the blackline master(s) from unitedstreaming™ referenced in this lesson plan.)

Reserve the computer lab for the Culminating Activity in this lesson. Ensure that all computers used in the Culminating Activity have the latest versions of Flash and Shockwave. Bookmark the Web site http://www.pbs.org/wgbh/nova/eheart/transplant.html on each computer.

Introductory Activity

Step 1: Tell students that you will be watching a short video. As a **Focus for Media Interaction**, ask them to try to figure out what is being described in the video. Ask students to keep their guesses to themselves until you **pause** the video.

Step 2: Play the video clip, "The Wonder of the Heart and Circulatory System (01:12), from the video, "Pumping Life: The Heart and Circulatory System" (22:00).

Step 3: Pause the clip at 00:40 or when the narrator asks, "Is this system part of a science fiction novel – an imaginative vision of the future?" Ask your students what this video might be referring to. Entertain a few answers while being careful not to give it away.

Step 4: Play the rest of the video clip. As a **Focus for Media Interaction**, ask students to consider why they might be most surprised by the answer (*that it's the human circulatory system*).

Step 5: Check with students to see what most surprised them about this description of the human circulatory system. *Possible answers: the circulatory system constitutes over 59,000 miles or 96,000 kilometers of veins and arteries; the heart (or pump) never has the chance to rest throughout the course of a human life; blood serves so many purposes.*

Step 6: Tell students that they will be learning a lot more about this amazing part of human physiology through watching another video and conducting virtual heart transplants.

Learning Activities

Step 1: Distribute copies of The Circulatory System: Vocabulary handout to your students.

Step 2: As a **Focus for Media Interaction**, tell your students to pay particular attention to definitions found in the video for the vocabulary items listed. Also, inform them that there will be a video quiz at the conclusion. *You can either **play** the video in its entirety, **pausing** whenever important vocabulary information is shared, or **play** the video in clips, **pausing** between the clips to share information gathered.*

Step 3: Play the video, "Human Body Systems: The Circulatory System" (23:00). Be sure to **pause** when vocabulary information is revealed which should be noted on your students' vocabulary sheets. **Note:** You will not need to **play** the last two segments, "A Healthy Circulatory System" (00:37) or "Summary" (00:35), before the video quiz. If you are viewing

from the entire video (rather than the individual segmented clips), you will want to stop when the time code reaches 16:11.

Step 4: As a check for understanding, review the vocabulary items using an overhead so that everyone has the correct definitions.

Step 5: Distribute copies of The Circulatory System: Video Quiz (one per student). As a **Focus for Media Interaction**, tell students that they will take the video quiz as an additional check for understanding. They are to note their answers in the space provided. If they require additional space, they can attach another sheet of paper with their complete answers.

Step 6: Play the video clip, "Video Quiz: The Circulatory System" (04:04), from the video, "Human Body Systems: The Circulatory System" (23:00). If you are viewing from the entire video file, start from 18:06.

Step 7: It is likely that your students will have missed at least some of the answers to these quiz questions since their focus was on vocabulary. If necessary, go back to the beginning of the video quiz and **play** it again. This time, when the narrator pauses between questions, work together to share answers so that all students have noted the correct information.

Step 8: Collect video quizzes.

Culminating Activity

Step 1: Now that students have learned so much about the circulatory system, tell them that they will have an opportunity to walk through the basic steps of a heart transplant. Take your students to the computer lab and instruct them on how to find this Web site: http://www.pbs.org/wgbh/nova/eheart/transplant.html.

Step 2: As a **Focus for Media Interaction**, ask students to consider the function of the heart/lung machine and be prepared to share their answers with the class upon completion of their surgeries. Remind them that this is not a race. They should carefully consider all of the steps along the way and why they would be necessary, taking into account their newfound understanding of the body's circulatory system. If students finish early, have them explore other areas of this Web site. A couple of great places to visit are "Amazing Heart Facts" found at http://www.pbs.org/wgbh/nova/eheart/facts.html and "Map of the Human Heart" found at http://www.pbs.org/wgbh/nova/eheart/human.html.

Step 3: Ten minutes before the end of class, ask your students to close their windows and log off of their computers.

Step 4: As a check for understanding, ask if your students learned anything new by interacting with the heart transplant simulation. What function does the heart/lung machine perform during the operation? *Answer: It works as a heart, taking blood from a body, then pumping that blood*

back into the body with the proper amount of force. It also works as a lung, removing carbon dioxide from the blood and adding oxygen.

Cross-Curricular Extensions

English

- Read Edgar Allan Poe's short story, "The Tell-Tale Heart," where an insane narrator describes the sound that a heart makes as it beats. Ask students to write their own stories in which the heart plays a crucial role in the plot.

History

- The introduction of hemophilia into the Russian royal family was through the Tsar's wife Alexandra, who was a granddaughter of Queen Victoria. Victoria was a carrier of the disease, which passed through her children to royal families in Spain and Prussia. Ask students to research why the present British royal family is unaffected by the disease.

Health

- Study living habits that contribute to heart disease and positive actions like diet and exercise and their role in having healthy circulatory systems.

Community Connections

- Ask students to monitor the media for stories about heart disorders. Have them make a list of the topics covered most frequently and the kinds of information presented.

- Ask the school health nurse to demonstrate to the class how a blood pressure reading is taken. The nurse's presentation should include an explanation of how a sphygmomanometer works and a differentiation between systolic and diastolic readings.