

Running Title: UNIT PLAN FOR PHYSIOLOGY CONTENT

Anchor Assignment 4A

Unit Plan to Meet State Content Requirement for Teaching Physiology

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TED 625A

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Rationale

Physiology is the science of the normal functioning of an organism. Physiology is possibly the most important section in the Biology curriculum, because it has applications to all students throughout life. In the short term, a passion for Physiology often is predictive of a career choice in Health Care. Later in life, a strong background in Physiology makes one a better informed patient. Physiology also ties in with many of the other sections of the Biological Sciences Standards, particularly Cell Biology, Ecology, and Evolution.

Physiology is more than the mastery of terminology. Cognitive skill development is central, but Psychomotor skills are also developed. For example, one cannot fully understand the physiology of respiration (breathing) without being able to feel how the diaphragm expands and contracts the thoracic cavity. Physiology, when taught effectively, requires manipulation of skeletons and anatomical models. Whereas many areas of Biology primarily effect the first two categories of the Cognitive Domain (Knowledge and Comprehension) understanding of the interrelationships of the different organ systems requires Application, Analysis, and Synthesis as well.

The Physiology section will follow Cell Biology because the understanding of the roles of tissues and organs completely depends on the understanding of their basic building blocks, cells. Physiology will precede Ecology and Evolution because one needs an understanding of the requirements of organisms before they can fully comprehend their relationships.

Target California Content Standard

9. As a result of the coordinated structures and functions of organ systems, the internal environment of the human body remains relatively stable (homeostatic) despite changes in the outside environment. As a basis for understanding this concept:
 - a. *Students know* how the complementary activity of major body systems provides cells with oxygen and nutrients and removes toxic waste products such as carbon dioxide.

End Learner Outcomes

1. At the end of the unit, the student will be able to explain how air enters the lungs and how oxygen is exchanged with Carbon dioxide from the blood in the alveoli. The student will also be able to explain the avian lung and why it is more efficient than the mammalian lung.
2. At the end of the unit, the student will be able to chart how the blood travels from the lungs, through the heart, through all organs and tissues, and brings back deoxygenated blood to the lungs. The student will also be able to explain how the mammalian heart is superior to the reptilian three-chambered heart.
3. At the end of the unit, the student will be able to chart how food is digested, where nutrient absorption takes place, in what forms the nutrients enter the blood, and where intestinal microorganisms produce essential vitamins. The student will also be able to explain why an omnivorous primate, such as a baboon, can have a lighter body than a purely herbivorous gorilla.
4. At the end of the unit, the student will be able to explain the role of the kidney in filtering out Nitrogen-containing waste and transporting it to the urinary bladder for micturition. The student will be able to discuss how elimination of a urinary bladder helps birds fly.

Adaptations

Students will work individually on vocabulary but in groups of 4-6 when studying skeletons or models of the human body. Videos, 5-10 minutes in length, showing animations of the circulatory, respiratory, and urinary systems will be viewed by the entire class

Scope and Sequence

Day 1

LO – Students will be able to discuss the structure of the lungs, including how gases are exchanged in the alveoli. Students will also be able to trace air from the trachea through the lungs on inspiration and expiration.

LA - Students will read about and discuss the structure of the Respiratory System from the trachea to the alveoli. They will then see an animation of the process. The class will then learn of the role of red blood cells (RBCs) Iron, heme and globin in the process.

Assessment – End of class matching exercise connecting the names to the parts of the respiratory system.

Homework – Carefully examine how they breath standing up, sitting down, on their back, and after exertion.

Day 2

LO – Students will understand the role of the diaphragm and intercostal muscles in *proper* breathing. Students will learn why their voices are unique and be able to explain it to a parent.

LA – Student will see the teacher demonstrate how the diaphragm changes the volume of the thoracic (chest) cavity. The teacher will explain, with use of a bellows, how the air inside lungs is not pressurized.

Assessment – students will draw a chest cavity labeling heart, lungs, trachea and bronchioles. Extra credit for two diagrams, one inhaling, one exhaling.

Homework – none

Day 3

LO – Student will be able to draw a chart showing pulmonary and corporeal circulation showing the four chambers of the heart, the aorta and vena cava, and the pulmonary arteries and veins. They will be able to designate where the air is oxygenated and where it is deoxygenated.

LA – Students will see two videos: one of the heart; one of pulmonary circulation.

The students will then discuss how this process connects with the previous two lessons for exchanging Oxygen and Carbon Dioxide with the outside world.

Then, in groups, the students will label a diagram of the four chambers of the heart, the aorta and vena cava, and the pulmonary arteries and veins.

Assessment – The labeled diagrams will be graded for accuracy.

Homework – none

Day 4

LO – The students will be able to draw a diagram of the digestive tract, being able to label the esophagus, stomach, duodenum, small and large intestines, liver, pancreas and gall bladder. They will know the function of each and the location of where proteins, carbohydrates and fats are digested and absorbed.

LA – Students will watch a 10 minute video on the alimentary canal and another on the digestion of proteins, lipids, and sugars. The students will then examine models of the alimentary canal and be able to identify them. Then they will learn how nutrients leave the intestine through the mucosal layer and enter the circulatory system to be stored in the liver or adipose tissue.

Assessment – To leave class, each student will have to identify a part of the body from the previous four days, as pointed to by the instructor on a model.

Day 5

LO – The student will be able to identify the kidney, ureter, urethra, renal pelvis, and glomerulus (Bowman’s Capsule and Glomerulus will be extra credit). The students will then be able to integrate the four systems together for an overview of nutrition, respiration, and excretion.

LA - The students will watch a video with animations of blood filtration and micturition. They will then draw the route of elimination of Nitrogen from the blood through the kidneys, bladder, and urethra. Then, in groups, they will trace the path of Oxygen, Carbon Dioxide, urea (urine) lipids, carbohydrates, and proteins through the body.

Assessment – Both diagrams will be graded.

Homework – Study for Quiz on Day 6.

Day 6

LO – Demonstrate understanding of material presented from Days 1-5

LA – The students will be given a fifteen minute review of the material covered in the previous five days. Then the students will clear their desks and take a quiz.

Assessment – The quiz will contain three parts: fill in the blank; matching; and thought questions. Examples follow:

Fill in #1 – What does an artery do? a) carry blood to the heart b) carry blood away from the heart c) carry only oxygenated blood, or d) carry only deoxygenated blood.

Fill in #2 – Where is Vitamin K produced (hint: bacteria make it) a) stomach b) large intestine c) small intestine d) gall bladder

Matching

A Diaphragm
B Alveoli
C Capillary
D Trachea
E Bronchial tree

_____ Thin walled blood vessel capable of gas exchange
_____ Passages from mouth to lungs
_____ Major muscle of breathing
_____ Bubble-like chambers in the lungs where gases exchange
_____ Another name for the ‘windpipe’
Students will only have to answer two of the thought questions

Thought Question #1

Lizards have three-chambered hearts, where there is only one large ventricle. Crocodiles and mammals have four-chambered hearts. From what you know about pulmonary circulation, why would it be an advantage to have a separate left and right ventricle.

Thought Question #2

Birds do not have a urinary bladder. For birds that fly, can you propose an advantage to this anatomical arrangement?