ITQ ARTS AND SCIENCE INTEGRATION
GRADE 5
DANCE AND LIFE SCIENCE

All Systems, GO!
Lesson #3

FOSS California, Grade 5, *Living Systems,* Investigation 1, Part 3

CONTENT STANDARDS

Dance Grade 5

2.1 Create, memorize and perform complex sequences of movement with greater focus, force/energy, and intent.

Science Grade 5

LS2B Students know how blood circulates through the heart chambers, lungs, and body and how carbon dioxide (CO_2) and oxygen (O_2) are exchanged in the lungs and tissues.

LS2C Students know the sequential steps of digestion and the roles of teeth and the mouth, esophagus, stomach, small intestine, large intestine, and colon in the function of the digestive system.

ESSENTIAL QUESTIONS *(Questions students might ask about the topic)*

- How do the circulatory, respiratory, and digestive systems work together and how can I show that through movement?

OBJECTIVES & STUDENT OUTCOMES *(Students will be able to…..)*

- perform movements in proper sequence to show the relationship between the structures and functions of the circulatory, respiratory, and digestive systems.

ASSESSMENT (*Various strategies to evaluate effectiveness of instruction and student learning)*

- **Feedback for Teacher**
  - Student performance
  - Student response to inquiry
  - Student Science Notebook Journal Entry
- **Feedback for Student**
  - Teacher Feedback
  - Peer feedback

WORDS TO KNOW

Dance

- **Dance Sequence:** The order in which a series of connecting movements and shapes occur.
- **Dance Study**: A short work of dance that investigates a specific idea or concept and shows a selection of movement ideas.

Science

- **Circulate**: To move in or flow in a circle.
- **Circulatory System**: The system of blood vessels and organs that transports blood to all the cells in the body.
- **Digestion:** The process of breaking down food into nutrients that can be used by cells.
- **Digestive System**: The system of organs and structures responsible for the digestion of food. The digestive system includes the teeth, mouth, esophagus, stomach, small intestine, large intestine, and

colon.
- **Nutrient**: A chemical found in food that helps keep an organism alive and active.
- **Respiratory System**: The system of lungs and connecting tubes that transports oxygen to the red blood cells and gets rid of carbon dioxide.
- **Small Intestine**: The part of the digestive system between the stomach and large intestine that absorbs nutrients from digested food.
- **Transport**: To move or carry.

MATERIALS

- CD Player and music
- Three (3) rolls of colored masking tape: red, blue, and black
- One set of six (6) different colored pieces of large construction paper with each labeled with a different part of the digestive system (mouth and teeth, esophagus, stomach, small intestine, large intestine, and colon) or one long sheet of butcher paper labeled with the parts of the digestive system.
- Eight (8) green, 8"X10" pieces of construction paper labeled "nutrients"
- 20, 8"x10" pieces of red construction paper labeled "oxygen"
- 20, 8"x10" pieces of blue construction paper labeled "carbon dioxide"
- Diagram #1 "Systems Can't Work Alone"
- Diagram #2 "The Digestive Chant"
- Diagram #3 "Slices of Pizza" picture
- Optional: 20, 8"x10" pieces of yellow construction paper labeled "waste"
- Science notebooks, 1 per student

RESOURCES

- *FOSS California,* Grade 5, *Living Systems,* Investigation 1, Part 3
- Internet:
  - http://www.livestrong.com/article/302607-how-do-the-digestive-respiratory-systems-work-together/
  - http://www.biology4kids.com/files/systems_main.html

PREPARATION

- Present vocabulary from *FOSS California,* Grade 5, *Living Systems*, and teach Investigation 1, Part 3.
- Read the attachment at the end of this lesson, "Systems Can't Work Alone".
- Prepare six labels on large pieces of colored construction paper labeled six different colors to represent each part of the digestive system (mouth and teeth, esophagus, stomach, small intestine, large intestine, colon), or
- One piece of white butcher paper 16' long labeled from top to bottom, with each part of the digestive system. Allow ample space between each part.

WARM UP *(Engage students, access prior learning, review, hook or activity to focus the student for learning)*

(15 minutes)

- Post charts of the **digestive** and **circulatory system**.
- Post vocabulary.
- Review both **Circulation** and **Digestion** dances one section at a time.
  - As students are dancing each study, reinforce vocabulary and function of each part of the system.
  - The **Digestion** Dance
    - The "Dougie" dance (teeth, mouth, saliva).
      - Chant: *In the **mouth,** in the **mouth**. Where the **teeth** chew up the food.*
    - The Body Wave (esophagus)
      - Chant: *The **esophagus*** (beats 1-2), *the **esophagus*** (beats 3-4). *Where food goes down the tube.*
    - The Rolling Paddle Turn (stomach)

- Chant: *In the **stomach*** (beats 1-2). *In the **stomach*** (beats 3-4). *Where the acid breaks down the food* (beats 5-8).

➢ The Sway (small intestine)
- Chant: ***Small intestine*** (beats 1-2), ***small intestine*** (beats 3-4). *Where **nutrients** enter the blood* (beats 5-8).

➢ The Jazz Square (large intestinr)
- Chant: ***Large intestine*** (beats 1-2), ***large intestine*** (beats 3-4). *Where the water is absorbed* (beats 5-8).

➢ Four Shapes (colon)
- Chant: *In the **colon*** (beats 1-2), *in the **colon*** (beats 3-4), *elimination* (beats 5-6), *elimination* (beats 7-8).

o The **Circulation** dance

➢ Arrange students as the organs (heart, lungs, body and blood) and move through the blood vessels in a circular pathway.
- *We are **circulating** through the right side of the **heart** to the **lungs** were we pick up oxygen.*
- *We are **circulating** back to the left side of the **heart**.*
- *We are **circulating** to the body where we given oxygen to the cells and we receive carbon dioxide.*
- *We are **circulating** back to the right side of the **heart** and back to the lungs where we trade carbon dioxide and get another oxygen.*

MODELING *(Presentation of new material, demonstration of the process, direct instruction)*
(30 minutes)

- Arrange the All Systems, Go! (see attached diagram)
  - The students in the **circulatory system** dance (13) will maintain their place marked with the tape.
  - Divide the remainder of the class into two groups. One group (two or three people in each part of the **digestive** system) will dance the **digestive system** and group two will say the chant. Arrange dancers in a vertical line to the left of the **digestive system** and place the appropriate label next to each sub group of dancers.
  - The chanters should be placed apart and far enough away so as not to disrupt the movement.
  - *Say* (this is a key part of the lesson)
    - ➢ (To the students dancing as the small intestine)*: When I prompt you, I want you to move to this open space* (point to the open space in the **circulatory system** dance formation). *You will do your part of the **digestion dance** here.*
      - (Give each student two **nutrient** cards). *One of you will hand a **nutrient** card to a red blood cell as it passes by. Each time a red blood cell passes by, hand out a **nutrient** card. This will simulate the nutrients passing out of the **digestive system** and into the bloodstream.*
    - ➢ (To the rest of the students dancing in the **digestion** dance): *You will all do your part of the dance in your places where you are right now. When it's your turn, stand and do your section of the dance, then sit back down.*

GUIDED PRACTICE *(Application of knowledge, problem solving, corrective feedback)*
(15 minutes)

- Begin with **circulating** of the blood in the **circulation dance study**.
  - *Say: Your **circulatory system** never stops, your heart continues to pump blood and **circulate** it all through your body even while you sleep. Your **digestive system** continues to work all the time as well. You may not be eating, but you continue to swallow throughout the entire day, and even while you sleep. Your stomach may not always be churning and secreting acids, but your small intestine never stops supplying **nutrients** that the blood absorbs and **transports** all through your body. Your body uses energy from the food you ate at dinner even while you sleep. Your large intestine continues to absorb water and compact waste even while you sleep.*
- Stop all action. Begin the **digestive** dance.
- Remind students that in reality, the **digestive system** and its structures are really embedded within

the **circulatory system**. But in order to save space, we have separated them out so that we can see each one working

- *Say: You wake up and start to eat your breakfast. Yummmmm! Cereal and toast. Your mouth and teeth chew up each bite.*
  - Group 1, dancing part 1 of the **digestion** dance (mouth and teeth) stands and performs. The rest of the class says the chant. The chanters will continue throughout the exercise. Dancers will sit when finished.
- *Say: Each bite is swallowed and travels down the esophagus.*
  - Group 2, dance part 2 (esophagus) stands and performs. Sit when finished.
- *Say: The food travels to the stomach where it is churned and mixed with acids.*
  - Group 3, dance part 3 (stomach) stands and performs. Sit when finished.
- *Say: The food enters the small intestine where the **nutrients** are released into the bloodstream. This takes place in tiny blood vessels called capillaries.*
  - Group 4, the students dancing part 4 (the small intestine) slide over into the space allotted for them in the **circulation** dance and do their part of the dance.
    - The dancers will perform and hand a green **nutrient** card to one of the students moving as a red blood cell. The student representing the blood cell will now have one oxygen card and one **nutrient** card.
    - The blood cells continue in their pathway to the body.
- *Say: The red blood cells take the **nutrients** and the oxygen to the body.*
  - At this point, the students representing the red blood cells will hand both the **nutrient** and oxygen cards to the person representing the body and receive a carbon dioxide card.
    - Option: You may want to have a stack of yellow cards labeled "waste". The student representing the body would hand not only a carbon dioxide but also a waste card to the student representing the red blood cell. You as the teacher or other identified student can place yourself somewhere on the pathway back to the heart to represent the kidney, where the waste card would be dropped off.
- *Say: The food enters the large intestine where water is absorbed back into the bloodstream.*
  - Group 5, dance part 5 (large intestine) stands and performs. Sit when finished.
- *Say: Undigested food is compacted and stored in the colon for elimination.*
  - Group 6, dance part 6 (colon) stands and performs. Sit when finished.

- The entire time through the "breakfast" cycle, the **Circulation Dance Study** continues.
- Reinforce to the students that neither systems ever really stops.
- Stop the action and repeat the entire **dance study** all over again, this time using lunch as the scenario.
- Remind students that this happens with everything that we eat. The entire system does not stop even though we are not eating. The Small and large intestine continue to operate all the time.
- Videotape the performance.

DEBRIEF & REFLECT *(Identify problems encountered, ask and answer questions, discuss solutions and learning that took place. Did students meet outcomes?)*
(2 minutes)

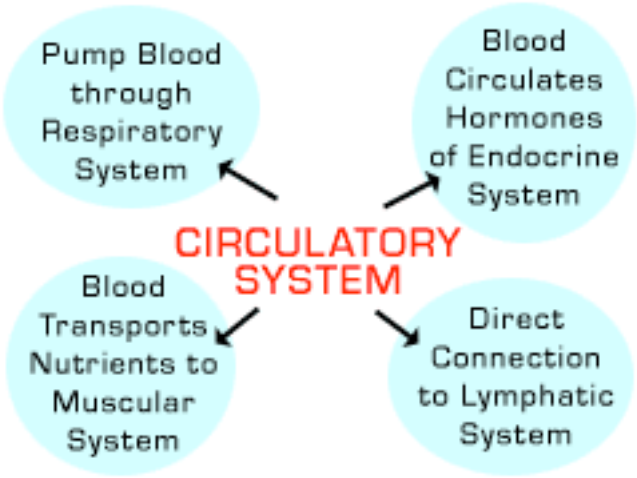
- Have the class jigsaw the "Systems Can't Work Alone" attachment at the end of this lesson.
- Have students answer the following questions in their science notebooks.
  - *How do cells in the human body get the nutrients they need? Provide the following sentence frames:* The **digestive system** reduces the food we eat into **_____**. **Nutrients** pass out of the **_____ _____** into the bloodstream for **transport** to the cells.] [The **digestive system** reduces the food we eat into **nutrients**. **Nutrients** pass out of the **digestive system** into the bloodstream for **transport** to the cells.]
  - *How does the **digestive system** work? Provide the following sentence frames:* Physical and chemical processes break complex food into simple substances as it progresses from the mouth and teeth, esophagus, stomach, _____and _____intestine and colon.] [Physical and chemical processes break complex food into simple substances as it progresses from the mouth and teeth, esophagus, stomach, small and large intestine and colon.]
  - How did doing the **dance studies** in **digestion** and **circulation** help you understand how these

two systems work together?

EXTENSION *(Expectations created by the teacher that encourage students to participate in further research, make connections, and apply understanding and skills previously learned to personal experiences.)*

- Rehearse the two **dance studies** and brainstorm ideas for creating a 16-32 beat dance sequence for the respiratory system, showing waste passing through the walls of the small intestine into the blood stream and to the kidney, to the bladder.

Diagram #1 - Systems Can't Work Alone



Systems rarely work alone. All of the systems in an organism are interconnected. A simple example is the connection between the circulatory and respiratory systems. As blood circulates through your body, it eventually needs fresh oxygen (O_2) from the air. When the blood reaches the lungs, part of the respiratory system, the blood is re-oxygenated. Your stomach, part of the digestive system, constantly interacts with your endocrine system and spreads hormones throughout your body.

It's easy to point out a few in your body. The two you think of the most are probably your respiratory and digestive system. A couple of times a day you might get hungry, sit down, and have a nice meal. All of that food gets broken down in your digestive system so that your body has energy to survive. The stuff your body doesn't need is eliminated at the other end of the digestive tract.

Since you're breathing all of the time, the respiratory system is always at work. You breathe in and out from your nose and mouth while your lungs are the main organs that allow your body to absorb the oxygen you need from the air. There are many other systems in your body and specialized systems in other animals around the world.

Respiratory Function
Your respiratory system takes in oxygen from the atmosphere and moves that oxygen into the bloodstream by allowing it to move across the membranes of the lungs into the blood vessels. The circulatory system then carries oxygen to all the cells in the body and picks up carbon dioxide waste, which it returns to the lungs. Carbon dioxide diffuses from the blood into the lungs, and you exhale it into the atmosphere.

Digestive Dependence Upon Respiration
The digestive tract is dependent upon the respiratory system, because your digestive tract functions by using muscular contractions to break up food and move it along the tract. Smooth muscle in the stomach churns food into a liquid, and contractions of the intestine move food through the system. These muscles depend upon oxygen in order to function -- without oxygen, your digestive tract would stop working.

Respiratory Dependence Upon Digestion
Similarly, your respiratory tract wouldn't be able to function without the products of digestion. While the process of exhalation is passive and doesn't require muscular contraction, you contract the respiratory muscles -- including the diaphragm and intercostal muscles -- to inhale. Muscles need fuel in order to contract, and the fuel they use is primarily in the form of carbohydrate and fat. The efforts of the digestive tract provide the cells of the respiratory muscles with fuel.

Cellular Dependence Upon Both Systems
The body cells depend upon products of both the respiratory and digestive systems' functions in order to

maintain themselves. To produce energy, cells burn nutrient molecule fuel in oxygen. The digestive tract provides the nutrient molecules, through the process of digestion, while the respiratory tract provides oxygen. As such, the two systems work together to give your cells the ingredients they need to produce energy, which they use to communicate, build cellular products and grow.

Diagram #2 - **DIGESTIVE DANCE & CHANT**

THE DOUGIE

1. In the mouth, in the mouth.
   Where the teeth chew up the food.

THE BODY WAVE

2. The esophagus, the esophagus.
   Where the food goes down the tube.

THE ROLLING PADDLE TURN

3. In the stomach, in the stomach.
   Where the acid breaks down the food.

THE SWAY

4. Small intestine, small intestine.
   Where the nutrients enter the blood.

THE JAZZ SQUARE

5. Large intestine, large intestine.
   Where the water is absorbed.

FOUR SHAPES

6. In the colon, in the colon.
   Elimination, elimination.