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Teaching “Human Body Systems” with Systems Thinking Approach
An Educational Program Design:
Human Body System with Systems Thinking

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Systems Thinking in Science Classes at Darussafaka (2022-2023 Academic Year)

- **Human Body Systems**
  - 6th Grade Science
  - Digestive System
  - Respiratory System
  - Circulatory System

- **Motion in one Dimension**
  - 6th Grade Science
  - Distance-Speed Graphs
  - Distance-Speed Problems

- **Heat and Temperature**
  - 5th Grade Science
  - Introduction to Stella Online
  - Heat Exchange

- **Healthy Life**
  - 6th-7th-8th Grade Science Project
  - Energy Inputs
  - Energy Outputs
  - Obesity
Human Body Systems & Systems Thinking

Life needs energy. That’s why all living things contain various mechanisms that transfer energy to their cells to survive.

“F.6.2 Systems in Our Body / Living Things and Life” unit of Science program in the Ministry of National Education (MoNE) curriculum of Turkey is modelled conceptually and numerically by this approach and these activities are developed.
Objectives of Digestive System

- Digestive System
- Respiratory System
- Circulatory System

F.6.2.2.1. Explains the functions of the structures and organs of the digestive system using models.
F.6.2.2.2. Makes the inference that nutrients must undergo physical (mechanical) and chemical digestion to pass into the blood.
F.6.2.2.3. Explains the functions of auxiliary digestive organs.
In summary, students would be able to

- Define systems in the human body,
- Identify the circulatory, digestive, and respiratory systems in the human body,
- Describe the essential functions of the circulatory, digestive, respiratory systems,
- Explore the ways the systems in the human body work together.
How did we use System Thinking Tools in science classes in this unit?

- We used them as a concept map,
- We used them to improve graph reading skills.
- We used them as retrieval practices.
Digestive System & Systems Thinking

Protein and Amino Acid

Fat and Fatty Acid
1) This diagram below, shows the stocks and flows of the chemical digestion of fats. Label the drawing with the missing names.

Student's correct answer: Transmission of fat to the stomach / Fat goes through swallow and esophagus

Students correct answer: Small intestine

Student's wrong answer: Pankreatic juice.

Student's corrected answer: Fat into small intestine
2) This diagram below, shows the stocks and flows of the chemical digestion of carbohydrate. Label the drawing with the missing names.

- **Student’s correct answer**: Transmission of glucose with saliva.
- **Student’s wrong answer**: large intestine

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**Student’s wrong answer**: Glucose

**Student’s corrected answer**: Glucose in mouth

**Student’s corrected answer**: Glucose in small intestine
5) Please think about the stock and flow diagram that shows the chemical digestion of carbohydrates and draw a graph of total amount of carbohydrates when they go into organs which makes a chemical digestions. After you draw the graph, please check the graph on the model and copy-paste the screenshot of it.

İki grafik arasındaki farkların sebebi: Ince bağırsaktan sonra besinin tamamen bitğini gösterseydím grafikim daha doğru olurdu. If I shows that the nutrient run out completely it would be correct answer.
Respiratory System & Systems Thinking
Human Body Systems & Systems Thinking

What are the differences in the applications of the human body systems unit between the 2021-2022 and 2022-2023 academic years?

• We tried to simplify the stock & flow diagrams in each human body system.
• We focused on a specific concept, such as chemical digestion and its graphs.
• We applied the human body systems unit with System Thinking Approach for all 6th grade students. Whereas the previous year, we had applied it only for a specific group of 6th grades students.
Digestive System & Systems Thinking (2021-2022 Academic Year)

Fat and Fatty acid
Digestive System & Systems Thinking
(2021-2022 Academic Year)
Limitations and Future Challenges

**Limitations**
- Annecdotal evidences

**Future Challenges**
- Existing topics can be deepened:
  a. Preparation of working papers for all subjects
  b. Excretory system

- New topics can be added:
  a. Support and Movement System
  b. Supervisory and Regulatory systems
  c. Health of Systems

- Academic research can be conducted
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Thank you