centre de développement pédagogique
pour la formation générale en science et technologie

COOPERATIVE ASSIGNMENT

« The heart and circulatory system »

Team guide

Name: _____

Name: _____

Name: _____

Name: _____

WORKING DOCUMENT

February 2007

Problem

During physical education and biology classes in your school, we notice an increase in obesity, breathlessness under effort and an increase in blood pressure as well as problems with diabetes and constipation. This portrait is replicated across Quebec society in youths of your age. Quebecois and Canadian children are progressively gaining extra kilos and becoming obese. The proportion of obese children has tripled in the last 20 years. The effect is premature wear in the structures of the circulatory system, resulting in cardiovascular illness as soon as early adulthood.

Why are we seeing an increase in these health problems? How can we remedy this?

Mandate :

The mandate of your team, comprised of four specialists including a cardiologist, a nutritionist, a physical trainer and an engineer, is to improve the general health of your school!

The **cardiologist** has the responsibility for explaining the composition and functions of the parts of the heart and the different blood vessels by schematics and drawings.

The **nutritionist** has the responsibility for informing his or her colleagues about the best diet and the effects of certain substances on the quality of the circulatory system. You must present a balanced diet.

The **physical trainer** has the responsibility for informing his or her colleagues about the best exercises and pace to improve and/or maintain the circulatory system's health. You must present a detailed plan to get back in shape!

The **engineer** has the responsibility for informing his or her teammates as to the physical characteristics of the components and structures of the circulatory system. He/she must identify the peculiarities and constraints of the heart as a pump as well as those of the blood vessels. He/she must show the function and direction of flow in the circulatory system with the help of the prototype. The group of engineers will therefore have to detail or perfect the valves to complete the prototype pump.

The team must :

1. Explain the workings of the heart and circulatory system. Support its explanation with a visual aid (pump-valve).

2. Present the causes and effects related to health problems as laid out in the original problem.

3. Propose viable solutions to improve the health of youths in your school both in terms of nutrition and physical condition.

4. Prepare an oral presentation, maximum ten minutes, supported by the visual aids of your choice.

Instructions:
- Form a four person team;

- Determine the role each person will play within the team;

- Give your team a name;

- The specialists within the same discipline must meet for one period, in order to discuss the notions related to their field of expertise;

- Each specialist will come back to their respective teams with the fruits of their labour, share the learned information and prepare their presentation as it relates to the original problem;

- The allotted time to answer the problem and prepare the presentation will be _____ hours.

- You must retain all your notes regarding your discussions and your team's work.

Information gathering

Specialists' team meeting

- The specialists will have one period in which to gather information and prepare their report.
- Individually, each specialist appropriates the available information and completes his file.
- As a team, they discuss and agree upon the pertinent information to consign to each of their files, and then transmit this information to the teammates from their original team.
- You must retain all your notes regarding your studies or discussions.

Multidisciplinary team meeting

- With the help of the documents gathered in the specialists' meeting, the team discusses the information and prepares the assessment (pages 4 to 7) in the team guide.
- By the end of the second period, the team must have outlined the problem and come up with solutions.
- During the 3rd and 4th periods, the team prepares its prototype (pump-valve) and the oral presentation.

Each team will turn in the team guide outlining the problem as well as each specialist's files.

Global presentation of the problem

(Within its context)

What are the principal components of the circulatory system, their characteristics and their function?

Living World
Compulsory concepts: Muscle, Types of blood vessels, circulatory system
Tissues, organs and systems

For each component, identify its internal structure, as well as the function(s) of each of these.

Describe the direction of blood flow and the pump that allows this movement.

Explanation of the scientific principles (workings of the system under study)

Why must the blood flow only in one direction?

Identify the structures that prevent blood from flowing back into the heart and blood vessels.

Determine the chemical and physical characteristics of liquids, and particularly blood (composition), as well as their behaviour.

Living World
Compulsory concepts: Function of components of blood
Material World
Compulsory concepts: Properties of solutions ((concentration, solute, solvent),)
Heterogeneous mix.

Explanation of technological principles (pump-valve model)

Determine the behaviour of liquids under pressure.
Material World
Compulsory concepts: Compressible and incompressible fluids, pressure, pressure volume relationship

Identify the capacity for compression of liquids, gases and solids.

Describe the action of a compressed liquid on the walls of a container and then the equivalent within our circulatory system.

Which structure(s) allow the heart to perform efficiently; to move blood with a certain pressure in one direction?
Living World
Compulsory concepts: Circulatory system
Types of blood vessels.
Material world
Compulsory concepts: Pressure and volume

What role does the elasticity of blood vessels play in blood circulation?

Why is it necessary for blood vessels to be sealed?

Position-taking in relation to the original problem (opinion forming)

What is the impact or importance of diet in putting the circulatory system back in working order, in improving it or even in maintaining its health?

What is the effect or importance of physical activity in putting the circulatory system back in working order, in improving it or even in maintaining its health?

What are the impacts of lifestyle on the circulatory system?

What is the usefulness of maintaining or improving the health of the circulatory system?

How would your approach be adapted to the needs of the students of your school?

Working document