

Lesson plan example using the «YOUNG CARDIOLOGISTS» application



Lesson: Science

Link to the curriculum: Circulatory system

Duration: 3 lessons x 80'

Grade: 5th grade primary students

Learning context: General education (Mainstream classroom)

The lesson plan has been developed by:

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The sequence of learning activities

The following tables present the sequence of the learning activities for the learning unit, in relation to the learning goals and the attainment/adequacy targets.

Lesson 1: Introduction to the driving question and the structure/function of the heart.

At the first lesson, the students are introduced to the driving question guiding their inquiry-based investigation (“Exercise and nutrition contribute to the circulatory system’s health: Myth or Reality?”) and their learning mission through a short learning scenario. Then, they participate in a sequence of activities with the aim of learning more about the structure and the function of the heart as the circulatory system’s vital organ.

Learning activity	Learning goal	Attainment targets/ Adequacy targets
<p>Activity 1 The students are asked to study and then to discuss the learning scenario “Exercise and nutrition contribute to circulatory system’s health: Myth or Reality?”.</p> <p>The students are also asked to prepare an informative poster, adding the title of the current learning unit.</p> <p>Duration 10 minutes</p> <p>Classroom organization Whole class discussion</p> <p>Materilas</p> <ul style="list-style-type: none"> • Projector & Computer for displaying the scenario • Scenario video 	<p>The learning scenario works as an introductory activity aiming at introducing students to the inquiry question activity and capture their interest.</p>	<p>Attainment targets 5. To make decisions and take measures for respiratory system’s health and circulatory system’s health based on evidence related to illnesses and their causes.</p> <p>Adequacy targets 5.4 Habits that positively or negatively affect the respiratory and circulatory system (e.g. uncontrolled eating, balanced diet, systematic exercise, sedentary life)</p>
<p>Activity 2 The students discuss in groups and then in a whole class discussion, the question 1, page 58: “Write down what do you know about your</p>	<p>This activity aim to support students recall and write down their previous knowledge on the topic.</p>	<p>Attainment targets 3. To interpret diagrams, graphic representations, stimulations and 3D models in order to draw conclusions about the circulatory system’s</p>

Learning activity	Learning goal	Attainment targets/ Adequacy targets
<p>hearth and blood (from previous observations, others' opinions and information that you have already read)".</p> <p>Also, the following question is added: "Find the parts of your body where you can feel your heart beating".</p> <p>Duration 10 minutes</p> <p>Classroom organization In groups / Whole class discussion</p> <p>Materials</p> <ul style="list-style-type: none"> • Worksheets: Exercise 1, page 58 		<p>organs function and blood path during the small and large circulation.</p> <p>Indicators of proficiency 3.4 To find parts of the body where we can feel the heart rate.</p>

<p>Activity 3 The students discuss in groups and then in a whole class discussion, the question 2b, page 59: "Observe the following pictures, discuss in groups and write down each organ's name".</p> <p>Duration 10 minutes</p> <p>Classroom organization In groups / Whole classroom discussion</p> <p>Materials:</p> <ul style="list-style-type: none"> • Worksheets: Exercise 2b, page 59 	<p>The activity aims to introduce students to the main organs of the circulatory system as well as to the main structure of the circulatory system.</p>	<p>Attainment targets 3. To interpret diagrams, graphic representations, stimulations and 3D models in order to draw conclusions about the circulatory system's organs function and blood path during the large and small circulation.</p> <p>Adequacy targets 3.1 The main circulatory system's organs: Heart, veins, arteries, capillary vessels.</p> <p>3.2 The position and the size of the heart in the human body.</p>
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<p>Activity 4 For the purpose of this activity, 5 learning stations are created:</p> <ul style="list-style-type: none"> • Learning station 1: "Young Cardiologists" embodied learning app [Level 1] • Learning station 2: Heart 	<p>The activity aims to introduce students to the main organs of the circulatory system as well as to the main structure of the circulatory system.</p>	<p>Attainment targets 3. To interpret diagrams, graphic representations, stimulations and 3D models in order to draw conclusions about the circulatory system's organs function and blood path during the large and small</p>
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Learning activity	Learning goal	Attainment targets/ Adequacy targets
<p>stimulation</p> <ul style="list-style-type: none"> • Learning station 3: 3D heart model made out of plastic • Learning station 4: Experiment 1: pump and small balloons • Learning station 5: Experiment using a dropper <p>Duration 50 minutes</p> <p>Classroom organization In groups/ Whole class discussions</p> <p>Materials</p> <ul style="list-style-type: none"> • “Young Cardiologists” embodied learning app [Level 1] • Heart stimulation • 3D heart model made out of plastic • Materials for experiment 1 • Materials for experiment 2 		<p>circulation.</p> <p>Adequacy targets</p> <p>3.3 The role of heart as a pump that sent the blood to all the body parts, the arteries, blood vessels that remove the blood from heart and the veins as blood vessels that transfer the blood back to the heart.</p> <p>3.5 The parts of the heart (right ventricle, left ventricle, left atrium, right atrium).</p>

Tips for a successful lesson implementation

General information: To keep your activities running smoothly, within the established time frames, it's important for the teacher to:

- Be familiar with “Young Cardiologists” embodied learning app
- Set up the equipment (kinect camera, computer, projector) and “Young Cardiologists” digital application before the lesson.
- Classify all the materials needed for the activities (ahead of time) and especially to keep the learning stations running smoothly.
- Divide students in groups before the lesson. Here, it would be useful to include a student coming from special education in each group. In this way, the student will take part in a supportive system during the activities and the teacher creates opportunities both for his/her inclusion and acceptance.
- Study the lesson plan carefully in collaboration with the special education teacher and have assigned tasks, keeping always in mind their special education students' needs.

Activity 1: Teacher need to give enough time to discuss the learning scenario with all the students. During the discussion, it would be useful if the teacher prompt students to express their initial ideas and hypothesis of how nutrition and exercise might affect the circulatory system's health. Also, the teacher needs to explain the assigned learning mission.

Activity 2: During this activity, the teacher needs to support and guide students appropriately in order to identify the heart rate measurement parts on their bodied: on the wrist joint (radial artery) or on the neck (carodit artery).

Activity 3: During this activity it would be useful to print out in enlarged size (e.g. size A3) and laminated the diagrams in exercise 2b, page 59 for each team.

Activity 4: Teacher should have organized the learning stations before the lesson. Focusing on students' support, his/her presence is crucial especially at the 1st learning station: “Young Cardiologists” embodied learning app. Focusing on the students with disabilities, is recommended not to be the first ones to use the app so that they can imitate and follow the example of the other students. In this way students with disability might have a more positive attitude towards the app. Moreover, it is particularly important that the teacher encourages each student to differentiate the movements' pace (from the slowest to the fastest) so that the students will relate the heart rate to the various daily activities (e.g. sitting, walking, running, etc.). The special education teacher could provide his/her support to the other 4 learning stations. Additional support is expected to be needed at stations 4 and 5 where students will work with simulations/experiments with actual materials.

Lesson 2: Introduction to the small and large circulation

At the second lesson the students are introduced to the pulmonary and systemic circulation as well as to the reasons why blood need to perform the specific paths in the human body.

Learning activity	Learning goal	Attainment targets/ Adequacy targets
<p>Activity 1 The teacher brings back the pedagogical scenario and the learning mission. During a whole class discussion, students are asked to present the collected information and explain their point of view about the driving question: “Exercise and nutrition contribute to circulatory system’s health. Myth or Reality? ”.</p> <p>Duration 10 minutes</p> <p>Classroom organization Whole class discussion</p> <p>Material</p> <ul style="list-style-type: none"> • Projector & Computer for presenting the pedagogical scenario • Scenario video 	<p>The pedagogical scenario works as an introductory activity aiming at introducing students to the the driving question and capture their interest.</p>	<p>Attainment targets 5. To make decisions and take measures for respiratory system’s health and circulatory system’s health based on evidences related to illnesses and their causes.</p> <p>Adequacy targets 5.4 Habits that positively or negatively affect the respiratory and circulatory system (e.g. uncontrolled eating, balanced diet, systemic exercise, sedentary life)</p>
<p>Activity 2 During this activity, the students are asked to complete the diagram, in exercise 2e, page 61: “Mark the blood final destination in each phase using the first level of «Young Cardiologists” embodied learning app”. Teacher does an example, filling in the first gap using the second level of the app. Then, a pair from each team</p>	<p>The activity aims to introduce students to blood path during the pulmonary and systemic blood circulation as well as to distinct the blood vessels that contain oxygenated blood or carbon dioxide.</p>	<p>Attainment targets 3. To interpret diagrams, graphic representations, stimulations and 3D models in order to draw conclusions about the circulatory system’s organs function and blood path during the large and small circulation.</p> <p>Adequacy targets 3.6 Blood transportation during the systemic</p>

Learning activity	Learning goal	Attainment targets/ Adequacy targets
<p>is using the app to complete the rest of the gaps.</p> <p>Duration 30 minutes</p> <p>Classroom organization Pairs / Whole class discussion</p> <p>Materials</p> <ul style="list-style-type: none"> • Worksheets: Exercise 2e, page 61 • “Young Cardiologists” embodied learning app [Level 2] 		<p>circulation: left ventricle (through arteries) - various organs of the body (through veins) - right atrium.</p> <p>3.7 Blood transportation during the pulmonary circulation: right ventricle (through arteries) - lungs (through veins), left atrium.</p> <p>3.8 Distinction between blood vessels transferring blood with oxygen and blood vessel transferring blood with carbon dioxide based on their color on the different representations.</p>

<p>Activity 3 The students work in groups in order to discuss and complete the question 2st, page 61: “Write down briefly the two paths that blood follows during its circulation”. Then, a whole class discussion is followed.</p> <p>Duration 10 minutes</p> <p>Classroom organization In groups / Whole class discussion</p> <p>Material Worksheets: Exercise 2st, page 61</p>	<p>The activity aims to introduce students to blood path during the pulmonary and systemic circulation as well as to distinct the blood vessels that contain blood and oxugen or carbon dioxide.</p>	<p>Attainment targets 3. To interpret diagrams, graphic representations, stimulations and 3D models in order to draw conclusions about the circulatory system’s organs function and blood path during the large and small circulation.</p> <p>Adequacy targets 3.6 Blood transportation during the large circulation: left ventricle (through arteries) - various organs of the body (through veins) - right atrium.</p> <p>3.7 Blood transportation during the small circulation: right ventricle (through arteries) -lungs (through veins), left atrium.</p> <p>3.8 Distinction between blood vessels transferring blood with oxygen and blood vessels transferring blood with carbon dioxide based on their color on the different representations.</p>
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Learning activity	Learning goal	Attainment targets/ Adequacy targets
<p>Activity 4 The students work in groups in order to discuss and complete the question 2z, page 61: “Why blood need to perform this two paths constantly? What does blood do in each one?”. Then, a whole class discussion is followed.</p> <p>Duration 10 minutes</p> <p>Classroom organization Groups / Whole class discussion</p> <p>Materials</p> <ul style="list-style-type: none"> Worksheets: exercise 2z, page 61 	<p>This activity aims to support students understand the role of blood during pulmonary and systemic circulation.</p>	<p>Attainment targets</p> <p>3. To interpret diagrams, graphic representations, stimulations and 3D models in order to draw conclusions about the circulatory system’s organs function and blood path during the pulmonary and systemic circulation.</p> <p>Adequacy targets</p> <p>3.9 The role of blood during the systemic circulation is to transfer oxygen from heart to the rest of the blood organs and carbon oxygen from the different organs to the heart, based on the different colors in diagrams, maps and stimulations.</p> <p>3.10 The role of blood during the pulmonary circulation is to transfer carbon oxygen from heart to the lungs and oxygen from the lungs to the heart based on the different colors in diagrams, maps and stimulations.</p>
<p>Activity 5 Each group is asked to create a concept map connecting the concepts they have learned during the lesson (e.g. heart, part of the heart, blood vessels, veins, arteries, small circulation, large circulation etc.) and to point out small and large circulation.</p> <p>Duration 20 minutes</p> <p>Classroom organization Groups</p> <p>Materials</p> <ul style="list-style-type: none"> Concept maps with the human body 	<p>The activity aims to support students connect and better understand all the new concepts they have learned during the two lessons. Also, it works as an evaluation activity, that helps teacher to evaluate students’ misconceptios and learning gains.</p>	<p>Attainment targets</p> <p>3. To interpret diagrams, graphic representations, stimulations and 3D models in order to draw conclusions about the circulatory system’s organs function and blood path during the large and small circulation.</p> <p>Adequacy targets</p> <p>3.6 Blood transportation during the large circulation: left ventricle (through arteries) - various organs of the body (through veins) - right atrium.</p> <p>3.7 Blood transportation during the pulmonary</p>

Learning activity	Learning goal	Attainment targets/ Adequacy targets
		<p>circulation: right ventricle (through arteries) -lungs (through veins), left atrium.</p> <p>3.8 Distinction between blood vessels transferring blood with oxygen and blood vessels transferring blood with carbon dioxide based on their color on the different representations.</p> <p>3.9 The role of blood during the systemic circulation is to transfer oxygen from heart to the rest of the blood organs and carbon oxygen from the different organs to the heart, based on the different colors in diagrams, maps and stimulations.</p> <p>3.10 The role of blood during the pulmonary circulation is to transfer carbon oxygen from heart to the lungs and oxygen from the lungs to the heart based on the different colors in diagrams, maps and stimulations.</p>

Tips for a successful lesson implementation

General information: To keep your activities running smoothly, within the established time frames, it's important for the teacher to:

- Be familiar with “Young Cardiologists” embodied learning app
- Set up the equipment (kinect camera, computer, projector) and “Young Cardiologists” digital application before the lesson.
- Classify all the materials needed for the activities (ahead of time) and especially to keep the learning stations running smoothly.
- Divide students in groups before the lesson. Here, it would be useful to include a student coming from special education in each group. In this way, the student will take part in a supportive system during the activities and the teacher creates opportunities both for his/her inclusion and acceptance.
- Study the lesson plan carefully in collaboration with the special education teacher and have assigned tasks, keeping always in mind their special education students' needs.

Activity 1: Teacher need to give enough time to discuss the learning scenario with all the students.

Activity 2: It is important to include a student with disability in each pair. It is expected to promote equality and a collaborative environment between all the students, abolishing any discriminations.

Activity 3-4: During this activity it would be useful if the general and special education teacher, pass by the groups in order to listen their discussions and support them when needed.

Activity 5: During this activity it is important to be given to each student a worksheet with the feature of a human body in order to complete the structure and the function of circulatory system.

Lesson 3: Introduction to the habits that affect the circulatory system's health

At the third and final lesson, the students are introduced to the habits that affect circulatory system's health (e.g. uncontrolled eating, balanced diet, systemic exercise, sedentary life) and complete their learning mission.

Learning activity	Learning goal	Attainment targets/ Adequacy targets
<p>Activity 1 The teacher brings back the pedagogical scenario and the learning mission. In the whole class discussion, students are asked to present the collected information and express their point of view regarding the driving question “Exercise and nutrition contribute to the circulatory system’s health: Myth or Reality?”.</p> <p>Duration 5 minutes</p> <p>Classroom organization Whole class discussion</p> <p>Materials</p> <ul style="list-style-type: none"> • Projector & Computer for presenting the learning scenario • Scenario video 	<p>The learning scenario works as an introductory activity aiming at introducing students to the driving question and capture their interest.</p>	<p>Attainment targets 5. To make decisions and take measures for respiratory system’s health and circulatory system’s health based on evidences related to illnesses and their causes.</p> <p>Adequacy targets 5.4 Habits that are positively or negatively affect the respiratory and circulatory system (e.g. uncontrolled eating, balanced diet, systemic exercise, sedentary life)</p>
<p>Activity 2 This activity aims to explain to students how certain habits contribute to circulatory system’s health as well as how unhealthy habits can cause health problems (e.g. atherosclerotic plaque, thrombus). During this activity, students are called to work to the following learning stations:</p> <ul style="list-style-type: none"> • Learning station 1: “Young Cardiologists” embodied 	<p>This activity aims to introduce students to the daily habits (e.g. uncontrolled eating, balanced diet, systemic exercise, sedentary life) and how the circulatory system’s is being affected by them.</p>	<p>Attainment targets 5. To make decisions and take measures for respiratory system’s health and circulatory system’s health based on evidences related to illnesses and their causes.</p> <p>Adequacy targets 5.1 Interpretation of research data that present the frequency of cardiac and breathing diseases between groups that follow certain</p>

Learning activity	Learning goal	Attainment targets/ Adequacy targets
<p>learning app [Level 3] (10')</p> <ul style="list-style-type: none"> • Learning station 2: Smoking [Read an article & video] (10') • Learning station 3: Unhealthy eating [Read an article & video] (10') • Learning station 4: Lack of exercise [Read an article & Video] (10') • Learning station 5: Healthy habits [Read an article & video] (10') <p>Duration 50 minutes</p> <p>Classroom organization Groups/ Whole class discussion</p> <p>Materials</p> <ul style="list-style-type: none"> • “Young Cardiologists” embodied learning app [Level 3] • Short articles and videos about healthy and unhealthy habits that affect the circulatory system. 		<p>habits (e.g., smokers, non-smokers, athletes, not athletes).</p> <p>5.2 Pictures and x-rays interpretation that present how unhealthy habits affect respiratory and circulatory systems’ organs functionality.</p> <p>Adequacy targets</p> <p>5.4 Habits that are positively or negatively affect the respiratory and circulatory system (e.g. uncontrolled eating, balanced diet, systemic exercise, sedentary life)</p> <p>5.5 Preventive measures to prevent contagious diseases and other diseases in respiratory and circulatory system.</p>

<p>Activity 3 The students are called to complete their mission and prepare an informative poster entitled: “Exercise and health contribute to the circulatory system’s health: Myth or Reality?”.</p> <p>Duration 25 minutes</p> <p>Classroom organization Groups</p> <p>Materials</p> <ul style="list-style-type: none"> • Cardboards 	<p>This activity aims to support students connect and understand all the concepts they have introduced to during the three lessons in relation to the inquiry question. It is also an evaluation activity, for students’ misconceptions and learning gains.</p>	<p>Attainment targets</p> <p>3. To interpret diagrams, graphic representations, stimulations and 3D models in order to draw conclusions about the circulatory system’s organs function and blood path during the systemic and pulmonary circulation.</p> <p>5. To make decisions and take measures for respiratory system’s health and circulatory system’s health based on evidences related to illnesses and their causes.</p>
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Learning activity	Learning goal	Attainment targets/ Adequacy targets
<ul style="list-style-type: none"> • Pictures • Markers • Glues 		<p>3.3 The role of heart as a pump that sent the blood to all the body parts, the arteries, blood vessels that remove the blood from heart and the veins as blood vessels that transfer the blood back to the heart.</p> <p>3.5 The parts of the heart (right ventricle, left ventricle, left atrium, right atrium).</p> <p>3.6 Blood transportation during the large circulation: left ventricle (through arteries) - various organs of the body (through veins) - right atrium.</p> <p>3.7 Blood transportation during the pulmonary circulation: right ventricle (through arteries) - lungs (through veins), left atrium.</p> <p>3.8 Distinction between blood vessels transferring blood with oxygen and blood vessel transferring blood with carbon dioxide based on their color on the different representations.</p> <p>3.9 The role of blood during the large circulation is to transfer oxygen from heart to the rest of the blood organs and carbon oxygen from the different organs to the heart, based on the different colors in diagrams, maps and stimulations</p> <p>3.10 The role of blood during the small circulation is to transfer carbon oxygen from heart to the lungs and oxygen from the lungs to the heart based on the different colors in diagrams, maps and stimulations.</p>

Learning activity	Learning goal	Attainment targets/ Adequacy targets
		<p>5.1 Interpretation of research data that present the frequency of cardiac and breathing diseases between groups that follow certain habits (e.g., smokers, non-smokers, athletes, not athletes).</p> <p>5.2 Pictures and x-rays interpretation that present how unhealthy habits affect respiratory and circulatory systems' organs functionality.</p> <p>5.4 Habits that are positively or negatively affect the respiratory and circulatory system (e.g., uncontrolled eating, balanced diet, systemic exercise, sedentary life)</p> <p>5.5 Preventive measures to prevent contagious diseases and other diseases in respiratory and circulatory system.</p>

Tips for a successful lesson implementation

General information: To keep your activities running smoothly, within the established time frames, it's important for the teacher to:

- Be familiar with “Young Cardiologists” embodied learning app
- Set up the equipment (kinect camera, computer, projector) and “Young Cardiologists” digital application before the lesson.
- Classify all the materials needed for the activities (ahead of time) and especially to keep the learning stations running smoothly.
- Divide students in groups before the lesson. Here, it would be useful to include a student coming from special education in each group. In this way, the student will take part in a supportive system during the activities and the teacher creates opportunities both for his/her inclusion and acceptance.
- Study the lesson plan carefully in collaboration with the special education teacher and have assigned tasks, keeping always in mind their special education students' needs.

Activity 1: Teacher need to give enough time to discuss the learning scenario with all the students.

Activity 2: Teacher should have organized the learning stations before the lesson. Focusing on students' support, his/her presence is crucial especially at the 1st learning station: “Young Cardiologists” embodied learning app. Focusing on the students with disabilities, is recommended not to be the first ones to use the app so that they can imitate and follow the example of the other students. In this way students with disability might have a more positive attitude towards the app. Moreover, it is particularly important that the teacher encourages each student to differentiate the movements' pace (from the slowest to the fastest) so that the students will relate the heart rate to the various daily activities (e.g. sitting, walking, running, etc.). The special education teacher could provide his/her support to the other 4 learning stations. Additional support is expected to be needed at stations 4 and 5 where students will work with simulations/experiments with actual materials.

Activity 3: The teacher can inform students that the best poster will be posted on the classroom board in order to capture their interest. If it's possible, each team could prepare a different informative material as follows: e.g.,

- **Team 1:** Poster for the central school board.
- **Team 2:** YouTube video to inform the social media community.
- **Team 3:** Short article for the school magazine.
- **Team 4:** Short text for the school website.
- **Team 5:** Flyers to inform the school community.