# SPORTHEALTH & DEPENDENCE

## TEACHERS INVOLVED IN THE DESIGN OF THIS EDUCATIONAL GUIDE:

(Add some many rows as you need to include all teachers' names and information).

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Sportshealth & dependence: study of the correlation between musculoskeletal length and athletic performance

## PROJECT of (choose one):

| | |
|---|---|
| X | SPORT-health |
| | MENTAL-health |
| | NUTRI-health |
| | NEUMO-health |
| | CARDIO-health |
| | REPRO-health |

## Learn- STEM Model

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| X | COMPLEX |
| **X** | PROGRESS-ORIENTED |
| X | HOLISTIC |
| X | PRACTICAL |
| X | SOCIAL |

## **KEY COMPETENCES** OF THE PROJECT (choose one or more):

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| | Literacy |
| X | Multilingual |
| X | Mathematics, Science, Technology & Engineering |
| X | Personal, social and learning to learn |
| | Citizenship |
| | Entrepreneurship |
| X | Cultural awareness |

## **SUSTAINABLE DEVELOPMENT GOALS** of the project (choose one or more):

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| | No poverty |
| | Zero Hunger |
| X | Good Health and Well-being |
| X | Quality Education |
| X | Gender Equality |
| | Clean water and Sanitation |
| | Affordable and Clean Energy |
| | Decent Work and Economic Growth |
| | Industry, Innovation and Infrastructure |
| | Reduced Inequality |
| | Sustainable Cities and Communities |
| | Responsible Consumption and Production |
| | Climate Action |
| | Life Below Water |
| | Life on Land |
| | Peace and Justice Strong Institutions |
| | Partnerships to achieve the Goal |

## **SUBJECTS OF THE CURRICULA** worked in this project:

| | |
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| X | Mathematics |
| X | Technology |
| X | Geography & History |

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| X | Biology & Geology |
| X | Physical Education |
| X | English |

## GENERAL DESCRIPTION OF THE PROJECT:

The project is focused on the physical and functional properties of the organs of the musculoskeletal system, studying the possible correlations between the length of some of these organs and their efficiency in physical activities and sports.

## SPECIFIC STUDENTS' COMPETENCES

Key competences:

- ❖ LITERACY COMPETENCE.
- ❖ COMPETENCE IN SCIENCE.
- ❖ DIGITAL COMPETENCE.
- ❖ MULTILINGUAL COMPETENCE
- ❖ LEARNING TO LEARN COMPETENCE.

Objectives of the project:

- Identification and understanding the function of the organs that form the musculoskeletal system.
- Studying the types and dynamics of levers using the joints in the locomotor system as a guide.
- Identification and representation of the most important muscles and bones involved in different athletic activities.
- Record the scores in several athletic activities.
- Study of the correlation between two variables using data recorded and creating graphs.
- Study of the anatomical characteristics of human ancestors and creation of hypothesis about their scores in athletic activities.
- Design and production of an oral presentation in which the new vocabulary of the project must be a backbone.

## DESCRIPTION OF EACH ACTIVITY

# 1st session: BIOLOGY & GEOLOGY

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| *OBJECTIVES* | 1. Identify the main organs in the musculoskeletal system of vertebrates.<br>2. Understand the physiology and function of the main organs in the musculoskeletal system.<br>3. Assimilate new scientific vocabulary related to the musculoskeletal system. |
| *MAIN QUESTIONS TO BE ANSWERED BY STUDENTS MAKING THIS PROJECT* | • How do muscles and bones work to make movement possible?<br>• Which are the main organs involved in locomotion?<br>• Where are these organs in different vertebrate animals? |
| *STUDENTS´ ORGANIZATION* | Groups of 4-5 students (depending on the number of students in the group). |
| *TIME* | 2 sessions:<br>• 1st session: arm anatomy.<br>• 2nd session: leg anatomy. |
| *RESOURCES* | • Organkits.<br>• Smartphone/video camera.<br>• Textbook/source of information. |
| *ASSESSMENT & EVALUATION* | Final product: video recorded by students in which they identify and explain the main muscles, bones and joints in the arm (1st session) and leg (2nd |

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| | session). |
| *TIPS & TRICKS* | Muscle/bone measurement could take place during the Biology session if necessary. |
| *PROCESS OF WORK* | |
| ● Explanation of the Organkit contents:<br>○ Organs included in the kit.<br>○ Anatomical structures.<br>○ Functions.<br>○ Specific vocabulary.<br>● The students identify the same organs and structures in their own body (*connected with PE*).<br>● The students record a video explaining the organs and structures included in the Organkit. | |
| DIGITAL RESOURCES | |
| ● Rubric for the video. | |

## 2nd session: TECHNOLOGY & ENGINEERING

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| *OBJECTIVES* | 1. Study the linear transmission mechanisms.<br>2. Identify the types of levers: 1st class, 2nd class and 3rd class. |
| *MAIN QUESTIONS TO BE ANSWERED BY STUDENTS MAKING THIS PROJECT* | • Where are the first, second or third degree levers in the human body?<br>• What elements of the musculoskeletal system are involved in a jump?<br>• Does a longer femur make it possible to jump higher? |
| *STUDENTS´ ORGANIZATION* | Groups of 4-5 students (depending on the number of students in the group). |
| *TIME* | 2 lessons<br>• **1st session:** The teacher will provide a list of everyday objects for students, and they identify what type of lever is. Students will make a table and they will classify them in 1st, 2nd or 3rd class.<br>• **2ª sesión**: Students will locate the three types of levers in the human body. |
| *RESOURCES* | • Sports-health OrganKit<br>• Student's laptops<br>• Textbook |

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| *ASSESSMENT & EVALUATION* | The activity will be assessed by a rubric in which the following points would be evaluated:<br>• Scientific vocabulary used during the activity.<br>• Accuracy and clarity of the explanation.<br>• Reliability of the sources from which the information has been obtained. |
| *PROCESS OF WORK* | |
| • Study of the types of levers in the musculoskeletal system.<br>• Using the contents of the Organkit as a starting point, students must draw conclusions about the structures in the musculoskeletal system that play a main role in several physical activities (*connected with PE*).<br>• Students would answer several questions considering, according to levers theory, if there could be a relationship between some characteristics of the organs they have studied and the results in these physical activities. | |
| DIGITAL RESOURCES | |
| • Activity 1: biomechanics.<br>• Activity 2: study of levers using Scratch. | |

## 3rd session: PHYSICAL EDUCATION

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| *OBJECTIVES* | 1. Identify the main organs in the musculoskeletal system of vertebrates.<br>2. To be able to reproduce the concepts worked on and assimilated with the "organkits": musculature, tendons, ligaments and main bone elements.<br>3. Identify and recognise the direct relationship between the musculoskeletal system and physical-sporting performance. |
| *MAIN QUESTIONS TO BE ANSWERED BY STUDENTS MAKING THIS PROJECT* | • Do you recognize the main structure of the human body?<br>• Can you reproduce these structures in your own body or in the bodies of your classmates?<br>• Do you know what your body scheme is?<br>• Could you Identify and recognise the direct relationship between the musculoskeletal system and physical-sporting performance? |
| *STUDENTS´ ORGANIZATION* | Groups of 4-5 students (depending on the number of students in the group). |
| *TIME* | 1 session |
| *RESOURCES* | • Organkits: locomotor system.<br>• Pencils for body use.<br>• Sports measuring equipment: stopwatch, tape measure, etc. |

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| *ASSESSMENT & EVALUATION* | • Use of a comparative anatomical model which has been approved as a meaningful sample.<br>• Use of standardised tables to compare the results obtained in each of the physical tests.<br>• Finally, an observation and note sheet is used for final reflection. |
| *PROCESS OF WORK* | |
| • *Previously students have been studying and practising several physical activities: high jump, long jump, speed, flexibility, etc.*<br>• The session would begin revising the appropriate technique to be used in these type of activities.<br>• "Body painting" activity (*connected with Biology & Geology*) using the Organkit as a model to identify the main organs and structures involved in these activities.<br>• Finally, these physical activities would be carried out, recording the scores of each group member. | |
| DIGITAL RESOURCES | |
| • Body painting anatomy example | |

# 4th session: MATHS

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| *OBJECTIVES* | 1. Measure complex geometric elements by dividing them into known shapes.<br>2. Study two-dimensional statistical variables and their parameters.<br>3. Analyze the correlation between different variables. |
| *MAIN QUESTIONS TO BE ANSWERED BY STUDENTS MAKING THIS PROJECT* | • Is there any correlation between the geometric measurements of the different bones and muscles?<br>• And between these measures and the results in sports tests? |
| *STUDENTS´ ORGANIZATION* | Groups of 4-5 students (depending on the number of students in the group). |
| *TIME* | 2 sessions:<br>• 1st session: measurement of geometric variables<br>• 2nd session: statistical study. |
| *RESOURCES* | • Organkits.<br>• Ruler and compass.<br>• Computer with spreadsheet |
| *ASSESSMENT & EVALUATION* | Final product: spreadsheet with statistical variables and graphs that analyze the correlation between variables. |

| *PROCESS OF WORK* |
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| • Students would measure the length of the organs included in the Organkit and the same organs in their own body.<br>• A spreadsheet would be created by the students in which they would write down the length of the measured organs and the score of the physical activities (*session 3: PE*).<br>• From the data in the spreadsheet, students would create graphs in which every two variables would be correlated (i.e. lengtH of femur-high jump score, etc.).<br>• Analysing the generated graphs, students must draw conclusions regarding the relationship between variables. |
| DIGITAL RESOURCES |
| • Rubric<br>• Open Office statistical manual<br>• Correlation Graph in Open Office |

## 5th session: GEOGRAPHY & HISTORY

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| *OBJECTIVES* | 1. Identify the main physical changes that happened during the process of evolution.<br>2. Be able to understand the correlation between the body and the environment. |
| *MAIN QUESTIONS TO BE ANSWERED BY STUDENTS MAKING THIS PROJECT* | ● Were our ancestors able to perform physical activities like us?<br>● Did evolution change our physical characteristics? How?<br>● It's evolution a constant improvement? |
| *STUDENTS´ ORGANIZATION* | Groups of 4-5 students (depending on the number of students in the group). |
| *TIME* | 2 sessions<br>● First session: Students will read selected articles about the topic and draw their conclusions.<br>● Second session: Students will collect the data from the previous activities (from other subjects) and compare them with the data they had from our ancestors. |
| *RESOURCES* | ● Computers.<br>● Some specialised articles printed.<br>● The conclusions from the other subjects. |
| *ASSESSMENT &* | Final product: A global presentation of the |

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| *EVALUATION* | conclusions (rating their ability to link them to the other subjects). |
| *PROCESS OF WORK* | |
| ● Students would design infographics based on the conclusions from researches about physical activity in evolutionary biology: hypothesise about the scores the ancestors of *Homo sapiens* would obtain in the physical activities carried out by the students.<br>● Students must consider whether a correlation can be established between the score in these physical activities and different populations in the world. | |

## 6th session: ENGLISH

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| *OBJECTIVES* | 1. Organize short texts appropriate to the proposed communicative situation.<br>2. Use knowledge and strategies to improve the ability to communicate with support from other participants and digital media.<br>3. Guided implementation of strategies that facilitate and support the understanding and production of information and communication. |
| *MAIN QUESTIONS TO BE ANSWERED BY STUDENTS MAKING THIS PROJECT* | • What are the most relevant aspects of each subject related to the plastinated organ?<br>• How do I organize the information obtained from each subject to make a presentation that summarizes what we have learned during the different sessions worked? |
| *STUDENTS´ ORGANIZATION* | Groups of 4-5 students (depending on the number of students in the group). |
| *TIME* | 3 sessions:<br>• gathering of information and distribution of tasks to choose which tool is best suited to develop the oral presentation.<br>• group start-up and teacher advice<br>• Students' project presentations |
| | • Organkit<br>• Notes/materials collected from the different |

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| *RESOURCES* | subjects<br>● Laptops<br>● Interactive whiteboard |
| *ASSESSMENT & EVALUATION* | A rubric that will evaluate the objectives set in each of the different subjects and their achievement, in addition to a correct use of the foreign language. |
| *PROCESS OF WORK* | |
| ● Students would give a presentation in English explaining the conclusions obtained from all sessions.<br>● Students will be encouraged to use the Organkit as a support to explain the results to the rest of the group. | |
| DIGITAL RESOURCES | |
| ● Top 10 sport & health facts.<br>● Videos:<br>○ importance of physical activity.<br>○ exercise can reduce the risk of diseases<br>○ What happens inside your body when you exercise? | |

## TIPS & TRICKS

- Those sessions in which data is obtained (measuring the length in bones/muscles, athletic activities scores, data correlation) are essential to obtain a valid hypothesis and thus cannot be ignored.
- The rest of the sessions can be modified at will.
- Data correlation should take place during Maths, as well as the athletic activities during Physical Education.
- Muscle/bone length measurement could take place either during the Biology, Physical Education or Maths session.
- The order of the sessions does not disrupt the project as long as the Math session takes place afterwards the measurement.
- The groups of students:
    - should not change during PE and Maths.
    - can change as it will not disrupt the data.
- Students´ diversity: the oral presentation which would be the final product can be allocated according to the students´ difficulties, assigning the most complex presentations to those students who feel more confident expressing themselves in the English language.

## SELF-ASSESSMENT

This checklist has been included to promote the self-reflection about this designed educational project.

| | yes | no | Not sure |
|---|---|---|---|
| This proposal is based on **PBL** (Project Based Learning) | X | | |
| The project has be designed from a **muldisciplinary** perspective, with the integration of different subjects and approaches to knowledge | X | | |
| The educational design is **flexible**, every secondary school will be able to adapt it to its contexts, students' profile or educational needs. | X | | |
| We have considered the **key competences** and the **ODS** to design the project | X | | |
| We use **OrganKits** as the core of the project | X | | |
| We recommend some **open resources** (available in open access on internet) | X | | |

## FEEDBACK