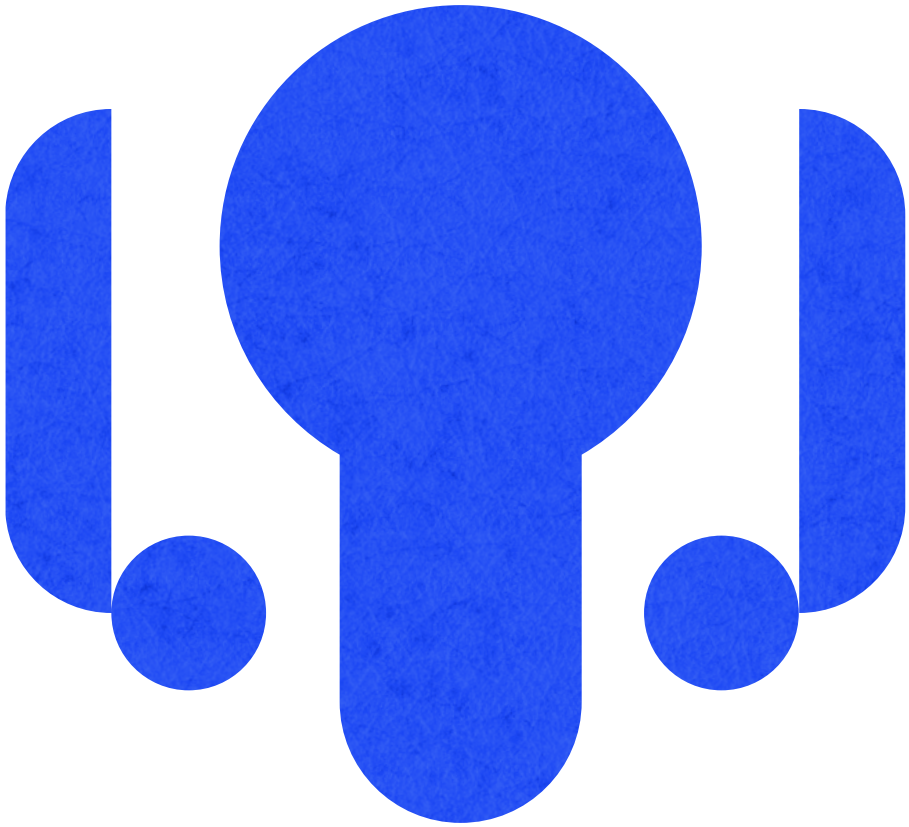
OrganKits
for STEAM

Co-funded by
the European Union



EDUCATIONAL GUIDE
to implement **OrganKits**

REPROHEALTH &GENDER

organkitsproject.eu

REPROHEALTH&GENDER

TABLE OF CONTENTS

"The moment a **child** is born, the **mother** is also born.
She never existed before.
The woman existed, but the mother, never.
A mother is something absolutely **new.**"

Osho

Reprohealth & gender:
Study of human reproduction and fertility through the use of plastinated organs

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PROJECT

- [ ] SPORT-HEALTH
- [ ] NEUMO-HEALTH
- [ ] MENTAL-HEALTH
- [ ] CARDIO-HEALTH
- [ ] NUTRI-HEALTH
- [x] REPRO-HEALTH

LEARN-STEM MODEL

- [x] Complex
- [x] Progress-oriented
- [x] Holistic
- [x] Practical
- [x] Social

KEY COMPETENCES OF THE PROJECT

- [ ] 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

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

SUBJECTS OF THE CURRICULA worked in this project:

- Mathematics
- Technology & Engineering
- Science
- Physical Education
- English
- Art

GENERAL DESCRIPTION OF THE PROJECT:

The "Reprohealth & Gender" project aims to enhance reproductive health and gender education in secondary schools through the use of plastinated organs and advanced technologies such as 3D printing. This multidisciplinary approach covers biology, technology, engineering, art, history, mathematics, physics, physical education, and English.

Students explore human reproductive organs, understanding their physiology and function. They use 3D scanning techniques to create prosthetics, appreciating their significance in reproductive medicine. Additionally, they develop genetic algorithms, promoting logical and critical thinking.

The project includes an artistic exploration of gestational anatomy through the work of Frida Kahlo and a historical analysis of women's empowerment and motherhood. In mathematics and physics, students analyze demographic and reproductive health data, learning to interpret and represent data. Physical education focuses on strengthening the pelvic floor. In English subject, students learn vocabulary related to the reproductive system, enhancing their language skills. "Reprohealth & Gender" is a comprehensive project that fosters practical skills, critical thinking, and cultural and social awareness.

SPECIFIC STUDENTS' COMPETENCES TO DEVELOP (LEARNING OUTCOMES)

Observing

Creating guide questions

Developing Team Job skills

Solving Problems

Identifying connections and relationships

Acquiring and interpreting data

Learning how to communicate

Learning to design routes

Discussing relevant arguments

Respecting deadlines and tasks' instructions

Debating

Self assessing

This proposal is based on **PBL** (Project Based Learning).

The project has be designed from a **muldisciplinary** perspective, with the integration of different subjects and approaches to knowledge.

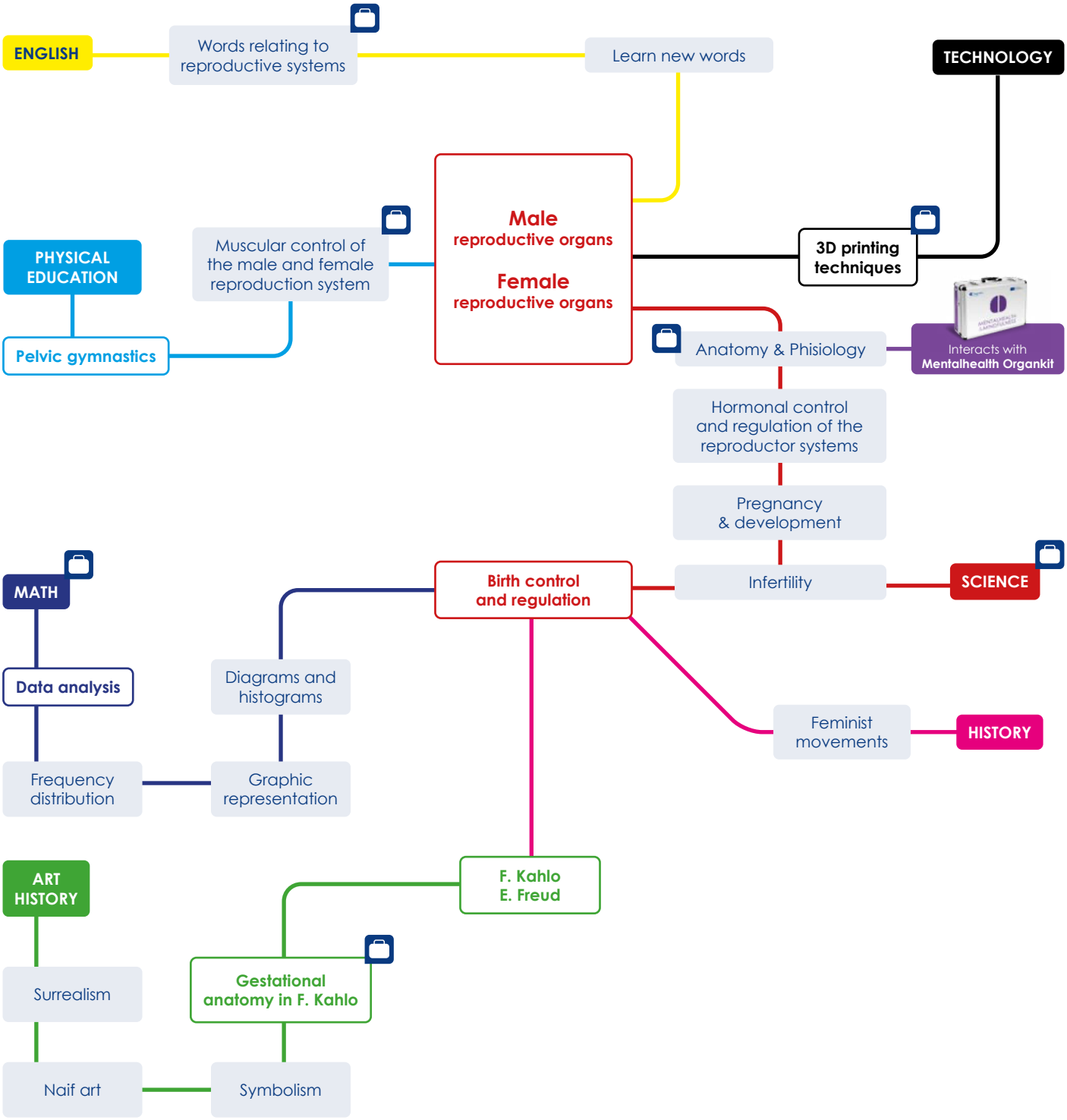
The educational design is **flexible,** every secondary school will be able to adapt it to its contexts, students' profile or educational needs.

We have considered the **key competences** and the **ODS** to design the project.

We use **OrganKits** as the core of the project .

We recommend some **open resources** (available in open access on internet)

PROJECT MAP



* This activity uses the OrganKits case.

SCIENCE / BIOLOGY

LEARNING UNIT 1: ***THE HUMAN REPRODUCTIVE SYSTEM***

OBJECTIVES

- Identify the main organs in the reproductor system of vertebrates.
- Understand the physiology and function of the main organs in the reproductor system.
- Identify the most common causes of infertility.
- Assimilate new scientific vocabulary related to the reproductive system.

MAIN QUESTIONS TO BE ANSWERED BY STUDENTS MAKING THIS PROJECT

- Which are the main organs involved in reproduction?
- How does the female and male reproductive system work?
- Where does the development of the embryo take place?
- Which are the healthy habits related to the reproductive system?

STUDENTS´ ORGANIZATION

Groups of 4-5 students (depending on the number of students in the group).

TIME

4 sessions:

- 1st session: female reproductive system.
- 2nd session: male reproductive system.
- 3rd session: fertilisation, embryo development and birth.
- 4th session: diseases of the reproductive system and assisted reproduction techniques.

RESOURCES

- Organkits.
- Smartphone/video camera.
- Textbook/source of information.

ASSESSMENT & EVALUATION

Final product: video recorded by students in which they identify and explain the main organs involved in reproduction.

PROCESS OF WORK

- Explanation of the Organkit contents:
  - Organs included in the kit.
  - Anatomical structures.
  - Functions.
  - Specific vocabulary.
- The students record a video explaining the organs and structures included in the Organkit.

DIGITAL RESOURCES

Female reproductive system picture

Male reproductive system picture

Female reproductive system picture

Male reproductive system picture

Female reproductive system video I

Male reproductive system video I

Female reproductive system video II

Male reproductive system video II

Female reproductive system video

Male reproductive system video

Fertilization phases picture

TECHNOLOGY

LEARNING UNIT 2:
3D SCANNING AND PRINTING OF THE REPRODUCTIVE SYSTEM

OBJECTIVES

- Develop spatial intelligence.
- Know 3D scanning techniques.
- Value the importance of 3D scanning techniques in medicine.
- Scan organs of the female reproductive system to create polymer PLA prosthesis (cervix, ovaries, etc.) for assisted reproduction using a 3D printer.

MAIN QUESTIONS TO BE ANSWERED BY STUDENTS MAKING THIS PROJECT

- Which are the main 3D scan techniques?
- Which are the main applications of 3D scanning in medicine?
- Are 3D ultrasound and 3D scan the same technique?
- Which 3D print prosthesis have made pregnancy possible in infertile patients?

STUDENTS´ ORGANIZATION

Groups of 4 students.

RESOURCES

- Reprohealth & Gender Organkit
- 3D Scanner
- Laptops
- 3D printer
- PLA filament

TIME

6 sessions:
- 1st session: 3D scanning techniques and awareness-raising of its importance in medicine.
- 2nd and 3rd sessions: scanning of different organs available in the Reprohealth and Gender Organkit.
- 4th session: basic parameters of 3D print.
- 5th and 6th sessions: 3D printing of selected prosthesis.

ASSESSMENT & EVALUATION

The assessment of each group of students will be carried out by a rubric which will include the following points:

- Raising a problem
- Objectives
- Theoretical framework
- Methodology
- Results analysis
- Built object

ASSESSMENT & EVALUATION

The files obtained with the scanned organs will be available for any department which could be interested in using them (e.g. it would be interesting if the Biology and Geology department made an identification of the different structures in the reproductive system).

PROCESS OF WORK

- Firstly, the students in each group will develop a research project in which they must find answers to the questions in point nº 2.
- Secondly, they will begin with the scanning of the organs included in the Organkit.
- Afterwards, using the knowledge acquired during the sessions in Biology and Geology and the appropriate software, they will identify the main structures in each organ.
- Finally, using additive manufacturing (3D printer), they will obtain the most important structures according to the research performed by each group.

DIGITAL RESOURCES

Cervix 3D printed prosthesis article

Cervix 3D printed first birth article

3D scanning characteristics article

ENGINEERING

LEARNING UNIT 3: ***THE GENETIC ALGORITHM***

TARGET GROUP

15-16 years old students

PREREQUISITES

- Basic elements of computer science
- Language analysis

FINAL OUTCOME

Implementation of an algorithm for selecting to determine an evolution of its assigment.

KEY COMPETENCES

- Design, identify links and relationships
- Collaborate and participate
- Communicate, acquire and interpret information

COMPETENCE ACHIEVEMENTS

- To understand the essentials of programming languages.
- Choose appropriate procedures for defining an algorithm.
- Development of logical thinking and critical thinking.
- Use IT tools and technologies.

LEARNING OBJECTIVES

- Observation
- Interpretation
- Experimention
- Communication

CONTENTS

- The evolution algorithms
- The ant algoritm
- The weight of nodes

SUBJECT OBJECTIVES

To know how to define a simple genetic algorithm.

TEACHING METHOD

Active learning, Project based learning, interactive lesson, debate. Know how to define a simple algorithm

RESOURCES

Educational videos , supplementary multimedia material, textbooks, Internet resources

IMPLEMENTATION AND TIME

March -April / 8 hours

EVALUATION

Formative and summative

ARTS

LEARNING UNIT 4: ***THE GESTATIONAL ANATOMY OF FRIDA KAHLO***

TARGET GROUP

16-17 years old students

PREREQUISITES

Basic elements of arts

FINAL OUTCOME

Video, Power point, text production

KEY COMPETENCES

Creates personal and creative works based on an original conception and design, applying the knowledge and rules of visual language, choosing different techniques and materials in a functional way even with the integration of multiple media and expressive codes.

Masters the main elements of visual language, reads and understands the meanings of still and moving images, audiovisual movies and multimedia products.

COMPETENCE ACHIEVEMENTS

Creates personal and creative works based on an original conception and design, applying the knowledge and Reads the most significant works produced in ancient, medieval, modern and contemporary art, knowing how to place them in their respective historical, cultural and

environmental contexts; recognizes the cultural value of images, works and handicrafts produced in countries other than one's own.

Recognizes the main elements of the cultural, artistic and environmental heritage of its territory and is sensitive to the problems of its protection and conservation.

Analyzes and describes cultural heritage, static and multimedia images, using the appropriate language rules of visual language, choosing different techniques and materials in a functional way even with the integration of multiple media and expressive codes.

Masters the main elements of visual language, reads and understands the meanings of still and moving images, audiovisual movies and multimedia products.

LEARNING OBJECTIVES

Observation, interpretation, experimention and communication

CONTENTS

- Surrealism
- Naife Art
- Symbolism
- Frida Kahlo
- The Relationship between the work of Frida Kahlo and Freudian psychoanalysis
- The Gestational Anthology in Frida Kahlo

SUBJECT OBJECTIVES

To know how to art about the gestational theme.

IMPLEMENTATION AND TIME

10h

TEACHING METHOD

- Introductory lesson
- Brain storming on selected works
- Analysis of works in circle time
- Extrapolation of recurring themes
- Co-presence with the science teacher
- Multimedia work production

RESOURCES

- Multimedia Interactive Whiteboard
- OrganKit
- Textbook

EVALUATION

The evaluation will be carried out on the products developed.

DIGITAL RESOURCES

Frida Kahlo: The woman behind the legend - Iseult Gillespie

Henry Ford Hospital by Frida Kalho

HISTORY

LEARNING UNIT 5: ***WOMEN'S EMPOWERMENT AND MOTHERHOOD***

TARGET GROUP

16-17 years old students

PREREQUISITES

Basic elements of history

FINAL OUTCOME

Video, Power point, text production

IMPLEMENTATION AND TIME

10h

KEY COMPETENCES

Planning, identifying links and relationships; collaborating and participating, communicating, acquiring and interpreting information

COMPETENCE ACHIEVEMENTS

Be aware of the historical evolutionary path that has led to a re-evaluation of the role of women in society

LEARNING OBJECTIVES

Observation, interpretation, experimention and communication

CONTENTS

Role of women from post-unification Italy to the present day

SUBJECT OBJECTIVES

- Kathe Schirmaker
- Post-unification period in Italy
- Urbanization of the second post-war
- The sexual revolution

TEACHING METHOD

- Introductory lesson
- Brain storming on selected works
- Analysis of works in circle time
- Extrapolation of recurring themes
- Co-presence with the science teacher
- Multimedia work production

RESOURCES

- Multimedia Interactive Whiteboard
- OrganKit
- Textbook

EVALUATION

The evaluation will be carried out on the products developed.

MATHS & PHYSICS

LEARNING UNIT 6: ***STATISTICS***

TARGET GROUP

15-16 years old students

PREREQUISITES

- Operations with rational numbers
- Number representations (fractions, decimal numbers, percentages)
- Approximations by defect and excess
- Fundamentals of logic

FINAL OUTCOME

- Graphs and tables of social surveys,
- Interviews with classes
- "Sample classes"

KEY COMPETENCES

Planning, identifying links and relationships; collaborating and participating, communicating, acquiring and interpreting information

COMPETENCE ACHIEVEMENTS

Identifying real difficult situations that occur daily; questions on situations to be examined, data collection and tabulation of information

LEARNING OBJECTIVES

Observation, interpretation, experimention and communication

CONTENTS

- Statistical survey
- Graphical representations
- Analysis of statistical distributions

SUBJECT OBJECTIVES

- To understand the importance of the statistical method in order to make choices and decisions.
- To know how to carry out a statistical survey by identifying with certainty the relevant phases: reading, interpreting and ordering data.
- To be able to graphically represent summarised data collected in the survey (by "hand" and using Excel).
- To know how to analyse statistical distributions using position and variance indices (by "hand"and using Excel).

IMPLEMENTATION AND TIME

November – January/ 8h

TEACHING METHOD

Active learning, Project based learning, interactive lesson, debate.

RESOURCES

Educational videos , supplementary multimedia material, textbooks, internet resources

EVALUATION

Formative and summative

LEARNING UNIT 7: ***BIRTH DATA STATISTIC ANALISYS***

TARGET GROUP

15-16 years old students

PREREQUISITES

- Operations with rational numbers
- Number representations (fractions, decimal numbers, percentages)
- Approximations by defect and excess
- Fundamentals of logic

FINAL OUTCOME

- Graphs and tables of social surveys,
- Interviews with classes
- "Sample classes"

KEY COMPETENCES

Planning, identifying links and relationships; collaborating and participating, communicating, acquiring and interpreting information

COMPETENCE ACHIEVEMENTS

Identifying real difficult situations that occur daily; questions on situations to be examined, data collection and tabulation of information

LEARNING OBJECTIVES

Observation, interpretation, experimention and communication

CONTENTS

DEMOGRAFIC INDICATORS:

- Birth rate
- Life Expectancy at Birth
- Infertility statistics data

SUBJECT OBJECTIVES

- To be able to read the demografic statistical data in order to interpretate phenomens
- Interpret statistical data
- Detect consequences from statistical data
- To know how to analyse statistical distributions using position and variance indices (by "hand"and using Excel).

IMPLEMENTATION AND TIME

November – January/ 8h

TEACHING METHOD

Active learning, Project based learning, interactive lesson, debate.

RESOURCES

Educational videos , supplementary multimedia material, textbooks, internet resources

EVALUATION

Formative and summative

PHYSICAL EDUCATION

LEARNING UNIT 8: ***PELVIC FLOOR AND REPRODUCTION***

OBJECTIVES

- Identify the main reproductive organs of the human being differentiated by binary gender.
- Know the physiological functioning according to the muscle fibres and muscles of which they are composed.
- Being able to recognise the pelvic floor.
- To experience the different toning exercises and their direct relationship with their improvement in terms of the physiological functioning of the reproductive organs.
- To be able to generate specific models from the plastinated organs.

MAIN QUESTIONS TO BE ANSWERED BY STUDENTS MAKING THIS PROJECT

- What are the main human reproductive organs?
- What is their physiological functioning under normal conditions?
- What are the main pathologies of these organs in the presence of muscular hypology?
- What are the most recommended exercises to improve the pelvic floor?
- Would you be able to reproduce a muscular model of the pelvic floor?

STUDENTS´ ORGANIZATION

Groups of 4-5 students (depending on the number of students in the group).

TIME

3 sessions:

- 1st session: Presentation/explanation of reproductive organs and pelvic floor musculature. Practical implementation of the main pelvic floor strengthening exercises.
- 2nd session: Reproduction of the pelvic floor model based on the plastinated organs and using the 3D digital anatomical atlas model. Eva rubber will be used as a material to recreate the pelvic floor musculature.
- 3rd session: Each group will create a presentation of their pelvic floor model together with a practical explanation of the basic exercise sequence to achieve the proposed health objectives.

RESOURCES

- Organkits: Plastinated organs.
- 3D digital anatomical atlas model.
- Eva rubber.

ASSESSMENT & EVALUATION

Hetero Assessment rubric for the student-generate presentation template.

PROCESS OF WORK

- The plastinated organs are presented and the explanation is reinforced by using the 3D digital anatomical atlas to connect the content to the pelvic floor.
- The practical explanation of the pelvic floor exercises is followed by a practical explanation of the pelvic floor exercises.
- The next step is to generate a real 3D model that connects the plastinated organs with the musculature generated with eva rubber.
- Finally, a presentation is created as a routine explaining the physical exercises for the improvement and/or maintenance of pelvic floor health.

ENGLISH

LEARNING UNIT 9: ***SPEAKING ABOUT REPRODUCTIVE SYSTEM***

OBJECTIVES

- To enable students to recognize and learn in English the reproductive organs after biology lessons.
- To learn vocabulary related to the reproductive system (male and female).

MAIN QUESTIONS TO BE ANSWERED BY STUDENTS MAKING THIS PROJECT

- What is reproduction?
- How does reproduction happen?
- Which are the reproductive organs?

STUDENTS´ ORGANIZATION

- Whole class (brainstorming & feedback)
- Pairs (matching flashcards game)
- Whole class (online game: quiz show)

TIME

2 sessions

RESOURCES

- Computer/ whiteboard/ blackboard
- Worksheet (true/false)
- Definition cards (flashcards)
- Videos: reproductive systems
- Organkit

ASSESSMENT & EVALUATION

- Recognition of vocabulary.
- Worksheet (true or false).
- Matching activity (word - definition)

ex: "testis - egg shaped organs where sperm is produced."

PROCESS OF WORK

1ST SESSION

• Brainstorming: Ask students to mention the key words learnt in the Biology lessons to translate them into English. Post them on the board at the same time they remember the vocabulary (Flashcards) BOOST EDUCATIONAL MATERIAL IN SECONDARY SCHOOLS 19

• True or False: The teacher will show the organkits to students and read aloud some statements about the process of reproduction and the reproductive systems. Students have to tick on their worksheets if the sentences are true or false. Once they have finished, the teacher collects the worksheets to be checked after the Quiz Show.

• Game: Quiz show : In turns, students answer the questions in groups of four.

2ND SESSION

• Watching videos related to both reproductive systems focusing on the key words previously studied in class.

• Matching activity : face down cards with reproductive vocabulary and definitions. In pairs, the students have to match them correctly.

• Feedback: Once the matching activity has finished, the teacher hands out the true/false worksheets done by the students the day before, so that each one corrects himself/herself the task as a feedback activity of the contents previously worked. Students share their new results to the rest of their mates to check how well/badly they have acquired the diff

DIGITAL RESOURCES

Reproduction quiz show

Reproduction quiz show

Female reproductive system video

Male reproductive system video

OrganKits
for STEAM

UNIVERSIDAD DE MURCIA

mdc
I.E.S. MIGUEL DE CERVANTES

ISTITUTO SUPERIORE DA|LG

PLATON SCHOOLS

Bahçeşehir Koleji

DISCOVER-IN
anatomy at your hands

mentortec

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