Unplugged Activity

Title: Scientificate yourself.

Educational level: Year 5.
Curricular areas: Natural Sciences.
Timing: Two sessions (possibility to extend to three).
First term.

Summary

In this activity, students will work in teams of four to create a flowchart that outlines the steps of the scientific method and, in turn, to provide an example in each stage.
In order to do so, they will design an experiment to demonstrate their understanding of the scientific method. Once completed, groups will present their experiment to the rest of the class.

Aims

- Reflect on the scientific method, its steps, and the possible interactions that arise when carrying it out, seeking the best way to implement it for a specific project.
- Work collaboratively on the development of a project, contributing positively and respecting the contributions of others.
- Show strategies for presenting and defending the project in a way that makes the main ideas and development clear.

Key competencies to develop: linguistic communication competence, mathematical and science, technology and engineering competence, personal, social and learning to learn competence, and possibly digital competence.

Comunidad de Madrid
"Programa financiado por el Ministerio de Educación, Formación Profesional y Deportes"
GOBIERNO DE ESPAÑA
MINISTERIO DE EDUCACIÓN, FORMACIÓN PROFESIONAL Y DEPORTES

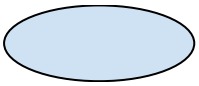
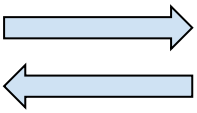
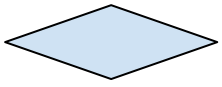
How do we do it?

1. To introduce the activity, we will present the students with the following video as motivation about flowcharts: Friendship Flowchart. YouTube. (5’)
2. Then, explain to the students that the intention is to compose a flowchart that explains how the scientific method is applied: what its steps are, the order to follow, what happens if there are problems, etc. (5’)
3. (Optional) Brainstorming about the steps of the scientific method. (5’)
4. Divide the students into groups of 4 and assign roles: spokesperson (will consult with the teacher or other teams), secretary (will record the team’s work), moderator (will assign speaking turns in the team), logistics (will manage the necessary materials, asking the teacher, distributing within the team…). (5’)
5. Give the students time to distribute the steps of the scientific method in a flowchart and ask them to think of a possible project to carry out using this flowchart. (15’)
6. Once they have decided on their project and flowchart, give them time to prepare a presentation (digital or not) of this work. (25’)
7. Presentation of the different flowcharts and debate about their possible relevance to the selected project. (30’, 5’ per team)
8. Conclusions of the activity: open a debate about the need to carry out all the steps correctly and evaluate the work carried out in the teams through self and peer assessment (see materials).

Comunidad de Madrid
“Programa financiado por el Ministerio de Educación, Formación Profesional y Deportes”
GOBIERNO DE ESPAÑA
MINISTERIO DE EDUCACIÓN, FORMACIÓN PROFESIONAL Y DEPORTES

Suggestions

- This activity can be used in isolation to work on the scientific method or as the start of any project or learning situation that will follow the steps of this method, thus laying the foundations for the work to be carried out during the learning situation, adding additional curricular content.
- Prepared posters with the steps of the scientific method (see materials) can be used to help students if prior knowledge does not show they have the necessary understanding of these steps.
- The timing for the different steps of the activity can be flexible to students' background knowledge on digital presentations (PowerPoint, Canva, Genially…), research on real experiments where the scientific method was applied, or experiment creations.. Hence, the duration can be two or three sessions. It could also be reduced to one session if a presentation is replaced with a whole group discussion on how to carry out the scientific method.
- It is important to show them that the flowchart is particularly interesting if the hypothesis is not confirmed by the experiment results, as it should allow returning to the hypothesis formulation phase.
- If students already master the steps of the scientific method, the activity can be used to reinforce this knowledge and introduce the different symbols used in flowcharts and their different utilities:

SYMBOL		FUNCTION
Start/End		Used each time the problem/solution is indicated in the flowchart
Flow arrows		Connect the elements of the diagram.
Process		Indicates an action within the process. These actions yield data.
Input/Output		Provide new information of interest for the process development.
Decision		Used to indicate choices or decisions within the process.

"Programa financiado por el Ministerio de Educación, Formación Profesional y Deportes"

Resources

- **Human:** Natural Sciences teacher.
- **Material:** blackboard, materials for the presentation (cardboard, sheets, pencils, markers, portable devices (PC, Chromebook, tablet…), posters with the steps of the scientific method, internet connection, rubrics for activity evaluation by students.

Space: classroom.

Type of activity: **collaborative in teams of 4.**

- Link to the introduction video
- Scientific method signs.
- Self-assessment and hetero-asessment rubrics.

"Programa financiado por el Ministerio de Educación, Formación Profesional y Deportes"

What have we learned?

Rubric for activity evaluation by teachers:

Assessment Criteria	4 Excellent	3 Very good	2 Satisfactory	1 Needs improvement
To create a correct flowchart order of the scientific method that demonstrates that each team has learned the content.	The flowchart is correctly created and the content is appropriate.	The flowchart includes the necessary elements in the correct order, although there are content errors.	The flowchart includes almost all the elements in the correct order and the content is acceptable.	The flowchart is confusing and the content is poor.
To develop the work in a proper environment.	The classroom environment is excellent.	The working environment is correct, resolving arising conflicts.	The working environment needs improvement, although conflicts are resolved correctly.	The working environment needs improvement and conflicts are not always resolved.
To deliver correct presentations and with quality content.	The presentations have been exceptional.	The presentations have been good and with appropriate content.	The presentations have been carried out with correct content.	Some teams failed in their presentations and the content was not as expected.
To fill out the self and peer evaluation rubrics responsibly.	Everyone filled out the rubrics realistically.	Everyone filled out the rubrics, although not all did so responsibly.	Some rubrics were not filled out or were not done adequately.	Many rubrics were missing or not filled out realistically.

Comunidad de Madrid
"Programa financiado por el Ministerio de Educación, Formación Profesional y Deportes"
GOBIERNO DE ESPAÑA MINISTERIO DE EDUCACIÓN, FORMACIÓN PROFESIONAL Y DEPORTES

Computational Thinking

Logic (prediction and analysis): thinking to make predictions, solve problems and make decisions based on available information.

Algorithms (steps and rules): is a step-by-step process that solves a problem or completes a task.

Decomposition (breaking down into smaller parts): breaking down problems into smaller and more manageable parts, which are easier to understand and solve.

Patterns (recognise and use similarities): recognising similarities or patterns in problems or data, which means come up with solutions quickly and effectively.

More information

QR codes to the activity resources:

Introduction **Scientific Method** **Self-assessment** **Hetero-assessment**

"Programa financiado por el Ministerio de Educación, Formación Profesional y Deportes"