SCIENCE

What is science?

Science is a **human activity of rational people with their own knowledge, their goals and their desire to solve problems and find explanations**. Its main objective is to **formulate questions** and **try to answer them**. Scientists try to understand the **patterns** (how things are) and **processes** (why they are the way they are) around us. To do so, they are based on a **specific form of construction**, which consists of relying on **evidence**, contrasting **hypotheses** and **models** on how some phenomenon or process works, with the data available at any given time.

Science is **changing**, **dynamic** and **constantly under review**. Explanations are attempts to explain what happens and what we observe around us, so when new data appears or the way we interpret it changes, they can change. Science gives us **temporary conclusions** based on current knowledge, which are open to revisions to improve or in some cases refute them, in the future.

A **scientific theory** is a well-founded **explanation of an aspect of the natural world** that may incorporate laws, hypotheses, and facts. A theory doesn't just explain known facts; it also allows scientists to make **predictions** about what they should observe if the theory is true. Scientific theories can be tested. New **evidence** should be compatible with a theory. If not, the theory is refined or rejected. The longer the central elements of a theory hold true, the stronger it is.

The theory of Evolution, for example, explains the biodiversity we observe on Earth , both currently and in the past when we look at the fossil record; that is, it explains why there are so many forms of life and the similarities and differences between them .

Knowing the science

Understanding science cannot be reduced to encyclopedic knowledge of its main facts, concepts and principles, but also to **knowing how the scientific community reaches reliable conclusions** from the **social practices of building scientific knowledge**.

Its main characteristics are:

- **Rationality**, that it is ensured by a fundamental compromise between the evidence (data) and the conclusions we draw from it. It is not an ideology or a faith dogma.
- The **uncertainty**, within which science lives, and which limits the claims of scientific knowledge; the key is knowing how to face it using different tools to minimize it.
- It undergoes **peer review**, that is, there is criticism in all parts of the process: during research, before publication and once it is public.
- **Consensus**, which is the best criterion of trust. The mutual agreement between relevant experts, on the subject being studied, will generate knowledge that will be established from a work that has been critically examined in all its stages.

  In short, these four characteristics can be considered as a **"toolbox"** that includes different processes to constantly protect against error.

  Science is the best way humans have found to give reliable explanations about the phenomena and processes that take place around us.

Why is it important?

Science is important because **it helps us understand and describe the world around us**. The knowledge it generates helps us to **improve in many areas** (health, food, resources...), and to **guide in an informed and well-founded way the decisions that must be made** both in a general scope (management, political or social decisions...) and in the everyday sphere (consumption, pollution, health...).

In today's world, where unproven pseudo-scientific claims circulate, it is important to be able to **differentiate scientific knowledge from what is not**, and to use **argumentation** as a tool to develop critical thinking.

Connection with biodiversity

Science helps us **understand and quantify biodiversity**. It must also serve us to **assess the state of conservation and guide the management of our biodiversity**. **Ecosystems are complex systems**, that is to say, their functioning cannot be understood by explaining how each of its components works. Ecosystems are made up of many individuals of different species that relate to each other and to the environment that surrounds them, affecting each other. Even if we knew how each of the species works and how they are affected by the environment separately, **the fact that they all interact with each other means that this is not enough to understand the functioning of the ecosystem**. Studying complex systems is complicated. Biodiversity research is carried out by many scientists of different disciplines: for example, taxonomists, ecologists, geneticists, physicists or mathematicians.

Other sources of information

- Teaching science with science
- Mystery boxes Jordi Domènech
- Interview with Digna Couso (CRECIM, Science and Mathematics Education Research Center)
- Diferents coneixements? (edu365.cat)
- Resources for Learning. American Museum of Natural History

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