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Erasmus+

Learning Scientific Skills Outside the Classroom

Scientific Skills

Selecting an enquiry	Identifying and Classifying Specific skill – comparing methods	Concluding
Country of Origin	Suggested Age Range	Suggested Theme
UK	9 – 10	Materials

Location outside the classroom	Benefits of using this location
On the playground	Large space and no need to worry about spillages

Learning Objectives – Scientific Skills	Learning Objectives – Knowledge
To select the equipment and method needed for a scientific enquiry and justify their decisions To compare methods of separation To present their findings in a written conclusion using relevant scientific language	To know that materials in a physically mixed mixture can be separated To know that materials in a physically mixed mixture can be separated by sieving or filtering or decanting To know that a mixture containing more than one state of matter can be separated

Key Vocabulary

Scientific skills vocabulary – enquiry, equipment, compare, comparing, method, justify, conclude, concluding, explain, communicate
Knowledge vocabulary – material, properties, mixture, separate, sieve, filter, decant, magnetic, solid, liquid, gas, particle, physical, chemical

Resources / Equipment

- Equipment to explore separation – solids of various sizes (for example rocks, stones, sand, pasta and pine cones), container to store the mixture, collection trays
- Equipment to separate materials – sieve, cardboard and scissors (in case they want to make their own sieve), filter paper, magnets, tweezers, beaker, containers for separating materials

Teaching Activities

Discuss – What is meant by separation? What is a meant by a mixture?

Explain – They are going to be exploring different ways to separate materials in a mixture. A mixture is when 2 or more materials are mixed together. To separate materials, it is important to consider the properties of a material and their state of matter and how they are connected (physically or chemically).

Discuss – Show pupils a tray which contains a mixture of materials which are only solids and are easy to separate (the materials will be mixed physically not chemically for example rocks, stones, sand, pasta and pine cones). Can we separate these materials? How could we separate them?

Activity – Children work in small groups to separate the materials into different trays.

Discuss – How difficult was it to separate the materials? Why was it easy? What equipment did they use to separate the materials? Ask the children to mix their materials back together and then pour some sand into each mixture. Can we separate the materials now? Do we need to do anything differently?

Activity – Children work in the same groups to separate the new mixture into different trays.

Discuss – How difficult was it to separate the materials this time? What was different? Why was this harder? Did you have any grains of sand left on any of your other materials? Were your materials completely separated?

Explain – They have been separating mixtures which only contain solids. The smaller the solid object, the harder it is to separate it, this is why it was more difficult with the sand.

Discuss – What different equipment could I use if I wanted to separate mixtures of solids or solids and liquids? Can they think of any real-life scenarios where mixtures of materials need separating?

Demonstrate – Show the children how to a) sieve mixtures to separate materials, b) filter a mixture containing a solid and a liquid and c) slowly decant a liquid in order to separate a sediment from the liquid.

Compare – What similarities are there between these processes? What differences are there?

Explain – Provide pupils with a container which contains a mixture of different sized solid objects (including sand), water and small solid magnetic objects. Explain that they are going to think about the properties of the materials in the mixture and their state of matter and use this information to help them separate the materials. They will need to decide what method and equipment is the most suitable for their materials. Show them the equipment they have available to use.

Activity – Pupils work in small groups and **select** methods and equipment to separate the materials. During the activity, talk about the choices they have made in their enquiry and how these were based on their knowledge of the material's individual properties and what each mixture contains.

Discuss – Were you successful in separating your mixture? Which materials were difficult to separate? Which materials were easy to separate? Are there are materials you could not separate? Why?

Conclude – Children write down a conclusion which communicates what they have found out about the separation of materials from a mixture.

Examples of children's work and teacher comments from country of origin

The pupils enjoyed trying to separate the materials using different types of equipment and the fact that some solid objects went through the sieve and others did not enabled them to visually see the difference in size between solid objects. They particularly enjoyed using the magnets at the end to separate the metallic objects.
A suggested follow-up lesson would be to look at the most effective material for filtering or to investigate how to separate a solid from a liquid (for example salt or sugar) when it has dissolved in the liquid. - this could be in the examples used on this day – get them to mix the salt and water and then try to separate them.