

STE(A)M PARTNERSHIPS

Education Resilience in Europe

Supported by:



Education Resilience in Europe is funded by the Grant Agreement signed on 21 September 2022 with Cisco Foundation and supported in promotional activities by Scientix 4 (Grant agreement N. 101000063). The content of the document is the sole responsibility of the organizer, and it does not represent the opinion of the European Commission (EC), and the EC is not responsible for any use that might be made of information contained.



STEAM IN PRESCHOOL EDUCATION

OUTDOOR

The main goal of this project is to support the work of Kokoro Association promoting and implementing the STEAM approach in preschools, demystifying the concept of the STEAM approach in school context and delivering a set of activities related with Science, Technology, Engineering, Arts and Maths for early school education, educators and children.

The STEAM activities presented were developed to nurture learning outdoors and the environmental education. The activities follow a 4-steps process design - 1) Problem; 2) Inquiry; 3) Design & Test; 4) Conclusion & Presentation -, creating a learning experience transdisciplinary and based in projects.

For this project, Kokoro Association collaborated with preschools in Portugal, and two in Greece 54 Piraeus and 4 Kissamos.

The Education resilience in Europe initiative is supported by the Scientix STE(A)M Partnerships and funded by Cisco. This initiative aims to identify, and support projects which address the challenges encountered while integrating students from different cultural and language backgrounds.

Do you want to know more about the STEAM approach?

Please visit the website <https://steamit.eun.org/about-the-project/the-framework/> to explore the first European framework that includes STEAM in education.



STEAM ACTIVITY

Science = ● / Technology = ● / Engineering = ● / Arts = ● / Maths = ●

Problem

After watching the movie Lorax with children or telling the story, you can focus on why the character Once-Ler couldn't cut trees. Why are trees important? Explore with the children why we need trees to survive and which are their benefits, like providing us with a shadow.

Inquiry

Invite children to go outside and look at trees, observe if there are animals close by - are trees their house? Observe if there are trees with fruits - are trees able to provide us with food? Observe from which the trunk is made of - can we use the wood to build houses? And what else trees provide to us... support children explaining that trees give out oxygen.

Design & Test

Ask children to collect branches of trees and other plants, as well as leaves and natural resources that they can find outdoors. Get all their findings together and start giving ideas for them to play with those natural resources - yes, trees also give us materials to play with!
Introduce maths and building games (e.g. ordering leaves by size, nim game, how tall is a tree, making shapes with the branches, etc.).

Conclusion & Presentation

In the end, they have to explain what games they are playing with the materials provided by trees and plants, outdoors. Together with children, recall why trees are important and end this STEAM activity with a visual challenge: planting a tree/plant; decorating a nearby tree as a thank you; or planning and recording a slogan or shout about the protection of trees and humans.

Resources

- 'Lorax' by Dr. Seuss (book or movie).
- Natural resources (leaves, small sticks, twigs, etc.).
- Paper sheets and colour pencils.
- Plant.
- Materials to decorate.

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Problem

After watching the short film 'Intelligent Bird' with children, discuss the importance of birds building nests to ensure the conservation of their species and introduce the notion of invasive birds. Together with the children, identify how they can help build/set up and preserve nests in order for birds to lay and incubate their eggs and raise their chicks. How can children contribute to the conservation of bird species in their region?

Design & Test

Support children in building a nest by collecting their ideas and designing a model to follow. Pick up a bucket or container and head outside to collect materials with children. Explore how the sticks, twigs and leaves fit together, how many you need, to try and build a nest that will be able to safely hold at least one egg. Begin by letting children experiment and build models of the nest and slowly introduce the notion that they can make their nest much sturdier by weaving the materials together to form a basket, or using a binding material like mud to hold the materials together.

Inquiry

Invite children to go outside and, from a distance, try to locate birds nests in nearby trees and/or on their way to and from the school. What do the nests look like? Are there birds near or inside the nests? Can they hear the little chicks? Try recording the nests by using a smartphone or tablet.

Decide with children how to build a bird's nest (e.g. small sticks, twigs, leaves) and take the time to explore the habitats of the most common bird species in your area. Investigate the materials needed and the measurements required to build a solid and safe nest for the bird and the eggs. Agree with children who will be responsible for each part of the project, making them count the steps needed to complete the task.
(If you can't find any bird nests outside, search for pictures of bird's nests online).

Conclusion & Presentation

Support children in preparing a birds nest exhibition for their school peers and parents. Document the exhibition and the reactions from visitors in video by using a smartphone or tablet.

Resources

- 'Intelligent Bird' by Toon Explainers, available at YouTube.
- Smartphone/Tablet.
- Natural resources (leaves, small sticks, twigs, etc.).
- Paper sheets and colour pencils.
- Mud.

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Problem

Using [Google Arts & Culture](#) or a virtual visit to a Museum, present to children several paintings with fog (e.g. Claude Monet paintings 'Houses of Parliament', 'Waterloo Bridge', etc.).

What do these paintings have in common? Guide children's answers questioning if the paintings present fog or smog. So, what's the difference?

Inquiry

Outside, divide children in groups and each group has to play a puzzle game with an image, previously cut in pieces by the educator. One group (or half of the class in groups) have photographs representing smog (air pollution that reduces visibility) and the other groups photographs representing fog (a cloud that touches the ground). Educators must introduce the concepts of each term and ask teams to decide if their photograph has smog or fog - they will understand that visually it's similar, but the educator must clarify that smog is prejudicial.

Design & Test

With the help of educators, explain the difference between smog and fog using a practical example. For smog, light a big match and observe the smoke, imagining fields of trees burning, watch a road nearby and the smoke from cars, observe if there are nearby factories and the smoke they release. For fog, explain the condensation by boiling water, filling 2/3 of one cup with the hot water and flipping the second cup placing it upside down on the first cup, finally balance an ice cube on top of the flipped cup - as the ice cube melts, condensation will begin to form inside the second cup.

For both experiments, involve children as much as possible teaching them to count the needed resources and to follow steps in the process to be safe.

Conclusion & Presentation

Ask children about what we can do to reduce smog. Introduce the ideas of using the car less, preventing forest fires, etc.

Children can draw these beneficial options to reduce smog and expose them in the school walls.

Resources

- Printed and cut images to puzzle games.
- Big match.
- Transparent plastic cups, electric kettle, water, ice cube.
- Paper sheets and colour pencils.

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Problem

After watching the short film 'The Carrots' with children, discuss the importance of vegetable consumption for a healthy living. Ask children which vegetable they like best, taking the opportunity to list different types of vegetables and propose building a vegetable garden in your school grounds.

Inquiry

Prepare a sample of ready to eat vegetables and fruits cut in small bits (e.g. carrots, beets, tomatoes, radishes, strawberries) accompanied by the whole fruit or vegetable and allow children to taste, smell, and touch, introducing the food pyramid and the different harvesting timing for each vegetable. Decide together the best place to set up your vegetable garden and which plants to grow. Involve children in planning the dimensions and materials (e.g. seeds, gardening tools, container, garden bed) needed for the activity. Design a sketch in a whiteboard or flipchart, receiving the suggestions of children of what elements are needed for your project and the structure to build. Gather the materials and head outside!

Design & Test

Allow children to build the vegetable garden and measure (using a measuring tape) the ideal space between seeds when planting (e.g. carrots seeds should be planted about 1 cm. deep and 2.5-5 cm. apart) and prepare to get dirty! Involve children in every step: soil preparation, seed planting, and routine maintenance. Divide rotating tasks within the group such as watering, taking out weeds, etc. Keep a photographic log, using a smartphone or tablet of the vegetable growth.

Conclusion & Presentation

When harvesting time comes, allow children to harvest the vegetables and prepare a celebration where they can taste what they grew, accompanied by a presentation of the photographic log of the process.

Resources

- 'The Carrots', by Little Margo Stories, available at YouTube.
- Vegetables and fruits to taste and expose.
- Food pyramid and harvesting calendar.
- Materials to create the vegetable garden.
- Smartphone/Tablet.
- Paper sheets and colour pencils.

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Problem

An educator can dress like or use some similar accessories of the meteorologist and photographer Wilson Bentley to interact with children outdoors as a surprise visit. Children might ask how he is, and Mr. Bentley introduces himself and by questioning children what a meteorologist and photographer does, explains his work. But why do people call him 'Snowflake'?

Inquiry

Mr. Bentley loves snowflakes so much that he discovered how to photograph them. So, Mr. Bentley shares with children, in groups, some of the photographs and explains how snowflakes are formed. Children can draw or paint their snowflakes. Mr. Bentley is really sad because there are fewer snowflakes than before - but why? Educators help introduce the fact that as the weather is getting warmer, the water is not getting cold as it should to form snowflakes; inquiring children why our planet is facing global warming.

Design & Test

The educator proposes that children create snowflakes to keep Mr. Bentley happy. Using geometrical forms, the educator provides several forms in white paper to each child to join pieces as in the photographs and glue in a black paper sheet. The educator explains that the snowflakes are formed from inside out, and they must follow steps to create one.

Conclusion & Presentation

The children will use a digital device with a camera (e.g. tablet, smartphone, etc.) to photograph their snowflakes and expose them on the school's wall.

Resources

- Accessories to look like Mr. Bentley.
- Printed Mr. Bentley's photos of snowflakes.
- Geometric shapes in white paper.
- Glue, black paper sheets.
- Smartphone/Tablet.

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Problem

After watching the short film 'Heatwave' with children, discuss the concept of heat wave and its consequences to our daily lives and introduce the question: what melts in the sun?

Design & Test

Prepare a muffin tin (or other container with individual spaces) and fill it with the assortment of materials chosen by the children. Together with the group of children decide on the best spot to place the muffin tin outside, taking into account that it should be in direct light from the sun. Set a timer for 10 minutes and help children keep record of the changes in materials in the chart previously prepared, repeat this at least 3 times. Document the changes in the materials using a smartphone or tablet.

Inquiry

Discuss with children what they think might melt or not in the sun. In a whiteboard or flipchart, collect the suggestions from children (e.g. lego, ice cube, rock, chocolate, marble, cheese, crayons, coin, butter, etc.). Introduce the concept of melting point and the notion that all solids have a melting point, but different substances have different melting points and the importance of this information for example, when choosing building materials for houses (e.g. what would happen if a house was made of chocolate?). Prepare a chart including all the objects and two columns, one for the materials they think will melt (hypothesis) and other for the ones that have melted. Help children formulate their hypothesis for each material.

Conclusion & Presentation

Help children prepare a presentation where they can explain their findings regarding their initial hypothesis. Allow them to be as creative as they wish and record the presentations using a smartphone or tablet to share with the parents.

Resources

- 'Heat wave' by Fokion Xenos, available at YouTube.
- Whiteboard or flipchart.
- Colour pencils.
- Selected objects by children to test hypothesis.
- Containers.
- Timer.
- Smartphone/Tablet.

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Problem

After watching the short film 'Red Kite' with children, explore the notion of how and when kites were first used and for what purposes other than just having fun (e.g. send messages, measuring distances). Invite children to, in small groups, design and build a kite.

Design & Test

Support children in building the kite. Whenever possible, have them measure the paper cuts from the newspaper and the colourful tape needed for the project. Explain the need to use light weight materials and add a tail to the kite to prevent it to keep rolling on itself and stabilise it. Take this opportunity to measure the optimal distance the kite should have from the ground and the different movements it can make in the wind. Allow children to decorate and personalise their kites.

Conclusion & Presentation

Prepare an outdoor competition with families, where children can try out their kites! Make a video using a smartphone/tablet so the class can recall the happy moments shared with colleagues, educators and parents!

Inquiry

Create a working space outside for the activity as it can get messy! Before deciding with the children how to build a kite and what materials you will need (newspaper, dowels, colourful tape, string, scissors, ruler) show a few examples of kites, exploring why do kites fly (wind force, gravity, light weight materials) and why do they need a tail (it helps stabilising it!). There are a lot of tutorials online to get inspired.

Resources

- 'Red Kite' by MrAcPilot, available at YouTube.
- Paper sheets and colour pencils.
- Materials to create kites (newspaper, dowels, colourful tape, string, scissors, ruler, ect.).
- Measuring tape.
- Materials to decorate.
- Smartphone/Tablet.

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Problem

Invite children to sit outdoors in a circle and start a mindful activity with them, by breathing in and out for 4 seconds each step; the educator asks children to raise their arms to the side and move them as if they were flying. Children should now lay down and observe the sky searching for their new 'colleagues' - the birds. How many do they see? Are they always the same birds everyday? Why are birds always moving around?

Inquiry

Invite children to observe birds nearby, and guess how they eat, sing, learn to fly, fly in groups. Encourage children to keep pretending they are birds, and let them climb, hop, and spin around. Again in a group, listen to their findings and correct some ideas if needed. Ask again how birds are always moving around and guide the debate by asking & explaining: how certain birds do not spend winter there (they prefer warm weather); how birds travel very far, and never get lost; how birds travel in large groups called flocks; how birds make sounds to communicate among themselves when it is time to flock together; how often, birds migrate back and forth between the same locations every year.

But if our planet has less water and food available, how can they feed themselves?

Design & Test

The educator challenges children to create bird feeders and help them to survive when travelling. There are plenty of [options for DIY bird feeders](#) online - you can use plastic bottles, fruit in pieces, etc. Organise children in groups and guide them to build the bird feeder, step-by-step.

Conclusion & Presentation

Each group should present their bird feeder and how it will help birds to overcome food shortage during their travels, affected by climate change. Children can record their audios and share as podcasts to raise awareness and invite their community to create more bird feeders.

Resources

- Materials to create bird feeders (plastic bottles, fruit in pieces, yarn, etc.).
- Measuring tape.
- Materials to decorate.
- Smartphone/Tablet.

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Problem

After watching the short film 'Hope, the boat' with children, discuss what happened to the boat, recalling what the boat wished for (to follow the big cruise boat) and what he conquered at the end. Introduce the concept of hope, and its importance to make our dreams come true. And how did the boat move? The wind! Ask children if there is wind by allowing them to observe it and on the smartphone using an app with weather information.

Inquiry

Go outside and feel the wind. The educator guides children's observation by asking them what is moving in the air, which objects are moving around, what sound the wind makes, how it feels (cold, warm), if it blows steadily or does it stop and go. Ask children 5 things that move with the wind and make them all count. Ask children to imitate the sounds of the wind and mimic its movements. Explain to children why we need wind (e.g. electricity, source of clean energy).

Design & Test

Divide children in groups and provide to each group a box with the needed resources to put wind to work! Some examples of what children can build to test the effects of wind are means of transportation (e.g. paperboat, kite, paddleboat, etc.) and structures that convert wind power (e.g. windmill, wind turbines). Guide children in the construction and allow them to test, introducing the concept of weight.

Conclusion & Presentation

Children present their constructions and name them, as well as how they work with the help of wind.

Expose their constructions and ask them to all together create a wind dance!

Resources

- 'Hope, the boat' by Paper Boat, available at YouTube.
- Smartphone/Tablet.
- Boxes and materials for the creation.
- Scale.
- Paper sheets, colour pencils.

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Problem



An educator can dress up as Philo of Byzantium, an ancient Greek engineer and mechanic, responsible for inventions such as the water mill, to be a surprise visit and interact with children outdoors. Children might ask how he is, and Mr. Philo introduces himself and by questioning children what an engineer and mechanic does, explains his body of work (e.g. water mill). As Mr. Philo is very old, he is having trouble recalling how to build a water mill. Ask children to help Mr. Philo.

Inquiry



Discuss with children how they think a water mill works. Introduce the notion that the power of water is used in mills to help grind flour and for other tasks such as producing electricity. Design a sketch in a whiteboard or flipchart, receiving the suggestions of children of what elements are part of your project (e.g. paper plates, small recycled plastic cups, wood skewer, tape, etc.) and the structure to build. Provide a video example if children are having trouble understanding the dynamics of the water mill and introduce the notions of gravity, weight and kinetic energy. Gather the materials and head outside! There are a lot of tutorials online to get inspired.

Design & Test



Divide children in groups and provide to each group a box with the needed resources to build the water mill. Support children in building their designs and testing them by pouring water from above in the final design. Take the opportunity to explain how water mills work, because it's moving, the water has kinetic energy that makes the mill spin; as the water fills the plastic cups, the gravity and the weight causes the mill to rotate around the axis (skewers), creating a cycle.

Conclusion & Presentation



Prepare a final presentation outside where children can present their water mills. Make a video using a smartphone/tablet so the class can recall the happy moments shared with colleagues, educators and Mr. Philo!

Resources

- Accessories to look like Mr. Philo.
- Smartphone/Tablet.
- Boxes and materials to creations (paper plates, small recycled plastic cups, wood skewer, tape, etc.).
- Whiteboard or flipchart.
- Water and containers.

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Problem



Inquiry



Design & Test



Conclusion & Presentation



Resources

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