SciTeach Center

Université du Luxembourg

INSTITUT DE FORMATION DE L'ÉDUCATION NATIONALE

Fondation Veuve Emile METZ-TESCH
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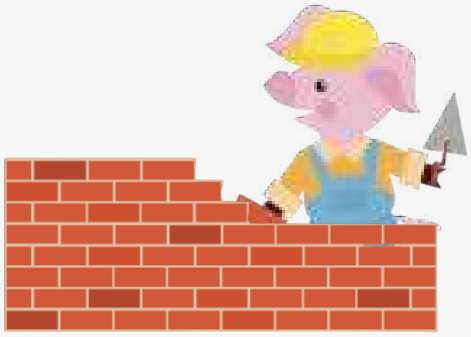
The SciTeach Center

The Three Little Pigs

Teacher Guide



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Contents

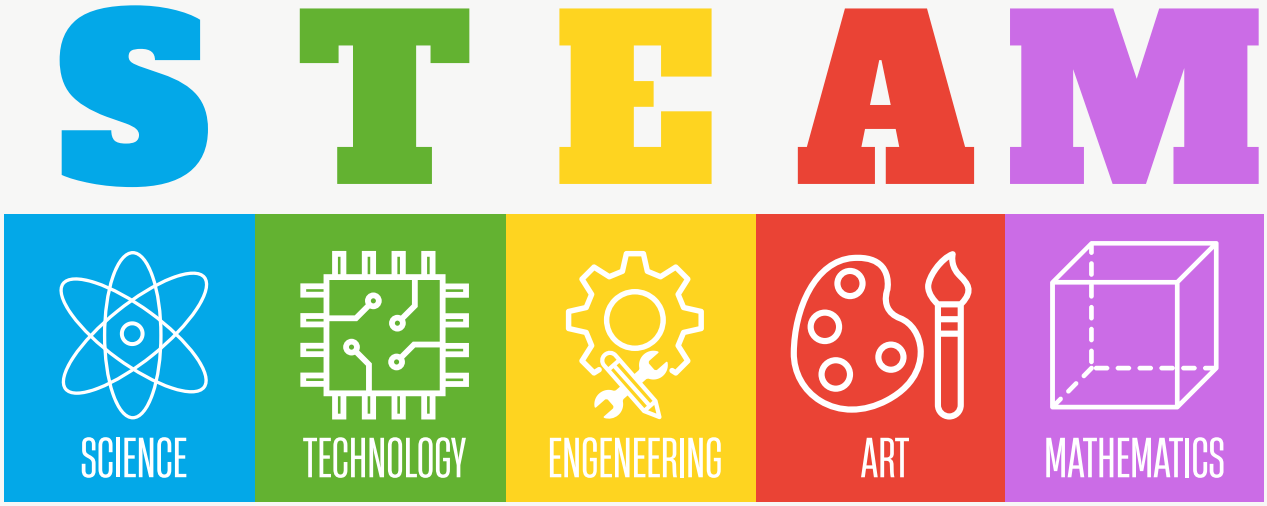
Introduction

What is STEAM?

STEAM is an interdisciplinary approach to teaching and learning that integrates science, technology, engineering, arts and mathematics education through authentic investigations and project-based teaching. STEAM cultivates children's curiosity about the world and supports their learning.

Why use STEAM?

Research findings highlight that STEAM-centered practices are especially appropriate for early childhood education, as they support children's natural exploration, inquiring, and sense-making in and out of school. Moreover, STEAM integrates design principles with arts practices and opens possibilities for children to learn through inquiry and collaboration. This way, it fosters creativity and critical thinking, sparkling children's imagination and supporting key curricular competencies related to language, mathematics, discovery of the world, and transferable skills.



Teachers and researchers agree that STEAM is beneficial to students' learning. However, the big question is: ***How to implement the STEAM approach at the early childhood level?*** One might wonder about how to get started, how to integrate such broad disciplines, and how to guide children through exploration and open-ended inquiry.

With this in mind, the SciTeach Center developed a set of EarlySTEAM resources with teachers to support practitioners in implementing STEAM in early childhood settings. Resources include a series of teacher guides and related multimodal inspirations, collaboratively designed by the SciTeach Center team and primary school teachers in Luxembourg, who shared examples from their teaching practice and co-taught a series of professional development workshops on STEAM for other primary teachers.

Each guide is accompanying a materials kit available for loan at the SciTeach Center. The EarlySTEAM teacher guides and our kits were designed to inspire teachers to explore science topics from an inquiry-based, child-centered stance. We present some suggestions as openings for investigations with your students, and these can be modified according to your needs and your context.

Happy exploration!

The SciTeach Center Team

Approaching this guide

When adopting activities from this guide, consider your context and who your students are: their age, interests, and abilities. Here are some things to consider to make the activities more inclusive and culturally relevant to your classroom.

ADAPT TO YOUR CLASS

What makes sense to your class and what will meet your needs? You may want to pick and choose only a few activities or explore all of them. Depending on children's questions and interests, you may want to extend an inquiry for weeks or explore it for a shorter period.

CONSIDER GROUP ARRANGEMENTS

Consider working with a smaller group of children at a time for certain activities, depending on how much support they will need. While some activities can be done as a whole group, others will work better if you break the class into stations or smaller teams.

EMBED DIFFERENT ENTRY POINTS FOR LEARNING

Consider how you can adapt activities to create entry points for students of diverse profiles, so everyone can participate and contribute with their expertise. For instance, if drawing is too challenging for one child because of their developing fine-motor skills, they might demonstrate their ideas using large building blocks or other materials.

BRING IN STUDENTS' RESOURCES

Find ways to bring your students' resources into the inquiry. For example, when using imagery, make sure to represent people from diverse backgrounds. When facilitating discussions, allow for translanguaging and keep a word-wall with key words in different languages.

CONNECT WITH FAMILIES

Family members might add value to the inquiry by sharing their expertise. For example, if a family member works in a profession related to your inquiry, invite them in for children to interview them.

OBSERVE YOUR STUDENTS

Observe children closely during the inquiry. Body movements, facial expressions and non-verbal communication will help you to understand what they are thinking and allow you to support their meaning-making.

HAVE CHILDREN DOCUMENT AND SHARE

Ask children to document their explorations by drawing, taking photos, or video recording. Likewise, always make space for them to share their findings and discuss ideas after each inquiry. Gathering data, sharing evidence, and discussing ideas are part of the scientific process and crucial for your little scientists' growth.

While these approaches might feel overwhelming at first, enjoy exploring with your students. Get started, do the best you can with the resources that you have.

Start with a story

Each EarlySTEAM guide uses stories as an entry point for STEAM-based investigations. Reading stories is a shared experience that can provide an engaging way to bring children into the topic. Starting with a story creates a meaningful opportunity for dialogue around the storyline, providing a way to build from children's imagination and open up space to hear their ideas, perspectives and wonderings.

Research findings highlight that children's books can increase the effectiveness of STEAM activities, especially at early ages, as the stories told usually appeal to children's imagination and support decision-making and problem solving. Stories can also provide the opportunity to learn new vocabulary words.

Teaching tips:

I: Consider starting a *word wall* (words that are displayed in large visible letters on a wall) through the lessons, where new words are documented, in the language of instruction or students' spoken languages.

II. Share oral stories or folktales related to each topic from your students' cultural backgrounds, making the storytelling sessions more culturally relevant to them. Inviting family members to share tales is another way of achieving that, while strengthening community connections.

The themes that emerge from the book can serve as prompts for investigations. Guided by what children notice in the story, move into discussing questions children might have layered with brainstorming conversations about science topics.

The SciTeach Center offers an extensive library of resources that includes a great variety of fiction and non-fiction books available for loan. The books are in different languages (Luxembourgish, German, French, English) and represent diverse themes from science to history, geography, sustainability, and more. The available books can be found on eduLibrary. Additionally, consider visiting your local library for more resources and inspiration.

Photo by Nicolas Donnerup

Materials kits

When we provide children with a range of open-ended materials that they can manipulate, experiment with, and modify during their investigations, we set them up to explore creatively, approach problems in unorthodox ways, and come up with innovative solutions or ideas.

The items included in the EarlySTEAM materials kits offer starting points for your explorations and were chosen because they are not typically found in most classrooms.

We encourage you to also make regular classroom articles (e.g., paper clips, painter's tape, etc.) available to students, and gather unconventional materials (natural items, recyclables, household items, etc.) to enrich your resources and students' investigations.

Photo by Nicolas Donnerup

The SciTeach Center offers a set of multimedia inspirations showcasing open-ended, inquiry-based scientific explorations that took place in Luxembourgish primary classrooms, led by our partner teachers. They may serve as inspirations for you to design your own investigations with your students and can be accessed through our website uni.lu/fhse-en/sciteach-centre.

Additionally, the SciTeach Center provides a variety of materials to borrow, including books, science investigation kits, games, taxidermic animals, technical equipment (e.g., microscopes, thermometers, stethoscopes, etc.) and other science teaching resources that can support and enrich your classes.

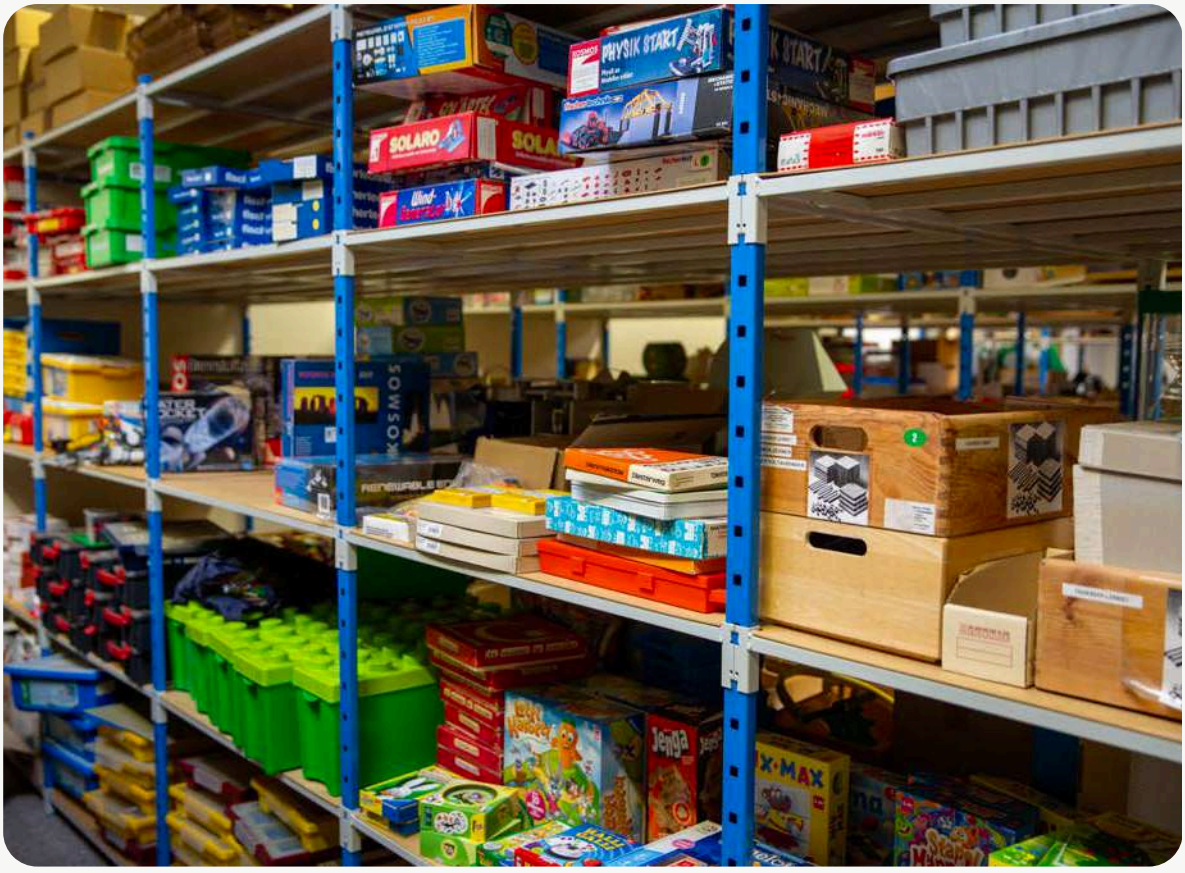
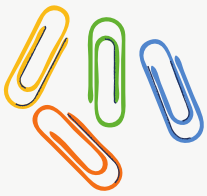


Photo by Nicolas Donnerup

The Three Little Pigs materials

The “Three Little Pigs” Materials Kit includes:

- Two picture books (1 x Déi dräi kleng Schwéngercher, by Vanessa Gabriel and Natascha Rosenberg; 1 x Déi dräi Schwéngercher, by Xavier Deneux)
- Nine wooden pigs
- One plush wolf hat
- One pair of bellows
- Five hand fans
- Two board games



Helpful extra materials to explore STEAM activities:

- Natural items: sticks, stones, pinecones, chestnuts, leaves, big seeds, bark, wood chips, shells
- Recyclables: plastic lids and bottles, cardboard boxes, egg cartons, cardboard tubes, bubble wrap
- Man-made materials: buttons, beads, light handkerchiefs, fabric scraps, elastic bands, tin foil, balloons, coffee filters, bolts and nuts, straws
- Stationary: pens, pencils, sticky tape, washi tape, paper, paper clips, scissors, paper (varied sizes, colors, textures)

Get comfortable, dim the lights, and read together!

Stimulate children's imagination and curiosity by diving into these interactive versions of the Three Little Pigs story with them.

Image credit: Atelier Kannerbuch

Déi dräi kleng Schwéngercher, by Vanessa Gabriel and Natascha Rosenberg

In this book, the classic story is told in rhymes, and children pull the tabs to unveil the narrative.

Déi dräi Schwéngercher, by Xavier Deneux

The playful collages and cutouts in this book invite children to touch the pages as they read the classic version of the tale.

Image credit: PersPektiv Editions

If you want unconventional versions of the Three Little Pigs tale, you can borrow these books from the SciTeach Center:

The True Story of the 3 Little Pigs!, by Jon Scieszka and Lane Smith

The wolf presents his version of the story, claiming to be an innocent creature framed by the pig police. The pig killings? Those were unfortunate accidents. This tale prompts children to critically reflect on who is in power of telling stories.

The Three Little Pigs: An Architectural Tale, by Steven Guarnaccia

In this book, the pigs are inspired by famous architects and build wonderful houses full of interesting design furniture. Despite their beauty and complexity, the wolf still comes to blow the houses down. The question is - will he succeed?

Brainstorming

What do we know?
What do we want to know?

Start the unit by brainstorming with your students what they already know and what questions they might have. Brainstorming with children provides a key opportunity to hear about their ideas, perspectives, and experiences while engaging them in the topic.

Additionally, listening to children's questions can provide insights into the way they currently understand certain topics/processes, and possible misconceptions they might have, which can help inform your teaching while guiding their explorations.

The approach "*think / pair/ share*" can be a nice way to support your students in thinking about a topic with the goal of discussing their ideas and questions. In considering a question as a class, provide a few minutes for children to think individually, and then encourage them to pair up and exchange on their thoughts.

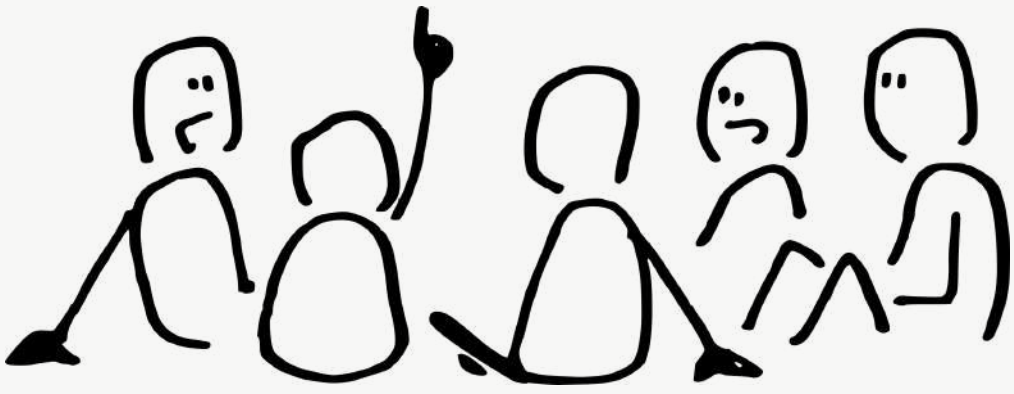
From these pair discussions you can move into a whole-class brainstorming. Consider recording ideas from the discussion on a chart with visual cues as well as words and adding to the list as you move through the different investigations.

We encourage you to value the complexity of children's ideas, even though they might not always be "correct". Throughout the inquiry process, once children have had opportunities to test out different ideas, gather evidence, and learn from each other, these initial thoughts can be revisited and discussed. Furthermore, **making mistakes is part of the scientific process and a powerful way of learning**!

Research findings overall highlight that open-ended structures can create space for children to pursue their wonderings as they creatively engage with play, make observations, test things out, ask questions, exchange ideas and come up with conclusions about scientific phenomena.

Nurturing children's sense of wonder and supporting them to pursue their questions is an important part of science teaching in the early years: it stimulates children's engagement, promotes autonomy, and drives genuine interest in scientific discovery.

Moreover, valuing children's ideas and encouraging them to pursue their own explorations from an early age lays the groundwork for them to keep approaching the world with curiosity and engage critically in science-related conversations as they grow older.



Brainstorming

Read one of the stories of the Three Little Pigs with your class. Inspired by the story, you can start with the activities. However, before building a house for a pig, it is important to discuss what a house is.

Start off by engaging your students in a discussion about houses, gathering their initial ideas about them, and asking some guiding questions:

- What features does a house have?
- Why do we have houses?
- Do animals have houses as well?

Depending on the children's ideas, you can add extension questions:

- Who builds a house?
- How is a house built?
- What materials can be used to build a house?

Photo by Zak Boca on Unsplash

Houses around the world

There is a great variety of houses around the world and you can introduce some of them to children. For example, there are houses on stilts, yurts, cave houses and more. It is fascinating how cultures and history influence the way houses look. Look at the photos below and ask children what they find interesting about these houses, and why they look this way. Also, do children know any other interesting houses around the world?

Photo by Miikka Luotio on Unsplash

Photo by Vince Gx on Unsplash

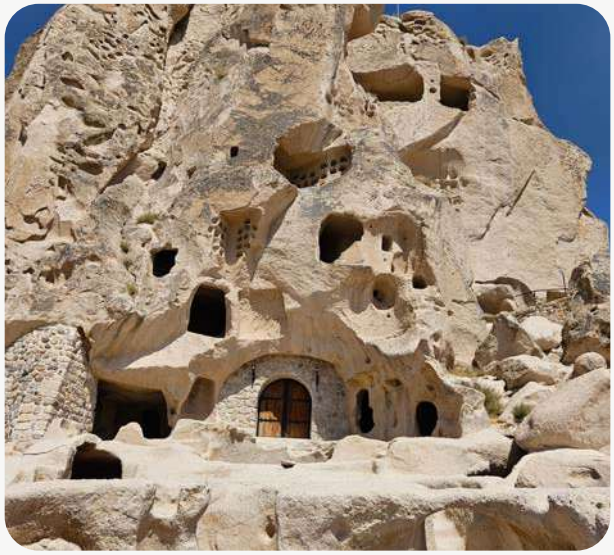


Photo by Sergei Glotov

Housing variety

Ask and prompt your students:

- Look closely at the photos of different houses.
- What are the similarities and differences between them?

Now consider:

- How do these houses look like inside? Who lives there?
- What materials were the houses built with?
- What components make a house (e.g., window, roof, balcony)?
- How does the climate affect the choice of materials and components when building a house?











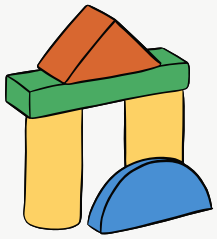

Photo 1 by Olena Polovko; Photos 2, 4, 5, 6, 7, 11 by Sergei Glotov; Photo 3 by Tyler Zhang on Unsplash; Photo 8 by Tanya Barrow on Unsplash; Photo 9 by Rockwell Branding Agency on Unsplash; Photo 10 by Nandu Vasudevan on Unsplash; Photo 12 by Musa Ajit on Unsplash.

Building a house

Now that your students have discussed various houses and their components, it is time to make a house of their own. In small groups, encourage students to build a prototype using everyday materials.

Suggested materials:

- Wooden blocks
- Cups
- Bottles
- Egg cartons
- Corks
- Clothespins
- Toilet paper rolls
- Boxes
- Cardboard
- Straws
- Sticks
- Modelling clay
- Tape
- Kapla



Teaching tips:

- This activity can be done inside a classroom, in a gym, outside, or in another suitable location.
- Provide children with a piece of cardboard to serve as a foundation for their house. This will ensure that the houses can be easily transported around.

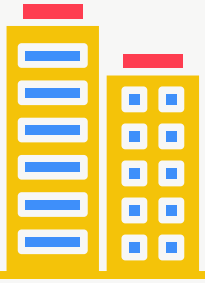
Now consider:

Have the groups present their houses to each other. Some guiding questions might be:

- What was important for them when constructing their house?
- Who can live in their house?
- What can one do inside the house?
- Was there anything challenging when building a house?

After the presentation, resume of what has been discussed around the topic of houses so far:

- What is a house?
- Why do we have houses?



Teaching tips:

- Connect the activity with social justice education, by discussing: Does everyone have a house?
- Have the houses exhibited for a while, if the space allows for it. Children may bring some small toys to populate their houses.

A house for a pig

The pigs must have sturdy houses, so they don't fall down when the wolf huffs and puffs. Split children into groups, and have each group pick one unconventional material to build a house (e.g., paper, straws, and popsicle sticks). Before building, have students familiarize themselves with the materials, and ask them to draw what they envision as a house for a pig.

Photo by David Moos

Suggested materials:

- Paper
- Recyclable straws
- Popsicle sticks
- Pieces of cardboard (to serve as foundation for the houses)
- Scissors
- Masking tape
- Modelling clay

Teaching tip:

It is more thought-provoking and engaging for children to work with unconventional materials rather than wooden blocks or LEGO bricks, especially since those are very stable and will not be easily blown down.

Test the houses against the wind!

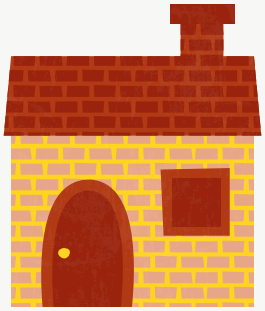
Arrange a testing station with wind sources (e.g., a hairdryer or a fan) and a marked spot for the houses. Then have the groups take turns testing their houses against the wind.

If a house is blown away, encourage children to consider how they can change it to make it stable. If the house passes the test, ask students which elements helped it remain in place.

Teaching tip:

During testing, you can let children role-play as the wolf, or you can pretend to be the wolf yourself. Wear the wolf hat from this Materials Kit, and accompany the activities with dramatic narration: “The wolf put all his efforts to try to blow the house down.”

Ask children to draw their finished houses and compare them with their previous sketches. Encourage students to talk about their illustrations and houses. Then write their narratives on a piece of paper and attach them to the drawings.



Explore further

Here are other things you can try:

1. Ask children to design a new book cover for the story, incorporating their houses. Discuss what is important to include on a cover, as well as what the purpose of book covers is. What do children think about each other's book covers?

2. The Three Little Pigs story has been adapted in various ways with different endings. Ask children to come up with their own ending and role-play it.

3. Prepare a voice-recording station where children can ask pig/wolf-related questions, leave messages to the characters, or retell the Three Little Pigs story.

4. Set up a dramatic play corner so children can reenact the story. Add the wolf hat (included in this Materials Kit) and other items to support students' storytelling (e.g.: tiaras with paper pig ears). Include a table covered with a sheet or a large cardboard box as shelter for the pigs.

5. Invite family or community members who are in the construction business in to share their expertise. Having children interview them is a powerful way to center families' resources, and highlight that knowledge is also produced within the community.

6. Invite families to audio record readings of The Three Little Pigs stories in their home languages. Then set up a listening station (e.g.: tablets and headphones) for students to listen to them.

Photo by Guillaume Techer on Unsplash

Wind brainstorming

In the Three Little Pigs story, the wind the wolf produced was strong enough to blow the pigs' houses down. Inspired by this, continue with exploring the power of the wind.

Start off by engaging your students in a discussion about the wind, gathering initial ideas, and asking some guiding questions:

- What is the wind?
- Where does the wind come from?
- Can we explore the wind with our five senses?

Depending on the children's ideas, you can add extension questions:

- When is the wind the strongest/the weakest?
- How is the wind helpful to people?
- How is the wind helpful to animals and plants?

Photo by Saad Chaudhry on Unsplash

Continue brainstorming and exploring the wind:

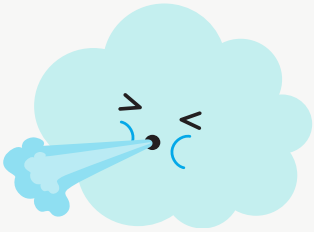
Go outside to check wind conditions. Is there a place where the wind is super strong? Is there a place with no wind? What factors could influence the wind?

What sounds does the wind make? How does the wind move? Ask children to make those sounds and move like the wind.

Are there any windmills in your area? Explore the windmill and discuss its use and purpose.

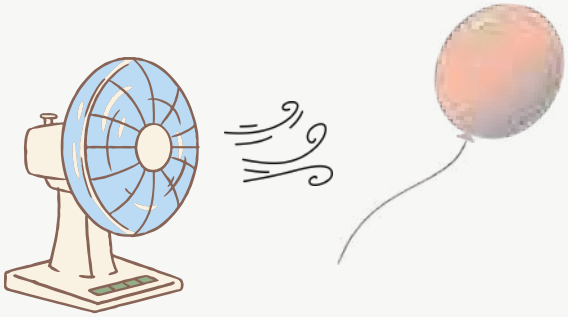
Photo by Taweesak Jang on Unsplash

Wind inquiry



Select a collection of objects with varied shapes and sizes. Pick a random object, and put it on a surface.

Ask children: Do you think the object can be blown away by their own breath or by using any of the provided blowing devices? After children share their thoughts and reasoning, encourage them to test their hypotheses.



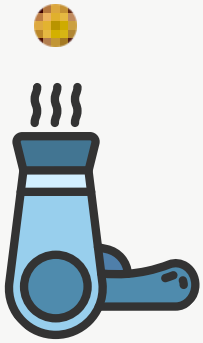
Suggested materials

- Hand fans
- Hairdryer or a fan
- Recyclable straws
- Stones of various sizes
- Egg cartons
- Paper cups
- Plastic and paper bags
- Wooden/LEGO blocks
- Balls or balloons

Teaching tip:

Support children in working with different objects and trying different placements of an object and a blowing device. For example, a book can be lying horizontally or standing vertically. Some materials can be easily moved on a smooth surface, but might stay in place on a fuzzy carpet.

Suggest directing the blowing upwards so that children can try to make an object fly. Then ask students: Can wind coming from above move an object?



Safety tip:

Closely supervise children when using fans and hairdryers, and operate them safely to avoid accidents.

After working with objects on their own, ask the students to combine materials. For example, they can put a rock inside a bottle, or tape objects together. Let them be creative!

Photo by Jonathan Richard on Unsplash

Teaching tip:

Document the inquiry using slow-motion video, as it can be fun for children to see objects fly at a slow speed.

Reflection

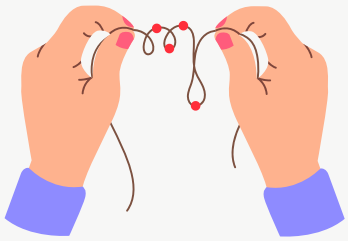
Have students present the results of their inquiry and discuss what could be blown away and what could not, and how. This can be arranged in a variety of ways depending on how they were documenting the inquiry. Importantly, provide children with space to reflect on how they approached their exploration.

During and after the presentation, discuss different variables that might affect how the wind moves objects:

- Height, weight and shape of the object
- Distance between the object and the wind source
- Friction (if the object is placed on a surface)
- Wind speed and direction

Wind chimes

As an extra activity, you can explore how the wind can create music with wind chimes and make one with your class.



Materials:

- A cup, plastic bottle or can to serve as a base
- Strings
- Scissors
- Colorful paper, beads, small bells
- Paint, stickers, glitter for decoration
- Modelling clay

1. Prepare the base for the wind chime.

2. Cut a hole in the middle of the top of the base, pass a string through it and secure it with a knot. This will later allow you to hang the wind chime.

3. Cut 5-6 holes around the mouth of the base.

4. Pass the strings through the holes and secure them with a knot.

5. Thread the beads on the string, as well as other available items, such as small bells and colorful paper rolled and fixed as a small tube.

6. Once each string is full of beads, secure it at the bottom with a knot, which you can hide with a piece of modelling clay placed around it.

7. Decorate the base with paint, stickers, glitter and other materials.

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Notes

SciTeach Center

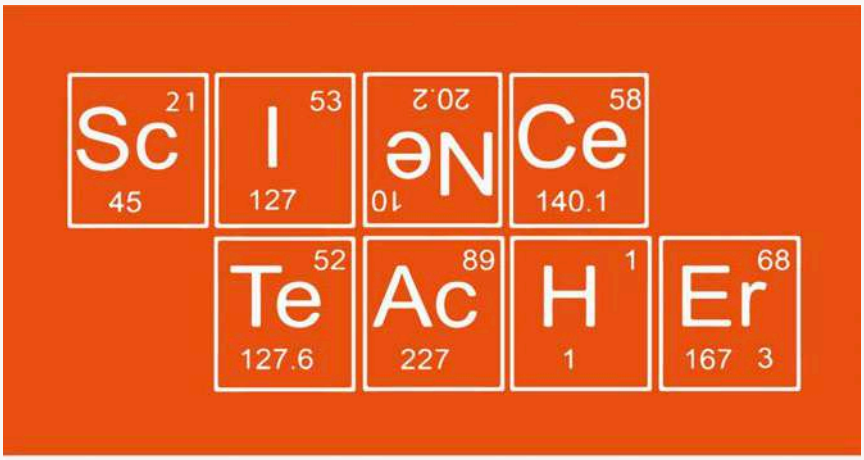
The SciTeach Center was opened in 2016 via a partnership between the University of Luxembourg, the Ministry of Education, the Ministry of Higher Education and Research, and the National Research Fund. Since then, the SciTeach Center continues to develop initiatives that are diverse in location (at the SciTeach Center, outdoors, online, at partner schools) and audience (people within one school or across a range of schools). The SciTeach Center's mission is to support science education at the primary school level through professional development workshops, extensive resources library, and a variety of teaching guides.

The SciTeach Center's work is research-based and embedded in classroom practices, as we work collaboratively with in-service primary school teachers in Luxembourg, who actively co-plan and co-teach with the SciTeach Center's researchers. Since its opening, the SciTeach Center has developed projects that support inquiry-based education, STEAM pedagogy and education for sustainable development. The team has also developed different downloadable teaching guides including the *Lët'z Teach Science!* and *Science Outside* series.

The SciTeach Center continuously provides IFEN accredited professional development workshops which are co-designed by teachers and researchers and respond to the specific needs of local teachers. You can browse the SciTeach Center's offerings through the IFEN catalogue, using keyword "SciTeach".

For more information and resources visit us online via sciteach.uni.lu or in-person at the Maison du Savoir, 4th floor, Atelier 4.550, located at the Belval Campus of the University of Luxembourg.

The Three Little Pigs
EarlySTEAM Guide



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