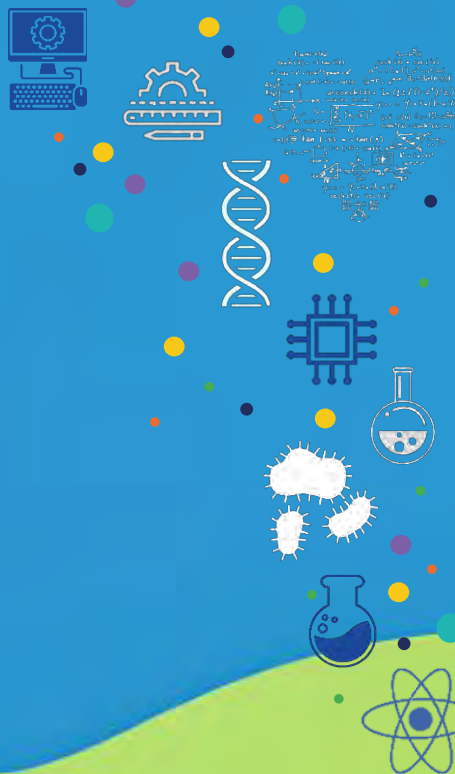




FASTEAM

Family engagement in STEAM



TOGETHER *tool*



A practical resource for
planning and improving
family engagement in
STEAM learning.

Created in collaboration:

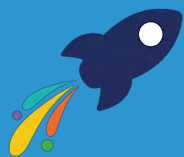


Co-funded by the
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of the European Union



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1. About the Project



Project **FASTEAM** - „Family engagement in **STEAM**” strengthens family engagement in STEAM by connecting home and school learning through practical tools, storytelling, challenges, and interactive workshops that inspire young learners in science and creativity.

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Project web page: www.fasteam-project.eu

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2. INTRODUCTION



2.1. Purpose of the Tool

Every child, regardless of their zip code, ethnicity, race, or gender, deserves access to high-quality STEAM programs and career exploration opportunities. To meet the rising demand for qualified professionals and to cultivate the next generation of leaders, we must actively support students and their families in building the competencies necessary to pursue STEAM degrees and professional pathways.

The primary mission of this tool is to expand access to STEAM education, particularly for youth, by:

- ✓ Developing proven ways to engage families in STEAM experiences at school, at home, and within the community.
- ✓ Connecting classroom education with digital learning and real-world community experiences.
- ✓ Working toward a future where every student has access to top-tier STEAM opportunities and every family is equipped to guide their child's educational journey, regardless of their background.



2. INTRODUCTION

Families serve as the vital link between a student's potential and their future success. They are the primary influencers of a child's perception of what is possible, acting as a gateway to enrichment opportunities. Decades of research confirm that effective family engagement is a cornerstone of student achievement. Because students recognize their families as critical partners in their educational journey, parents and guardians play a decisive role in shaping a student's long-term aspirations and career goals.

This tool provides teachers with practical guidance on building positive, lasting relationships with families. By learning how to better listen, learn, and connect with parents, educators can make STEAM (Science, Technology, Engineering, Arts, and Mathematics) learning environments more welcoming and inclusive





2. INTRODUCTION

Key focus areas include:

- ✓ Highlighting strategies to ensure that all families, regardless of their circumstances, can participate meaningfully in their child's education.
- ✓ Offering ideas for interactive activities that bring families and children together to explore STEAM concepts, building collective confidence through shared discovery.
- ✓ Sparking curiosity and encouraging students to see themselves in STEAM fields, ultimately motivating them to pursue further learning and professional careers in these sectors.





2. INTRODUCTION



2.2. Families must be more engaged in STEAM

Current data reveals a significant gap in our educational approach: most STEAM programs limit family involvement to administrative tasks—such as registration, payment, or simple drop-offs—rather than meaningful participation. This lack of engagement leaves many families unaware of the vast professional opportunities within STEAM. Consequently, parents often rely on their own past experiences to shape their children’s perceptions, feeling unequipped to provide guidance on educational choices or career pathways. Furthermore, there is a clear need to empower families to become vocal advocates for high-quality STEAM resources across all learning environments.

Meaningful family engagement is a powerful driver of student success. Research consistently demonstrates that regardless of socioeconomic status or ethnic background, students with involved parents or guardians are more likely to:

- ✓ Earn higher grades and pass their courses.
- ✓ Maintain regular school attendance.
- ✓ Develop stronger social skills.
- ✓ Graduate and pursue higher education.



2. INTRODUCTION

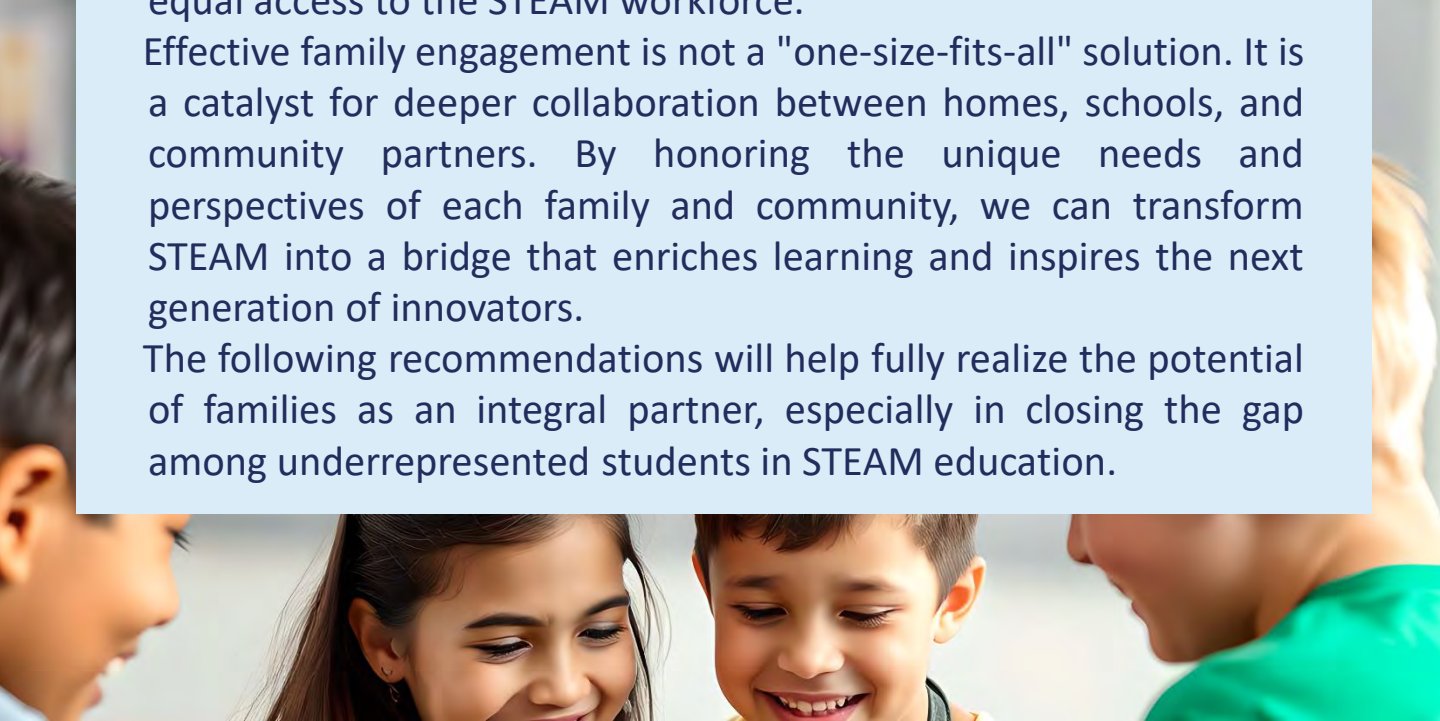
Our strategy focuses on several key pillars:

- ✓ We aim to improve how we welcome families by fostering active participation in STEAM activities across schools, extracurricular programs, and digital platforms.
- ✓ Establishing an open, two-way conversation between educators and parents is essential for communicating the long-term benefits of STEAM careers.
- ✓ By providing resources early on, we enable families to support their children's curiosity from a young age, helping them plan for formal education and future enrichment.

A top priority is ensuring that families from underrepresented groups—including girls, minority students, and those from low-income backgrounds—have the tools to guarantee their children equal access to the STEAM workforce.

Effective family engagement is not a "one-size-fits-all" solution. It is a catalyst for deeper collaboration between homes, schools, and community partners. By honoring the unique needs and perspectives of each family and community, we can transform STEAM into a bridge that enriches learning and inspires the next generation of innovators.

The following recommendations will help fully realize the potential of families as an integral partner, especially in closing the gap among underrepresented students in STEAM education.





3. WELCOMING ALL FAMILIES

Recognizing that parents are a child's primary educators, it is essential to involve them in STEAM learning within school, after-school, and digital environments. We can improve family engagement by demonstrating that STEAM is an accessible, fun, and interactive experience, thereby bridging the gap between the classroom and the home.

Aware of the importance of STEAM, parents and their schoolchildren can participate together in math, IT, and other STEAM workshops. Although these workshops are relatively short, they can be highly effective at encouraging independent learning when paired with motivational lectures. By introducing such 'alternative' programs early in their education, we can bring science closer to children and begin building their critical thinking skills.





3. WELCOMING ALL FAMILIES

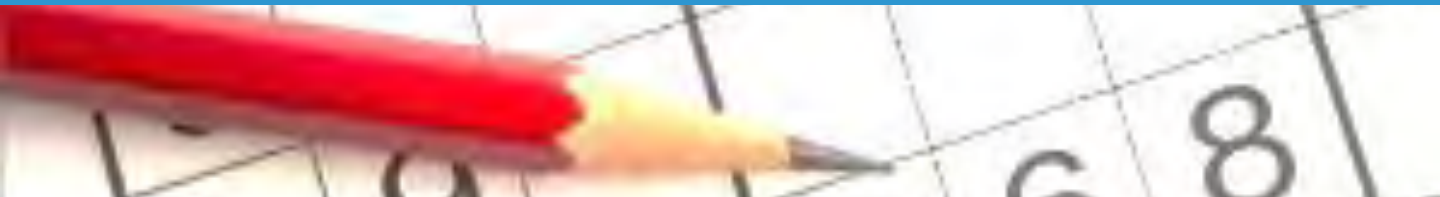


A prime example of such engagement is 'Mathematics Night', an event can be organized by the schools and organizations to popularize the subject and build a positive attitude toward it among students. The event can feature interactive workshops designed for both students and their parents.

By participating in fun activities and games based on mathematical concepts, participants can rediscover the often-forgotten enjoyable side of math. This experience reshapes their understanding of the subject and proves that we all successfully solve mathematical problems every day, often without even realizing our own talent. Furthermore, registered participants can gain access to a comprehensive database of engaging activities that can be used both during the event and in regular classroom teaching.



3. WELCOMING ALL FAMILIES

A close-up photograph of a red pencil with a yellow eraser, lying diagonally across a white grid pattern. The grid contains large black numbers, including '6' and '8'.

The program can feature various engaging activities, such as the "Drawing with Mathematics" workshop, which explores math not only as the language of science but also as a creative tool for artists. For logic enthusiasts, "Solve and Play Sudoku" offers a chance to engage with the world-famous puzzle enjoyed by children and adults alike. Additionally, visitors can enjoy a selection of mathematical games and puzzles. As part of recreational mathematics, these interactive activities allow participants to develop mathematical and computational thinking through play, proving that learning can be both effective and fun.

Also, parents must not forget how vital play is for children. Through play, STEAM can become truly engaging for students. Even a simple family walk in nature can turn into an exploration or a scientific scavenger hunt. Digital games can also be used to introduce STEAM concepts to children. A child's curiosity should be nurtured with stories, pictures, videos, and conversation. It is important to give children the chance to discuss topics one-on-one with adults. By talking openly about 'big topics,' they feel important and proud as they begin to understand new things.



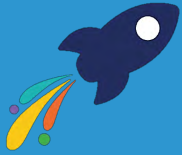


3. WELCOMING ALL FAMILIES



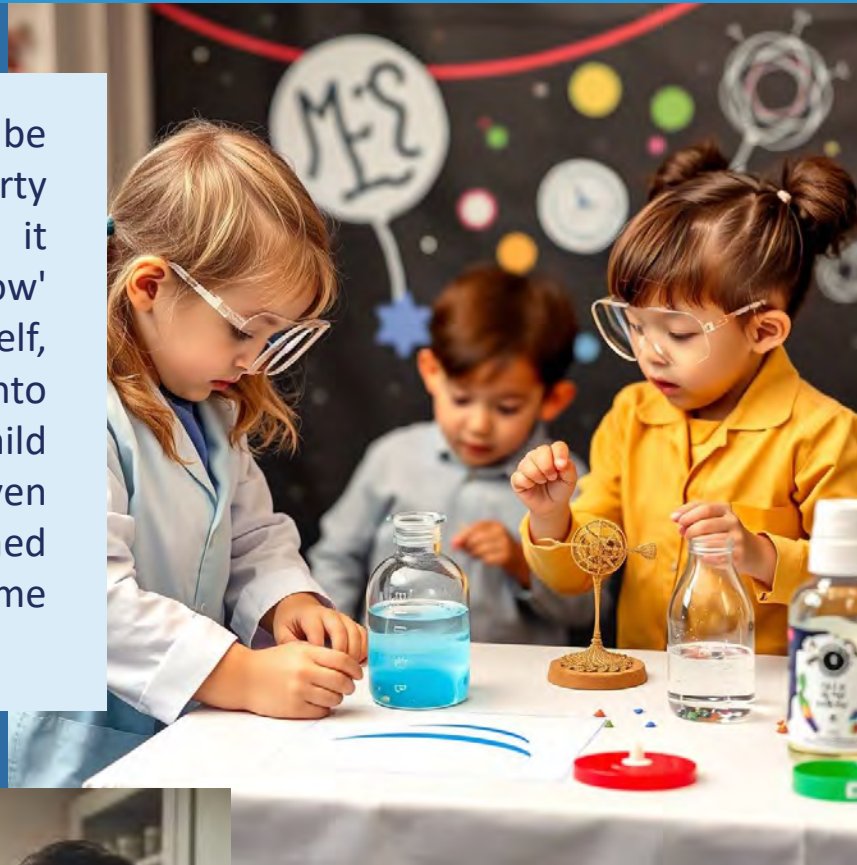
In elementary school, children learn about parts of the day and the seasons in their 'Nature and Society' classes, which can be linked to concepts in biology, physics, and astronomy. Parents who work in STEAM fields can focus on their own areas of expertise with their children. For instance, kids can be encouraged to collect pebbles, study the minerals used in jewelry, or simply pay attention to the ground they walk on.

Some children absolutely love playing with building blocks and toy cars, which is a great way to spark a lifelong interest in engineering. It would greatly help promote engineering studies if guided tours of factories and industrial plants were organized for children. Kids often ask how the things around them are made and how they work. We believe they would benefit from finding those answers with their own eyes through direct experience.



3. WELCOMING ALL FAMILIES

Also, a science theme can be chosen for a birthday party at a play center. While it might only result in a 'wow' factor during the party itself, parents can dive deeper into the topic with their child later on. Parents can even organize a science-themed birthday at home themselves.



In fact, everyday time spent at home can be linked to STEAM. While cooking, baking bread, making yogurt, or preparing preserves, it is possible to explain chemical and physical principles to children, as well as the role and importance of microorganisms.





3. WELCOMING ALL FAMILIES

LET'S PLAY TOGETHER!

In the following pages you can find two examples of simple and engaging activities that parents can do at home with their children to spark their interest in STEAM and demonstrate that learning in these fields can be both exploratory and fun. Inspired by these examples, parents can further explore online resources to find additional age-appropriate experiments, create similar worksheets, and plan STEAM dedicated play. Such activities not only support children's curiosity and learning but also provide valuable opportunities for quality family time.





3. WELCOMING ALL FAMILIES

ACTIVITY 1 - Strawberry DNA Experiment

The Background – what is DNA?

DNA is like a tiny instruction book inside living things. It tells our bodies how to grow, what color our eyes or hair are, and how plants and animals are built. DNA is found inside almost every living cell – in people, animals, plants, and even in fruits like strawberries. That's why we can see DNA in this experiment! DNA is very important because it carries information that is passed from parents to children and helps all living things stay alive and work properly.

What you need:

- ✓ Strawberries
- ✓ Plastic zip bag
- ✓ Dish soap
- ✓ Glasses
- ✓ Funnel
- ✓ paper towel or coffee filter
- ✓ Alcohol (Ethanol for wound cleaning, can be bought in pharmacy)
- ✓ A bent metal paperclip or a bent stick or a glass hook





3. WELCOMING ALL FAMILIES

1) Mash the strawberries.

Put a few strawberries into a plastic bag. Close it and gently squish them with your hands for about 2 minutes.



2) Make and add a soap solution.

In a bottle or a glass make a soap solution (about 1 dcl in total) consisting of a half volume dish soap, half volume water and one tea spoon of salt. Mix the solution with the spoon. Pour soap solution into the bag with mashed strawberries and gently mash for 1 more minute.

3) Filter the mixture.

Put a paper towel or a coffee filter into a funnel or on the top of the glass. Pour the strawberry mush through it into a clean glass. The liquid that comes through is what we need. Pour some of this liquid into a small glass cup.

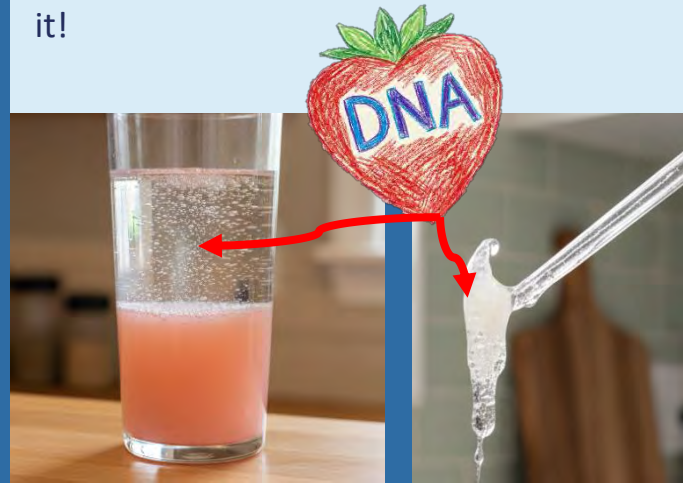


4) Add alcohol (slowly!)

Very slowly pour alcohol down the side of the glass so it makes a layer on top. Do not mix. Watch the magic. ✨ At the line between the strawberry liquid and the alcohol, you will see transparent and white, slimy strings. That is DNA!

5) DNA fishing (optional).

Use a stick or something long and thin, like a bent paperclip to gently lift the DNA out. If you like, you can even touch it!



Fun fact! Strawberries have lots of DNA, so you can see it very clearly – that's why this experiment works so well! It might not work so well with other kinds of fruit.





3. WELCOMING ALL FAMILIES

ACTIVITY 1 - Strawberry DNA Experiment - WORKSHEET

Conversation starters

- What do you think DNA does inside your body? If DNA is like an instruction book, what kind of instructions might it have?
- Detectives can use DNA that a thief leaves behind to find out who it was. What do you think – is DNA the same in all people, or a little different in each of us? Try to explore what makes DNA special and unique for every person.
- Who do you look like in your family? Do you think DNA helps decide how you look?
- What do you think, which of the following does not have DNA: animals, flowers, trees, people, rocks, bananas. Why not?

What does DNA actually look like?

If you could see DNA with a super microscope, it would look like a twisted ladder or a spiral staircase. This special shape is called a double helix. In our experiment many DNA strings from strawberries wind together in a slimy clump.

Activity for younger children – print out a coloring page depicting the double helix and let them colour it with their favorite colours.

Activity for older children - parent and child can try searching the internet for information on what is the DNA actually made of. What makes the code of life?





3. WELCOMING ALL FAMILIES

ACTIVITY 2 – Yeast inflating a balloon

The Background – what is yeast and why would it inflate a balloon?

Yeast is a tiny single-cell living organism that we cannot see without a microscope (a microorganism). It likes warm water and sugar, which it uses as food. When yeast eats sugar, it makes a gas called carbon dioxide (CO_2). This gas is the same kind of gas we breathe out. As more gas is made, it has nowhere to go, so it moves into the balloon. That is why the balloon slowly gets bigger!

What you need:

- ✓ Empty half-liter bottles, if possible transparent (like from store-bought water)
- ✓ Balloons
- ✓ A bag of dry yeast (for making bread, one small bag, e.g. couple of grams is enough)
- ✓ Two tablespoons of sugar
- ✓ Lukewarm water (30-37°C)





3. WELCOMING ALL FAMILIES

1) Fill the bottles with water

Fill a half-liter bottle with lukewarm water (30-37°C) to about one third. The water should not be too hot because it will kill the yeast (if it burns your hand it also burns yeasts).

2) Add sugar and yeast.

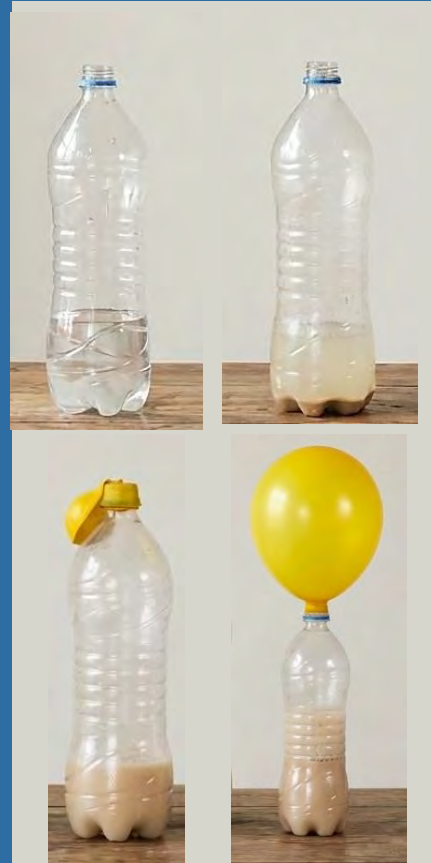
Add two tablespoons of sugar . Add one bag of baking yeast (or half a tablespoon if you have a larger pack) . Mix by shaking the bottle.

3) Put the balloon on the bottle.

On the mouth of the bottle put a balloon and wait for the magic. ✨ How soon will the balloon start inflating depends on the temperature and the quantity of water, sugar and yeast. It might take couple of minutes or up to an hour.

4) Make your own experiment!

Try repeating the experiment with several bottles. Put different amounts of sugar in different bottles or try varying the water temperature. Let your child make her/his own conclusions on how these variables influence the size of the balloon and try to speculate why this is.





3. WELCOMING ALL FAMILIES

ACTIVITY 2 – Yeast inflating a balloon - WORKSHEET

Conversation starters

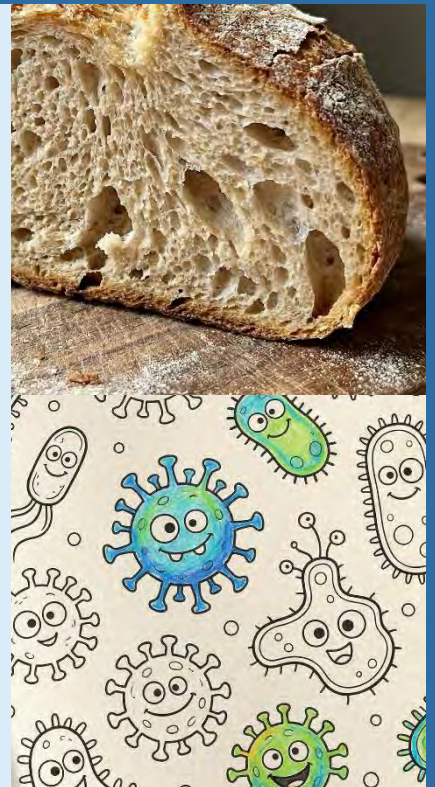
- What do you think yeast is – is it alive or not? Why?
- Why do you think the balloon gets bigger even though we don't blow into it?
- Where do you think the gas inside the balloon comes from?
- Can you think of other living things that make gases when they breathe?
- What do you think would happen if we didn't add sugar? Why?
- Why do you think warm water works better than cold water for the yeast?
- How is the yeast "breathing" similar to the way people breathe?
- What do you think would happen if we waited much longer—would the balloon keep growing?
- How does this experiment show us that even tiny organisms can do big things?

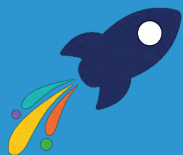
Microorganisms are small but mighty

Cut a bread slice. Remember the experiment and notice how gas made by yeast during bread making stays trapped inside the dough and leaves little holes when the bread is baked.

Activity for younger children – print out a colouring page depicting various funny looking microorganisms. Prompt your child to draw additional microbes.

Activity for older children - Can you name other microorganisms that we use in everyday life (e.g. in food making)? Try to learn about beneficial microorganisms that live on and inside of our and animal bodies and help in digestion and staying healthy.





4. COMMUNICATING EFFECTIVELY

1.Reframe the Conversation

For many families, STEAM can seem like a fortress: impressive but locked to those without the right key. Perhaps math was a struggle. Maybe a parent's own school memories are tinged with the belief that "I'm just not a science person." The path can seem narrow, reserved only for the lone genius or the child who has known their destiny since birth.

We must lay down a new, welcoming path. This starts with our very first words. Put away the script that says, "Here is what you need to know," and instead open with a question, an invitation: "We're here to explore what sparks your child's curiosity, and to see how the worlds of creativity and problem-solving can turn that spark into a future." This reframes the journey. It's not a test; it's an exploration.

The arts are not a side note but the bridge—the "A" in STEAM that says design, story, beauty, and human connection are at the very heart of innovation.

Relatable Ambassadors. And who tells this new story? Faces from the neighborhood. The local architect who designed the community center. The niece who codes for a living but loves to paint. The mechanic who uses diagnostics software and calls himself an automotive engineer. Find the parent who is a nurse, a landscape designer, or a project manager and help them see the STEAM in their own hands.



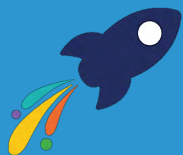
4. COMMUNICATING EFFECTIVELY



2. Create Shared Experiences

Families don't debate ideas; they share experiences. So, replace the podium with the workbench. Trade bullet-point slides for stations buzzing with hands-on discovery. This is the doing together phase.

The magic of doing it together is in its shared focus. When hands are busy and minds are engaged in a common, low-stakes challenge, defenses drop. A parent isn't worrying about the child's college education; they're laughing as their paper rocket veers off course. A child isn't feeling judged; they're seeing their mother's clever fix for a wobbly leg. In this shared focus, assumptions melt. STEAM stops being a distant, intimidating monolith and reveals itself as it truly is: a process of playful curiosity, resilience, and creative problem-solving.

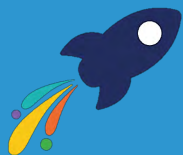


4. COMMUNICATING EFFECTIVELY

This creates the shared memory that fuels all future talk. Long after the glue dries, the family owns a story: "Remember when we made that crazy circuit together?" That story becomes the new reference point. Now, when a counselor mentions "engineering," it doesn't conjure a sterile textbook—it recalls laughter, collaboration, and the satisfying click of something that finally works.

Doing together transforms dialogue from an exchange of words into an exchange of "Aha!" moments. It's where the seed of interest, planted in the beginning, is watered by the joy of direct experience. We don't just tell families about STEAM pathways, but give them a taste of the journey itself, one hands-on, memorable spark at a time.





4. COMMUNICATING EFFECTIVELY

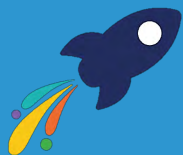
3. Sustain Daily Dialogue

Initial trust is built, but the energy of a single event will fade if not sustained. The goal is to channel that excitement into the daily rhythm of family life. Next, keep a clear, dedicated line of communication open and active in the daily rhythm of family life. The goal is to move the conversation from the school into the home by being a consistently available resource, not just an occasional presenter. This is where we listen actively and respond meaningfully.

The open communication channel is built on a loop of listening and responding. We send a one-question poll: "What does your child love to take apart or build?" And use those answers to tailor the next resource we share, proving the channel is live and two-way.

Ultimately, we make this channel consistently useful and human. The connection is no longer a scheduled meeting. It's a trusted, open line. When a parent sees something relevant, they know where to share it. When a child has a question, the family knows how to ask. The dialogue becomes self-sustaining—an open channel between curiosity and opportunity, always on.





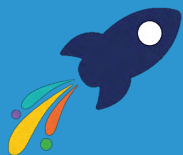
4. COMMUNICATING EFFECTIVELY

Final remark

This is our proven path: first, we plant the seed of trust, then we nurture it through shared experience, and finally, we sustain the growth with an open channel of communication. This is how a one-way announcement becomes a true, lasting dialogue. We stop informing families and start connecting with them, building a web of support where every shared story, every answered question, and every relatable role model strengthens the belief that STEAM isn't a distant fortress, but a landscape of possibility, and the map is being drawn together, in an ongoing conversation.

Remember:

- **Listen First:** The first step in two-way communication is to ask questions and genuinely listen to families' aspirations, concerns, and contexts.
- **Start Early and Be Consistent:** Engage families in elementary and middle school, before career anxiety sets in. Make it a sustained effort, not a one-off event.
- **Highlight Accessibility and Value:** Constantly message that STEAM pathways exist at technical colleges, apprenticeships, and not just universities. Lead to family-supporting careers.
- **Celebrate the "A":** Emphasizing the Arts (creativity, design, storytelling) makes STEAM feel accessible and relevant to a much wider audience.



4. COMMUNICATING EFFECTIVELY

ACTIVITY - DISCOVER PI: The outdoor math detective challenge

The Background: What is Pi and why is it important?

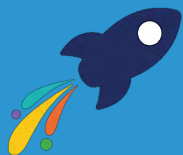
Pi (π) is one of the most famous numbers in mathematics. It's the ratio of a circle's circumference (the distance around it) to its diameter (the distance across it through the center). No matter how big or small the circle is, this ratio is always the same: approximately 3.14159... — a decimal that goes on forever without repeating. Pi isn't just for math class — it helps engineers build bridges, astronomers study planets, and artists create beautiful designs.

A Quick History of Pi:

- Ancient Babylonians and Egyptians (around 2000 BCE) used rough approximations like 3.125 and 3.160.
 - Archimedes of Greece (around 250 BCE) used polygons to calculate π to about 3.1418 — incredibly close!
 - The symbol π was first used by Welsh mathematician William Jones in 1706.
- Today, computers have calculated π to trillions of digits, but for most of us, 3.14 works just fine!

Materials Needed:

- Measuring tapes (flexible, at least 3 meters long) or string and rulers
- Notebooks or activity sheets + pencils
- Calculators (optional)
- Chalk or washable markers (for marking circles outdoors)



4. COMMUNICATING EFFECTIVELY



Step 1: Circle Hunt. Head outside to a park, playground, or street. Find at least 5 different circles in the real world (examples: manhole covers, round planters, fountains, bicycle wheels, round signs, painted circles on courts, tree rings visible on stumps, etc.).

Step 2: Measure the Circumference. Wrap the measuring tape around the circle to find its circumference (C). If using a string, wrap it around, mark where it meets, then measure the string with a ruler.

Step 3: Measure the Diameter. Measure straight across the circle through the center — that's the diameter (D). If you can't reach the center, measure the radius (from center to edge) and double it.

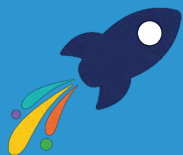
Step 4: Calculate Pi. Use the formula: $\pi \approx \text{"Circumference"} / \text{"Diameter"}$ to divide and record the result.

Step 5: Compare and Conclude. Compare your π values for each circle. Are they close to 3.14?

Discuss: Why might the numbers be slightly different? (Measurement error, not a perfect circle, etc.)

Fun Fact. Pi Day is celebrated on March 14 (3/14) around the world!

People eat pie, have math competitions, and some even recite pi from memory. The current record for memorizing pi is over 70,000 digits — that's more digits than there are words in a short novel!



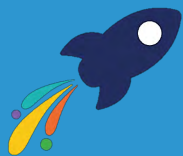
4. COMMUNICATING EFFECTIVELY

ACTIVITY – Discover Pi- WORKSHEET

Conversation starters

1. Every circle in the world hides the same secret number. Want to be a math detective and uncover it?
2. Engineers, artists, and astronauts all use the same magic number. Let's go outside and find it in its natural habitat.
3. What if you could discover a number so important it has its own holiday? Grab a tape measure—let's hunt for pi.
4. NASA uses pi to study planets. We're going to use it to study manholes and street art. Same math, just more sidewalk chalk.
5. Forget math class—today we're on a Pi Hunt. Your mission: find circles, measure them, and uncover the number that never changes.





4. COMMUNICATING EFFECTIVELY

ACTIVITY 1 – Discover Pi- WORKSHEET



Pi and the Family Pizza

Gather around the table with a fresh, round pizza. Before taking the first slice, turn dinner into a delicious experiment. Grab a piece of string and trace the crust to measure the circumference, then stretch it across the widest part to find the diameter. Divide one by the other, and right there in the sauce and cheese, you've discovered pi—the same number used by ancient mathematicians, now tasted, measured, and shared over a meal.

Activity for younger children. Become Pi Detectives in the Park—hunt for round objects like flowers, tires, and benches, then wrap string around them to feel the magic of pi as a “never-ending hug” around every circle.

Activity for older children. Become Pi Engineers—measure real-world circular structures like fountains or bike wheels, calculate pi with precision, then use that number to design and model a circular public space or sculpture using geometry software.



5. SUPPORTING STUDENTS SUCCESS



Supporting students' success in STEAM begins with empowering families to recognize and nurture their children's interests from an early age. When families understand how STEAM learning develops over time, they are better equipped to support their children not only academically but also emotionally and motivationally. Families should see STEAM as a long-term journey rather than a set of isolated school subjects. Early exposure to STEAM helps children build confidence and curiosity. We can support families by explaining how everyday interests – such as problem-solving, curiosity about how things work, or creativity - are connected to STEAM learning. We can raise families' awareness that the messages and statements they use at home also have a strong impact on a child's motivation and self-confidence. Statements that encourage learning like "Let's try again" or "What can we do differently?" have positive effect, while demotivating messages like "This school subject is difficult" or "You're not good at this" can reduce interest and self-confidence. Families should encourage children to explore without fear of making mistakes- mistakes are a natural part of learning, not a reason to quit.



5. SUPPORTING STUDENTS SUCCESS

Here are some examples of how families can respond to challenging situations. Making a maze from LEGO or maze from different materials like paper or straws- are some activities appropriate for smaller children to start at school and continue at home. Families can support their children by showing interest, suggesting fun design ideas, or helping integrate the model into a game. Also, families can make a video from the process. When the project is over, families can watch the video together, analyze and discuss the process. If the child is frustrated, the parents should offer help by creating a plan for a solution that involves simpler steps. The parents should recognize and praise the child's progress.

For older children such activities can include construction of different objects like: a building, a bridge, a rocket or whatever the child can imagine. Parts of such constructions are 3D models made from paper. Activity for younger students can be less complicated: start with creation of 3D models whose nets are learned at school. Advanced steps can involve drawing a more complicated net needed for the project- the student has to be creative and persistent to accomplish. Using Scetch or similar apps is preferable. Further, this activity can be related to other activities, like quality assurance or strength test. For example: if the object is a bridge- how much load can it carry, or if the object is a building- it can be tested for earthquakes by shaking and applying pressure, if the object is a ship- the student can test whether it can float and how much cargo it can carry. Families can be part of the process by suggesting improvements and motivating the child to finish the project.



5. SUPPORTING STUDENTS SUCCESS



Continued encouragement is essential in all phases of child's growth. Supporting children is shared responsibility between school and home. As children grow, practice and exploration strengthen skills such as logical thinking, persistence, and creativity. We can help families recognize that success in STEAM is not only measured by grades, but also by engagement, effort, and problem solving strategies.

Enrichment opportunities play an important role in sustaining interest and deepening understanding. Schools can support families by informing them about age-appropriate activities that expand learning experiences and allow students to apply knowledge in new contexts. Students can research problems in their neighborhood, problems they heard about in the media, or problems they have thought about.



5. SUPPORTING STUDENTS SUCCESS

For example, after learning about the weather and materials, students can be asked to think about floods they have seen in the news- they can model a house and place it outdoors in a realistic setting where they can simulate a flood by pouring water and thinking about solutions. Also, they can make relief out of clay or dough and conduct research on how to protect parts of the relief from flood. An advanced activity could involve building a structure, researching materials, and making calculations. Students can follow up with further research for the weather forecast for a particular region. Advanced steps can include using software for further analysis and forecasts. These experiences help students connect theoretical knowledge with real-life situations and build motivation for further learning.

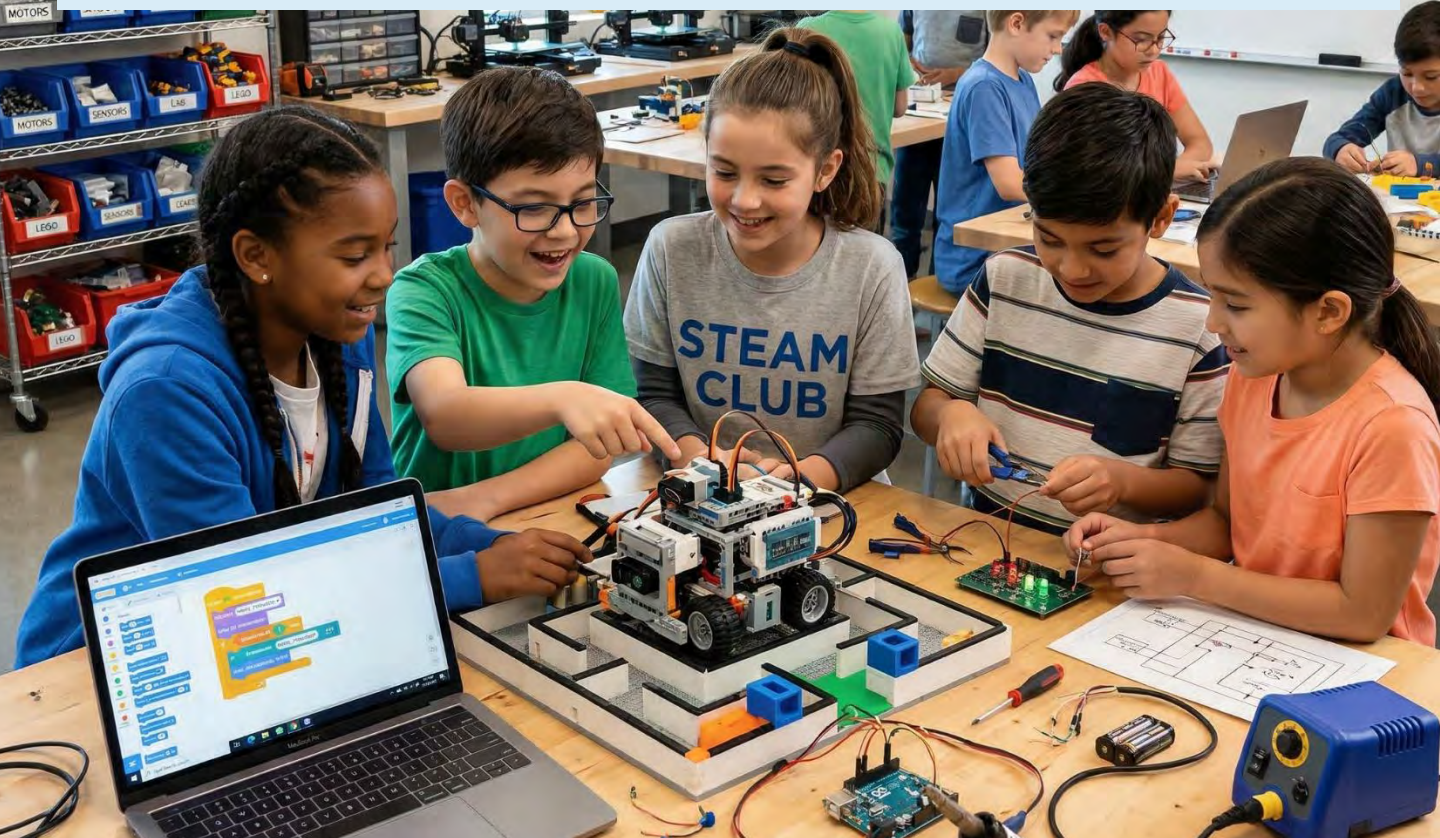
Such activities can be shared by the teacher through an online platform, but also on the same virtual space activities can be shared between families, with the additional goal of creating a sense of belonging to a group. Due to progress tracking, activities can be labeled by difficulty.

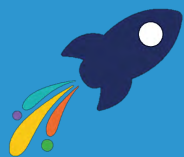




5. SUPPORTING STUDENTS SUCCESS

For strong motivation, it is essential for students to be part of specific school clubs. Students feel a sense of belonging, and at same time are exposed to challenges. Occasionally school clubs can organize educational workshops where students can present their works, participate in quizzes, demonstrate experiments, create a design, and exhibit models. If they are part of the “Coding Club” they can have competition (for example in Scratch or other age appropriate application). It can be game programming competition, animation or design. How such engagement stimulates success? Students’ progress is directly highlighted in front of their peers, their families, their teachers. Students feel successful and accomplished. This is a strong step that will play a role in their future career choices.





5. SUPPORTING STUDENTS SUCCESS



Another key element of supporting success is helping families understand the wide range of educational pathways within STEAM. We can provide guidance on how school subjects relate to future learning options. By seeing STEAM as flexible and diverse field, families are encouraged to support exploration rather than push children toward narrow or premature choices. Career awareness should be introduced gradually. Rather than focusing on specific professions.

Schools can organize an annual event “My Future STEAM Career”. On this event opportunities for education would be presented, along with successful role models from the STEAM field, interesting job positions, the demand for specific careers, and learning about professions that use similar knowledge and skills (engineer, scientist, and programmer). Family member or friend with STEAM career can take a guest talk to bring the concept of a certain career closer to the students.

Additionally, if a school does not offer career counseling, workshops for career guidance can be organized in line with students’ interests and competencies. Transitions within the education system are critical movements for students. Clear communication from teachers helps families understand expectations, available choices, and ways to support decision- making.



5. SUPPORTING STUDENTS SUCCESS

Families can support success also by keeping a STEAM activity journal. This will help them maintaining and organizing notes for joint activities, progress analysis, feedback of the experiment's outcomes, and number of attempts. "Have we learned something new", "is there an increase in interest, motivation, and desire for progress or was the experience negative (and what the reason was)?", "Is the activity difficult?", "is the activity age appropriate, and are the conditions adequate?", "Was the student supported and encouraged?", "Did the student have clear directions?" Ongoing feedback and encouragement strengthen long-term engagement. Families benefit from understanding how their child is progressing and where support may be needed.





5. SUPPORTING STUDENTS SUCCESS

ACTIVITY - CRACK THE CODE - Become a Secret Detective!

The background- what is cryptography and how the secret codes work?

Have you ever wondered how spies send secret messages? Or how your phone keeps your passwords safe? The science behind secret messages is called **cryptography**.

Julius Caesar was one of the first historical figures known for using a secret code. He shifted letters in the alphabet to hide military messages. Today, computers use much more advanced systems — but the main idea is still the same: changing information so only the right person can understand it. One of the simplest methods is called a substitution cipher. This means each letter is replaced with another letter or symbol. To read the message, you need a **key**, which explains the rule used to change the letters.

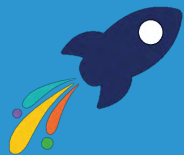
When we **encrypt** a message, we turn it into a secret code. When we **decrypt** it, we turn it back into readable text.

Let's try it!



What you need:

- Paper
- Pencil (colored markers optional)
- Printed alphabet chart (or write your own)
- Envelopes for secret message exchange (optional)



5. SUPPORTING STUDENTS SUCCESS

1) Write the alphabet. Write the alphabet in one line:

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

2) Write the rule. Choose your rule! In our example, the rule is: shift 3 letters forward.

3) Write the shifted alphabet. Write the shifted alphabet underneath:

D E F G H I J K L M N O P Q R S T U V W X Y Z A B C

Each letter in your message will be replaced with the letter directly below it in the secret alphabet.

4) Encode your secret message: Choose a word (or sentence). Replace each letter using your secret alphabet. Write the coded message on paper.

5) Simple example

Original word: HELLO

The rule: SHIFT 3 FORWARD

Shifted word: KHOOR

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
				↓			↓				↓			↓											
D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C

6) Advanced example:

Original sentence: HELLO I AM A CRYPTOGRAPHER

The rule: SHIFT 3 FORWARD

Shifted sentence: KHOOR L DP D FUBSWURJUDSKHU

7) Decode the message

Give your coded message to a family member or a friend.

They must use the key (the shifted alphabet) to decode it and to reveal the original message.

Fun fact! This is also known as Caesar cipher shift, one of the oldest methods of secret communication. Even computers today use the same principle to keep information secure online!



5. SUPPORTING STUDENTS SUCCESS

Bonus Trick: Invisible Lemon Ink

Want to make your message even mysterious? You can write it so it becomes invisible!

What you need:

- Lemon
- Small cup
- Cotton swab
- Paper
- Heat source (lamp, hair dryer –adult supervision required)

1) Write invisible message

Squeeze some lemon juice into a small cup. Dip a cotton swab into the juice and use it like ink to write your secret message on paper. Let it dry completely. The message will become invisible.

2) Reveal the message

Carefully hold the paper near a warm lamp or use a hair dryer. Watch the magic. The hidden message will slowly turn brown and become visible!

Tip: First encode your message using your secret alphabet. Then write it with lemon juice for double secrecy!





5. SUPPORTING STUDENTS SUCCESS

ACTIVITY – Crack the code- WORKSHEET

Conversation starters:

- Where do we use secret codes in everyday life?
- Why it is important to protect some of your messages or information?
- Try different invisible inks (milk, baking soda, vinegar). What do you notice? Are the results the same?
- What is the difference between encryption and decryption?
- Is there a way to decode a message without having the key? How?
- What do you think makes a code strong or weak?
- Can you think of other encoding systems besides shifting letters?
- Why are mathematical rules important for keeping information safe?

Why does lemon juice make invisible ink?

Lemon juice looks transparent when it dries on paper, so we cannot see it at first. But something interesting happens when we add heat! Lemon juice contains natural acids and organic compounds. When the paper is gently heated, these substances react faster than the paper itself. The heat causes the lemon juice to oxidize and turn brown. This makes the hidden message appear. This happens because the lemon juice burns at a lower temperature than the paper. So the message darkens before the paper does.

Activity for younger children- children can invent their own secret symbols instead of letters. Parents can help them write a short secret message. Decorate the envelope like a spy letter.

Activity for older children- Create a more complex cipher (example: shift 7, use reverse alphabet or combine two different rules). Challenge: can you design your own secret code system that someone else can decode using a key?



6. SPEAKING UP FOR EVERY CHILD

Since birth, a child shows a great deal of curiosity. An infant explores its surroundings and the world by observing, touching and constantly experimenting. In later years, curiosity and exploration are accompanied by an endless stream of questions. Research in developmental psychology shows that curiosity is one of the key factors in early learning, as it fosters cognitive development, creativity, and persistence in problem solving. Some studies even suggest that children who receive appropriate encouragement for exploration in early childhood are more likely to show interest in science, technology, and mathematics later in life.





6. SPEAKING UP FOR EVERY CHILD



Curiosity is therefore a natural need; however, its growth does occur automatically. It depends on the environment and encouragement a child receives while growing up.

Parents are the most important figures in a child's early years. They have great influence, power and responsibility to nurture a child's curiosity. Yet all too often, a child's curiosity and desire to explore further are suppressed by simple phrases such as, "Leave that, it's too complicated for you," "That's not for girls," or "We don't have time for that." By saying this, we unknowingly offer a solution too quickly, depriving the child of the opportunity to think and reducing their inner motivation to explore.

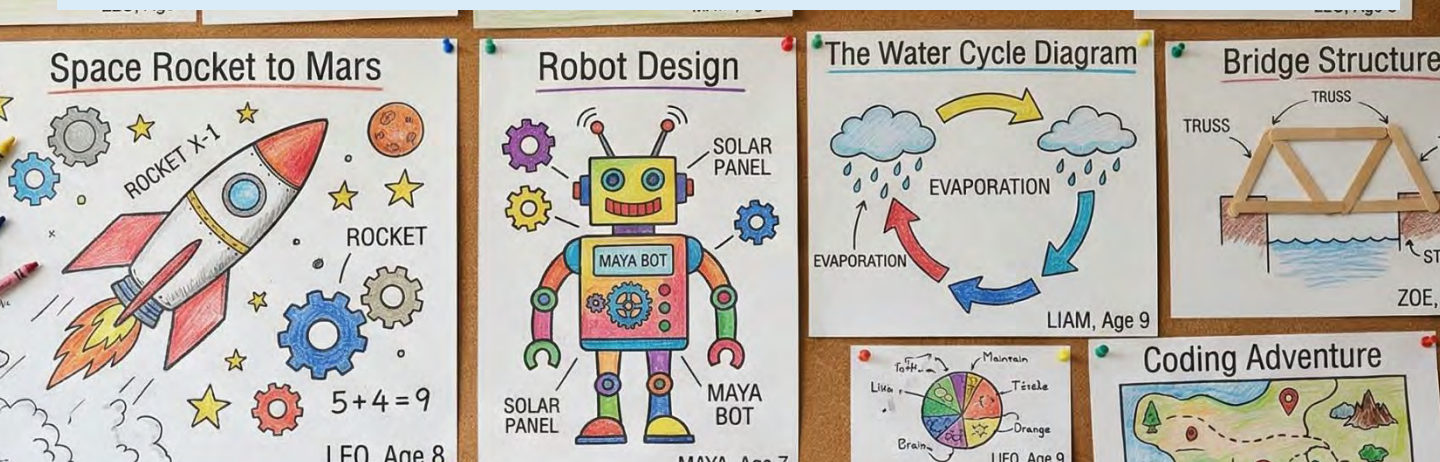
On the other hand, even small gestures—such as patience, encouragement, or openness to questions—can create a supportive environment in which a child feels safe enough to try, make mistakes, and try again.

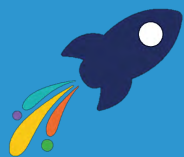


6. SPEAKING UP FOR EVERY CHILD

When we talk about accessible STEAM opportunities, we do not talk only about curiosity but also about fairness. Do all children truly have equal opportunities? Many children, including those with special needs, girls, or children from low-income families or less educated parents, face additional barriers. Lack of materials, limited encouragement at home, or social stereotypes further reduce the opportunities for experiential learning. It is therefore important, or even crucial, that schools as well as communities actively support families and help create conditions in which all children have roughly equal opportunities to develop their potential.

One way to provide support is to make STEAM content accessible without major financial investment. Schools can contribute by offering free workshops, lending science kits, or organizing other activities in which children can explore through play and parents can see possibilities for further development. It is important that these activities are designed to engage and encourage the participation of all stakeholders. When children see someone like themselves succeed in science, technology, or engineering, it is easier for them to imagine they can achieve similar things as well.





6. SPEAKING UP FOR EVERY CHILD

Another key element is empowering parents, especially those whose education and financial limitations present obstacles. Many parents feel intimidated and refuse to help when their child first encounters a science, mathematical, or technology task because they feel they lack sufficient knowledge. Yet fostering curiosity and exploration does not require expertise. All that is needed is sufficient degree of openness and some ingenuity. As teachers, we can provide parents with sufficient support and assistance in this regard. With simple ideas, we can contribute to exploration in their home environment without creating additional financial burden for families. What could be more valuable than observing nature during a walk, solving riddles together, exploring how devices work, or simply talking about why something happens? A simple question starting with “What do you think would happen if...?” is already the beginning of scientific thinking.

It is also necessary to create a safe environment in which making mistakes is allowed. Mistakes should be considered an important part of learning and exploration. Children from less privileged backgrounds often fear failure because the pressure is higher. When parents and teachers allow and normalize mistakes, we encourage children to keep looking for solutions. This helps them develop persistence, thirst for knowledge, and critical thinking—key features of STEAM.

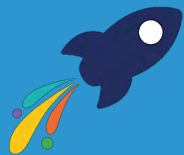
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6. SPEAKING UP FOR EVERY CHILD

An important part of the project we would like to highlight is our desire to speak up for every child as a society. We aim to identify and remove systemic barriers that make it difficult for some children to enter the world of STEAM. We want to promote the creation of such learning environment in which every child feels seen, heard, and capable. We believe in the potential of every child, regardless of their gender, origin, or financial background. When we enable children to preserve their natural curiosity, equip parents with tools to support exploration, and create inclusive opportunities in schools, we do more than just promote STEAM education. We lay the foundations for a society in which every child can dream, explore, and succeed.





6. SPEAKING UP FOR EVERY CHILD

ACTIVITY 1 – Solar system in the kitchen

Background – Let's get to know our solar system

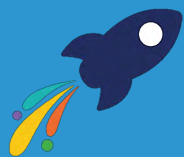
Our solar system consists of the Sun, eight planets, well over 100 moons, dwarf planets, asteroids, comets, and interplanetary matter. The Sun is the centre of our solar system and the planets orbit around it. They are at different distances from this enormous star; the closest to the Sun is Mercury, followed by Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. The planets are made of different materials, and when viewed through a telescope, they appear in different colours. Let's transfer these colours to our homemade solar system.



What you need:

- scales
- 300 g salt
- 300 g flour
- plastic cup
- measuring cup
- baking sheet
- tablespoon
- 2 dl water
- 1 tablespoon of oil
- acrylic/water colors
- paint brush





6. SPEAKING UP FOR EVERY CHILD

1) Make the salt dough.

Measure out all the ingredients in a plastic cup. Mix it with a tablespoon. When the ingredients start to come together, put the dough on the table and knead into a ball.



2) Divide the dough.

Divide the dough into 9 parts different size. Take the biggest one and make a ball – this one will represent the Sun. Next, shape other parts according to size to represent the planets. (borrow a book about the planets from the library or school and see how they are arranged in size).



3) Put the dough in the oven.

After forming all the planets, put them on a baking sheet and put them in an oven heated on 180 °C. Bake it for 20 minutes.



4) Cool down and paint the planets.

After the dough has cooled, paint the planets with acrylic or water colors.



Fun fact!

With our solar system, we can show how the planets orbit around the Sun. We can find data on how far each planet is from the largest star in our solar system and try to demonstrate the distances on a reduced scale.



6. SPEAKING UP FOR EVERY CHILD

ACTIVITY 1 – Solar system in the kitchen - WORKSHEET

Conversation starters

- Look up at the sky. What do you notice during the day and what at night?
- Do you think the Sun revolves around the Earth or the Earth around the Sun?
- Would you be able to find a planet in the night sky? Is it different from the other stars we see?
- Do you think all planets are the same shape?
- What are the individual planets made of? Is there any other planet that is similar to Earth?
- Earth is the only planet that is inhabited. Do you think there are any other planets that could be inhabited by living beings?
- Find out how far planets are from the Sun.
- The planets revolve around the Sun. Find out which planet is the fastest and which is the slowest?

How big the planets actually are and how far they are from the Sun?

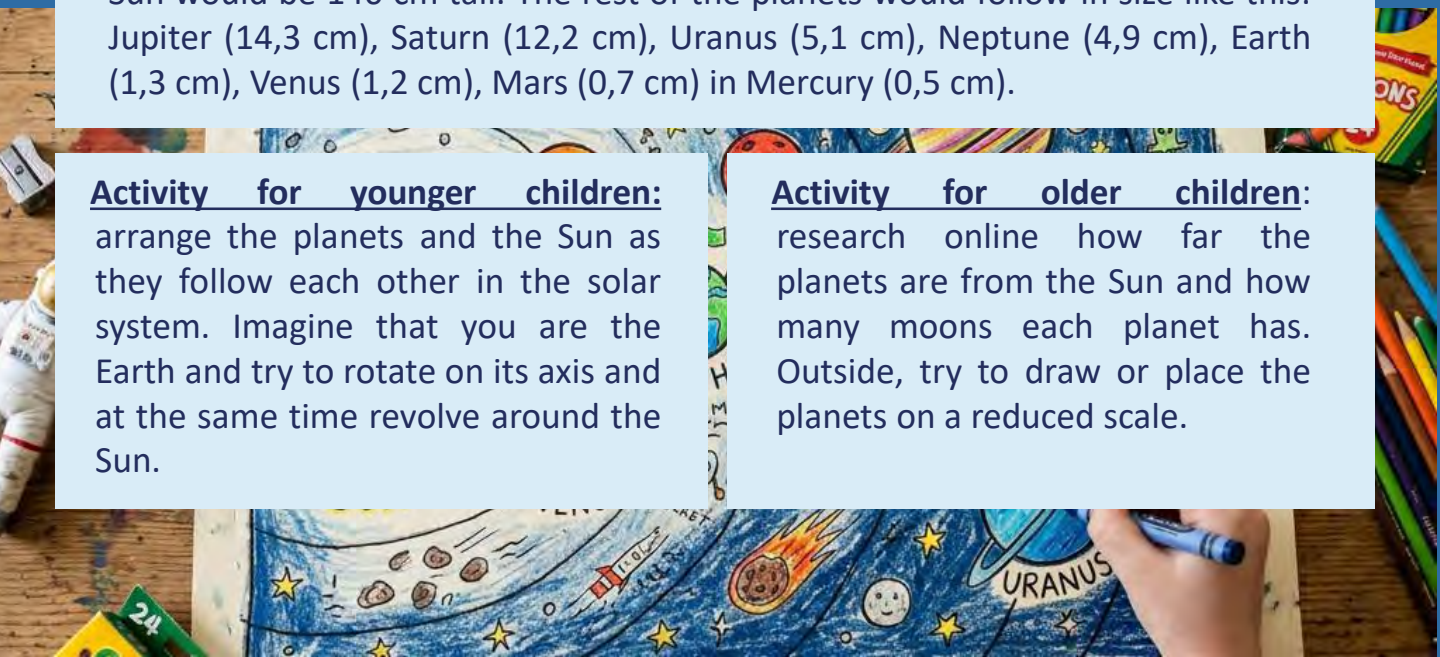
If you reduced the planets and the Sun to the same scale (1:1.000.000.000), the Sun would be 140 cm tall. The rest of the planets would follow in size like this: Jupiter (14,3 cm), Saturn (12,2 cm), Uranus (5,1 cm), Neptune (4,9 cm), Earth (1,3 cm), Venus (1,2 cm), Mars (0,7 cm) in Mercury (0,5 cm).

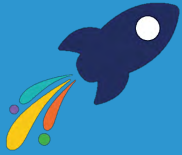
Activity for younger children:

arrange the planets and the Sun as they follow each other in the solar system. Imagine that you are the Earth and try to rotate on its axis and at the same time revolve around the Sun.

Activity for older children:

research online how far the planets are from the Sun and how many moons each planet has. Outside, try to draw or place the planets on a reduced scale.





6. SPEAKING UP FOR EVERY CHILD

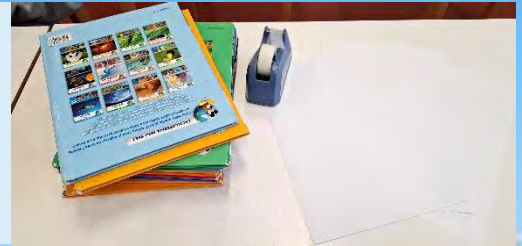
ACTIVITY 2 – Building with pillars

Background – What shapes are columns? Does their shape matter?

Columns are an indispensable element in construction. They provide stability and strength. They withstand the weather and carry heavy loads. Their shape is not a negligible factor. Different shapes have different advantages, and depending on what we want to build, it is important which shape we choose. What shapes of columns were used in Roman times? Why did they use circular columns?

What you need:

- 3 sheets of paper
- A larger number of thin books
- tape





6. SPEAKING UP FOR EVERY CHILD

1) Form the pillar.

Shape each paper individually into different shapes. Form the first paper into a square or rectangular shape, the second paper into a triangular shape and the third one into a round pillar shape.



2) Check the stability.

Place the pillars upright. Prepare a large number of thinner books. Try the triangular pillar first. Carefully place the books (one by one) on the pillar until it brakes. Repeat the same with other two pillars.

Which one is stronger?



Fun fact!

Circular columns have the highest load-bearing capacity, which is why they are most commonly used in construction. How many books did you place on each column shape? Did the circular shape withstand the greatest load?



6. SPEAKING UP FOR EVERY CHILD

ACTIVITY 2 – Building with pillars - WORKSHEET

Conversation starters

- Think of a Roman temple. How is it built? What shape are the pillars?
- What do you think, are all pillar shapes equally effective in construction?
- Do you think that architects and civil engineers think carefully about the shape of the pillars in relation to what they are going to build?
- Does it matter what shape of pillar are used in the construction of bridges?
- Does any form of pillars have a higher load capacity/can withstand more weight?

Why do they use round pillars when building bridges?

Round pillars have many advantages. With a round pillar, the load (weight) is distributed over the entire circumference. This means that they have a higher load-bearing capacity and that there are fewer cracks in the concrete. The round shape also reduces water resistance in rivers and is aerodynamically more favorable in wind.

Activity for younger children: built different bridges from wooden building blocks. Try building with square shapes and round ones. Place heavier objects on top of your structure. How many cubes is the least you need to make your structure still stand?

Activity for older children: look online at different bridges around the world and try to make a paper model. By folding the paper, you will be able to ensure more strength.





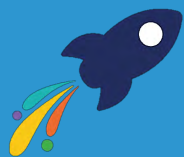
7. SHARING POWER

Taking shared responsibility for STEAM learning - Introduction

True family engagement in STEAM education requires more than informing families or inviting them to participate in activities. It requires sharing influence and responsibility. When schools, families and students make decisions about learning together, a sense of ownership emerges. This chapter describes how sharing power can contribute to meaningful, inclusive and sustainable STEAM education.

Sharing power does not mean that professionals give up their expertise. On the contrary, it means that professional knowledge is combined with the experiences, perspectives and ideas of families and students. Research on school–family partnerships shows that this type of equal collaboration leads to stronger engagement and improved learning outcomes.





7. SHARING POWER

Why sharing power is essential

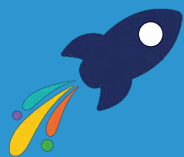
International research shows that parental involvement has the greatest impact when families not only support learning but also have influence over educational decisions. Epstein (2011) describes partnership between school and family as a core condition for student success, particularly when parents are involved in decision-making about educational content and learning processes.

Many schools unintentionally limit parental involvement to practical or organisational matters. Goodall and Montgomery (2014) argue that this is insufficient to create sustainable engagement. They emphasise that genuine involvement emerges when parents and caregivers feel jointly responsible for their child's learning. Sharing power is therefore not an additional step, but a necessary development.

From informing to deciding together

Sharing power is a developmental process. It often begins with informing, but gradually evolves through consultation towards shared decision-making. Schools can consciously support this process by being transparent about where families and students can have influence and how their input will be used.

Examples include making joint decisions about STEAM themes and projects, involving parents and students in designing learning activities, reflecting together on STEAM education and learning outcomes, inviting families to contribute ideas about collaboration with external partners. Transparency is essential in this process. When schools clearly communicate boundaries and expectations, trust grows and real collaboration becomes possible.



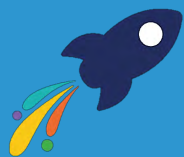
7. SHARING POWER



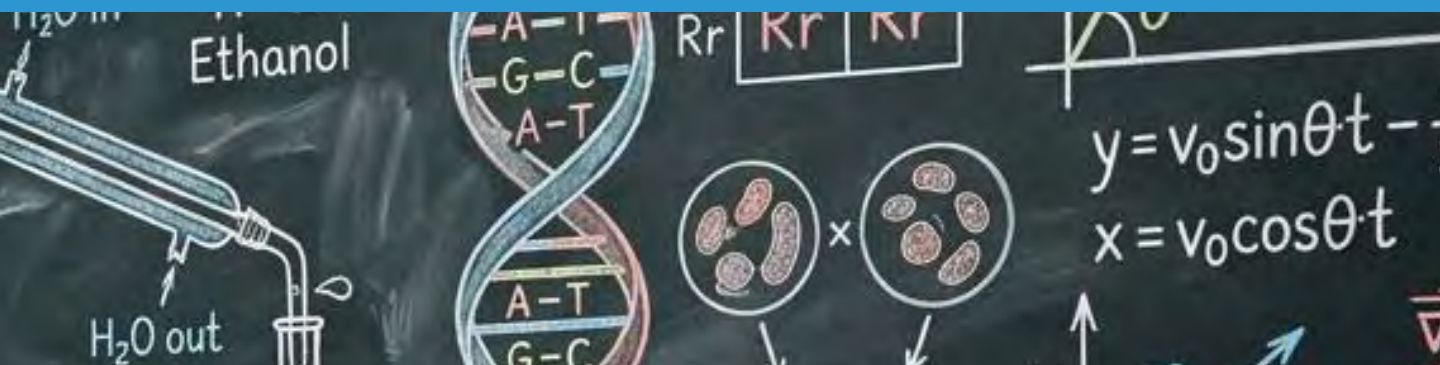
The role of students: ownership and voice

Sharing power concerns not only families but also students. Research on student voice shows that students who are involved in decisions about their learning experience greater motivation, responsibility and a stronger sense of belonging. Mitra (2004) demonstrates that taking student voice seriously contributes to both personal development and school improvement.

Within STEAM education this approach is particularly effective. Project-based and inquiry-based learning, in which students formulate questions and make choices themselves, leads to deeper understanding and higher engagement (Barron & Darling-Hammond, 2010). When students influence content, approach and presentation formats, they become active co-designers of their own learning process.



7. SHARING POWER



Sharing power and equal opportunities

Sharing power also plays an important role in promoting equal opportunities. Research shows that families from socio-economically vulnerable backgrounds or with a migration background often feel excluded from school decision-making. Auerbach (2012) emphasises that schools that deliberately invest in shared decision-making are more successful in reaching these families and in valuing their knowledge and experience.

By involving parents in STEAM-related choices, invisible barriers can be reduced. This increases the accessibility of STEAM education for all students, including girls and other underrepresented groups. In this way, sharing power directly contributes to more inclusive education.

Trust as a foundation

Sharing power requires trust. Bryk and Schneider (2002) describe relational trust as a key condition for successful school improvement. When schools show that the ideas of families and students are taken seriously, mutual trust grows. This trust strengthens engagement and the willingness to share responsibility.

Not every suggestion will automatically be implemented. However, it is essential that every contribution is discussed and that decisions are explained. In this way, the partnership remains credible and balanced.



7. SHARING POWER

ACTIVITY 1 – Exploring light, shadow and movement at home

About this activity

This activity invites families to play and explore together at home by discovering how light creates shadows and how movement affects what we see. The activity is flexible and can easily be adapted to the age and development of the child. No prior knowledge is required and all materials are simple household items.

Activity overview

Theme: light, shadow and movement; Age: 4–16 years; Location: home

STEAM focus

Science: light, shadow and movement

Engineering: designing and testing

Arts: creativity, imagination and storytelling

Mathematics: comparing, measuring and estimating depending on age

Learning goals

For children : Discover that light creates shadows, experience how distance and position influence shadows, explore and experiment through play, experience that their own choices guide the learning process

For parents and caregivers: Experience that STEAM learning can be accessible and playful, learn to guide through questions and conversation rather than explanation, see themselves as active learning partners of their child

Materials

- All materials are easy to find at home
- A flashlight, desk lamp or phone light
- Paper or cardboard
- Scissors
- Tape
- Pencils or markers
- Optional: string, wooden spoons, clothespins, small boxes





7. SHARING POWER

Step 1 – Discover together

Go together to a slightly darker room or close the curtains. Do this together. Shine the light on a wall. Make shadows with your hands. Move closer and further away. Observe what changes.

Conversation questions for parents

- What do you see happening?
- When does the shadow become bigger or smaller?
- What happens when you move?

Step 2 – The child chooses (sharing power at home)

Let the child decide what you will make. For example: an animal or figure, a shape or symbol, a shadow story, a moving object that creates shadows. Important: The child chooses the idea. The parent follows, supports and thinks along.

Step 3 – Designing and making

Draw or cut out the chosen shape. Attach it to cardboard, a stick or string. Test it together using the lamp. Encourage experimentation: different distances, different shapes, movement of the light or the object.

Step 4 – Play and explore

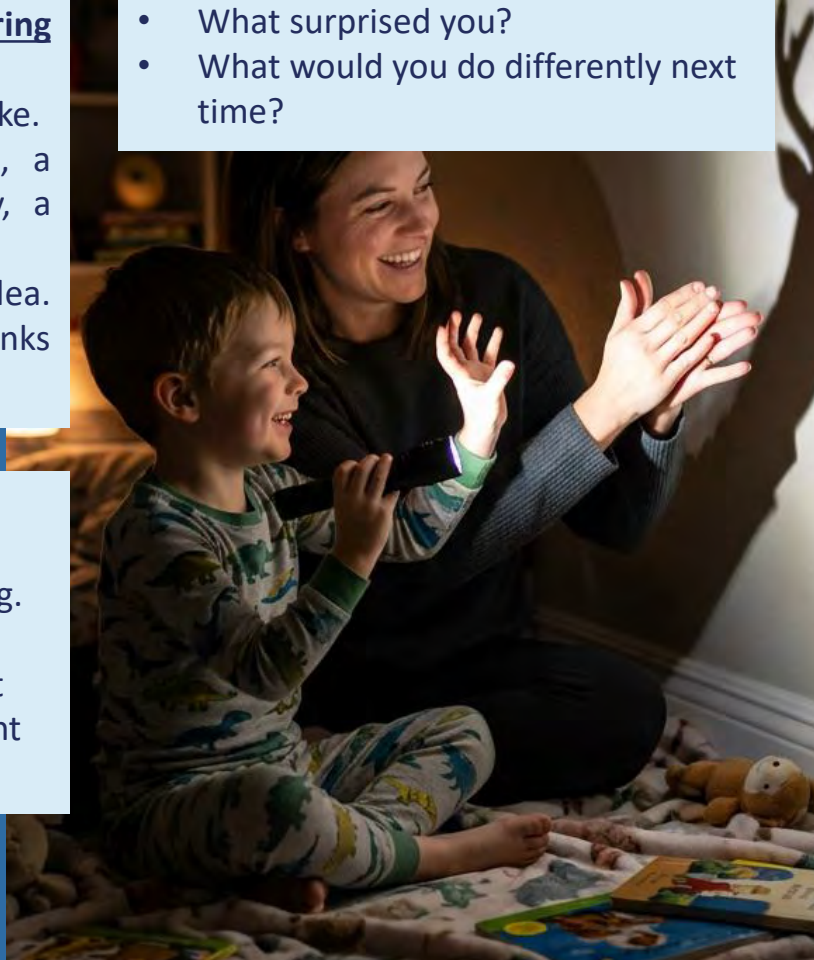
Use the object you created to play, invent a story or continue investigating.

Optional maths prompts:

- Which shadow is the biggest?
- Which one is the farthest away?
- Can you make the shadow move slowly or quickly?

Step 5 – Reflect together

- Finish with a short conversation.
- What did you enjoy most?
- What surprised you?
- What would you do differently next time?





7. SHARING POWER

Differentiation by age

Ages 4–6

- Focus: experiencing and naming
- Free play with light and shadow
- Parent role: play along and describe
- Outcome: shadow play or a short story

Ages 7–9

- Focus: discovering and comparing
- Compare two shadows
- Explain what happens
- Parent role: ask open questions
- Outcome: drawing with a short explanation

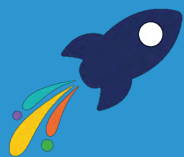
Ages 10–12

- Focus: investigating and explaining
- Additional challenge: Develop a research question together, for example: How can we make the shadow as large as possible. Test at least two possibilities. Discuss what works better and why
- Parent role: think along, not solve
- Outcome: design with a short reflection

Ages 13–16

- Focus: designing, justifying and improving
- Additional expectations: Formulate a goal. Define design criteria such as function, shape or stability. Test, evaluate and improve the design.
- Reflection questions:
 - Why does this design work better?
 - Which choices did we make deliberately?
 - What would you change if you had more time or materials?
- Parent role: critical discussion partner
- Outcome: design with a well-reasoned explanation in text, video or presentation.





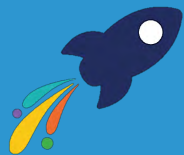
8. COLLABORATING WITH COMMUNITY

Why community collaboration matters for family engagement in STEAM

Family engagement in STEAM becomes stronger when learning takes place not only at school or at home, but also in the wider community. Community collaboration helps STEAM learning become more visible, relevant, and accessible for families by linking learning to everyday places, people, and experiences. STEAM provides a shared activity that brings families, schools, and community partners together around real questions and practical challenges.

In this context, “the community” includes the places and organisations families already know and trust, such as libraries, community centres, cultural organisations, sports clubs, small businesses, makerspaces, museums, nature organisations, and neighbourhood initiatives. It also includes people such as local professionals, volunteers, craftspeople, and parents themselves. These community actors form a familiar environment in which children grow and explore their interests. Learning in these spaces often happens informally, through conversation, observation, and shared activity, without pressure or assessment. This makes community collaboration especially important for engaging families who may feel uncertain about their own STEAM knowledge or who have had less positive experiences with formal education.

By working with community partners, schools can connect STEAM learning to real-life situations. When children and families explore STEAM through local challenges, practical activities, or familiar surroundings, learning becomes more meaningful. Families begin to recognise that STEAM skills are already part of their daily lives, even if they do not use technical terms to describe them.



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Seeing the community as a learning environment

Seeing the community as a learning environment means actively using local places and partnerships to create STEAM learning experiences that involve families, schools, and community actors together. In these settings, learning is co-created: families and children explore, investigate, and reflect alongside teachers and community partners.

A structured example of this approach is the MOST project, coordinated by ICSE. In this initiative, schools work with families, local citizens, science education providers, and businesses to address real community issues such as waste reduction or energy use. Collaboration is built step by step: schools identify a local challenge, community partners contribute expertise and context, and families participate in data collection, discussions, and solution design. The impact is twofold: students apply STEAM skills to real problems, and families become active contributors to learning and community improvement – ICSE – International Centre for Stem Education.

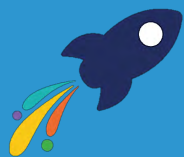


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Community-based learning does not have to rely on large projects. Many schools already build partnerships in smaller, practical ways. For example, a school may work with a local library to organise family STEAM afternoons where parents and children explore simple experiments or digital tools together. A collaboration with a nearby business or nature organisation can involve families investigating how STEAM is used in local work or the surrounding environment. These partnerships are often built through existing relationships and grow over time through repeated activities.

These examples show that when the community is treated as a learning environment, STEAM becomes a shared experience. Schools provide structure and guidance, community partners offer real-world contexts, and families participate alongside their children. This collaborative approach enriches STEAM learning opportunities and strengthens connections between school, home, and community.





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Building partnerships that include families

Community partnerships often start between schools and local organisations. In many cases, it is practical for teachers to first explore possible collaborations with community partners before involving families. This allows schools to create clear, low-threshold activities that families can later join with confidence.

Once a partnership takes shape, families can be gradually included in ways that feel manageable and meaningful. This might begin with inviting families to participate in a concrete activity. Experiencing an activity together helps families understand its purpose and lowers the barrier for further involvement.

Partnerships work best when they build on existing relationships. Teachers can start by identifying local organisations that already work with children or families, such as libraries, community centres, or sports clubs. These partners often have experience in welcoming diverse groups and can support schools in creating accessible STEAM activities.

Including families does not require extensive preparation or prior STEAM knowledge. Families can take part by exploring, asking questions, or working alongside their children. Over time, some families may choose to contribute ideas or suggest new connections within the community. By using STEAM as the shared activity, schools, families, and community partners can gradually build collaboration at a realistic pace. This step-by-step approach helps ensure that partnerships remain practical, inclusive, and sustainable.



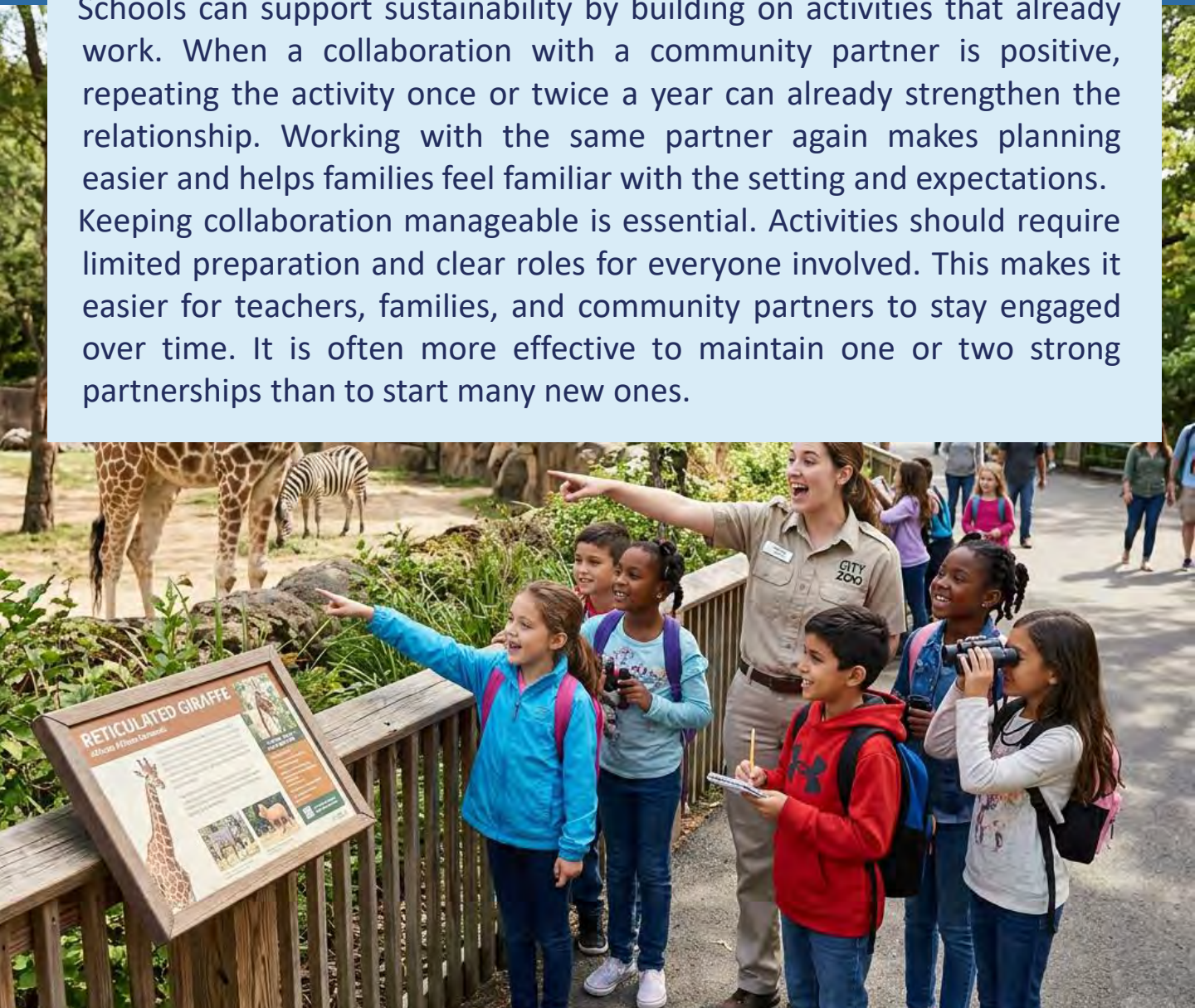


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Making collaboration sustainable

Sustainable community collaboration does not depend on large projects or long-term commitments from the start. In practice, it grows through small, repeated actions that fit into everyday school life. What matters most is continuity, not scale.

Schools can support sustainability by building on activities that already work. When a collaboration with a community partner is positive, repeating the activity once or twice a year can already strengthen the relationship. Working with the same partner again makes planning easier and helps families feel familiar with the setting and expectations. Keeping collaboration manageable is essential. Activities should require limited preparation and clear roles for everyone involved. This makes it easier for teachers, families, and community partners to stay engaged over time. It is often more effective to maintain one or two strong partnerships than to start many new ones.





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Informal reflection helps collaborations grow. After an activity, teachers can briefly check in with families and community partners to see what worked well and what could be improved. This feedback does not need to be formal or written down. Simple conversations help partners adjust activities and feel valued.

Over time, repeated collaboration creates trust. Families become more confident in participating, community partners better understand the school context, and teachers gain insight into local resources. By using STEAM as a shared focus, these ongoing relationships deepen collaboration and gradually expand learning opportunities for students in a sustainable way. Students benefit from this approach by experiencing STEAM in real-life contexts, working with different people, and developing curiosity and problem-solving skills in meaningful situations.





8. COLLABORATING WITH COMMUNITY

ACTIVITY 1 – Where does the water go?

The background – Why does water disappear faster in some places than in others?

After rain, some places dry quickly while others stay wet or form puddles. This happens because different materials absorb water in different ways. Engineers and city planners think about this when designing streets, parks, and playgrounds to control rainwater and prevent flooding.

What you need:

- A small bottle or cup of water
- Paper and pencils
- An outdoor space in the neighborhood





8. COLLABORATING WITH COMMUNITY

1) Look around

Take a short walk and find different surfaces, for example: grass or soil, sand or gravel, pavement or tiles, a place near a drain. Try to find at least three different surfaces.

2) Make a prediction

Before testing, think together: Which surface will absorb water the fastest? Which surface will keep the water on top the longest? Write down your predictions.

3) Test it

Pour a small amount of water on each surface. Watch what happens to the water: Does the water soak in? Does it stay on top? Does it flow away? Look again after about 30 seconds. Has anything changed?

4) What did we observe?

Surface: _____ - Water: soaked in / stayed / flowed away

Surface: _____ - Water: soaked in / stayed / flowed away

Surface: _____ - Water: soaked in / stayed / flowed away

5) Compare and discuss

Which surface absorbed the water fastest? Which surface stayed wet the longest? Which surface allowed the water to flow away?





8. COLLABORATING WITH COMMUNITY

ACTIVITY 1 – Where does the water go? - WORKSHEET

Conversation starters:

- Which surface absorbed the water the fastest? Why do you think that happened?
- Which surface kept the water on top the longest?
- Where in your neighborhood do you usually see puddles after rain? Why do they form there?
- Why do you think parks often have grass instead of only pavement?
- What do you think could happen in a city if rainwater could not soak into the ground or flow away?
- Where do you think the rainwater goes after it disappears?

How it works?

Different surfaces handle water in different ways. Some materials, like soil, sand, or grass, have small spaces between particles. Water can move into these spaces and soak into the ground. This is called absorption. Hard surfaces, such as pavement or concrete, do not have these spaces, so water stays on top or flows away. That is why puddles often form on hard surfaces. In neighbourhoods and cities, engineers design drains, slopes, and green areas to help rainwater soak in or flow away safely.

Activity for younger children

Draw your street or a place you know on a rainy day. Draw where the rainwater goes. Does it go into a puddle, into the grass, or down a drain?

Activity for older children

Look outside through a window or think about your street or school. Can you name three ways rainwater is guided or managed, for example drains, sloped streets, gutters, or grassy areas? Talk about why these are important.



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ACTIVITY 2 – Match the smells

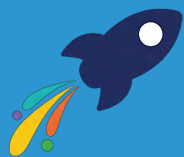
The background – How does our sense of smell work?

Our sense of smell helps us recognize materials, plants, and environments. Many natural things in our neighborhood, such as grass, soil, leaves, and flowers, release tiny particles into the air that our nose can detect. Our brain connects smells to memory, which is why we can often recognize a smell even without seeing the object. In this activity, you will test how well you can recognize and match different smells.

What you need:

- 6 to 10 small containers or cups
- Paper or aluminium foil
- A pencil to make small holes
- Natural materials collected outside (for example: grass, leaves, herbs, flowers, soil)





8. COLLABORATING WITH COMMUNITY

1) Collect materials

Take a short walk in your neighborhood, park, or schoolyard and collect several natural materials. Choose at least three different items, for example: grass, leaves, flowers, soil. Try to pick materials that have a noticeable smell.

2) Prepare the game

Place each material in two separate cups so that you have pairs with the same smell. Cover the cups with foil or paper and make a few small holes so the smell can escape. Mix the cups so you cannot see which ones belong together.

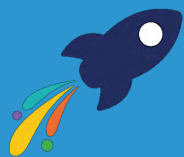
3) Smell and match

Without looking inside the cups, smell each one and try to find the two cups that contain the same material.

4) Check your results

Open the cups and see if your matches were correct. Which smells were easy to recognise? Which smells were difficult?





8. COLLABORATING WITH COMMUNITY

ACTIVITY 2 – Match the smells- WORKSHEET

Conversation starters

- Which smell was the easiest to recognise? What made it easy to recognise?
- Which smell was harder to recognise? Was it weaker, or less familiar?
- Why do you think some materials have a stronger smell than others?
- How do you think the smell travelled from the cup to your nose?
- Did any smells remind you of a place or a memory? Why do you think that happens?
- Where else in your neighbourhood can you find strong smells? What might be causing them?

How smell works

Many things around us release tiny particles into the air. These particles are called molecules. They are too small to see, but they travel through the air and enter your nose when you breathe in. Inside your nose, special cells detect these molecules and send signals to your brain, which helps you recognise what you are smelling. Smell is also closely connected to memory, which is why certain smells can remind you of places, people, or experiences. Smell molecules move through the air. Some smells are strong because many molecules are released, while others are weaker because fewer molecules reach your nose. Air movement, temperature, and distance can all affect how well we smell something. Want to know more about how we smell? Watch this video: How do we smell? - Rose Eveleth.

Activity for younger children

Ask children to draw one of the materials they smelled and draw small dots in the air to show how the smell travels to the nose. They can also draw where they found it in the neighbourhood.

Activity for older children

Parent and child can try a small investigation at home or outside: place a strong-smelling material (for example herbs or orange peel) on a table and step back slowly. At what distance can you still smell it? What happens if someone waves their hand to move the air? Discuss why moving air changes how smells travel.



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