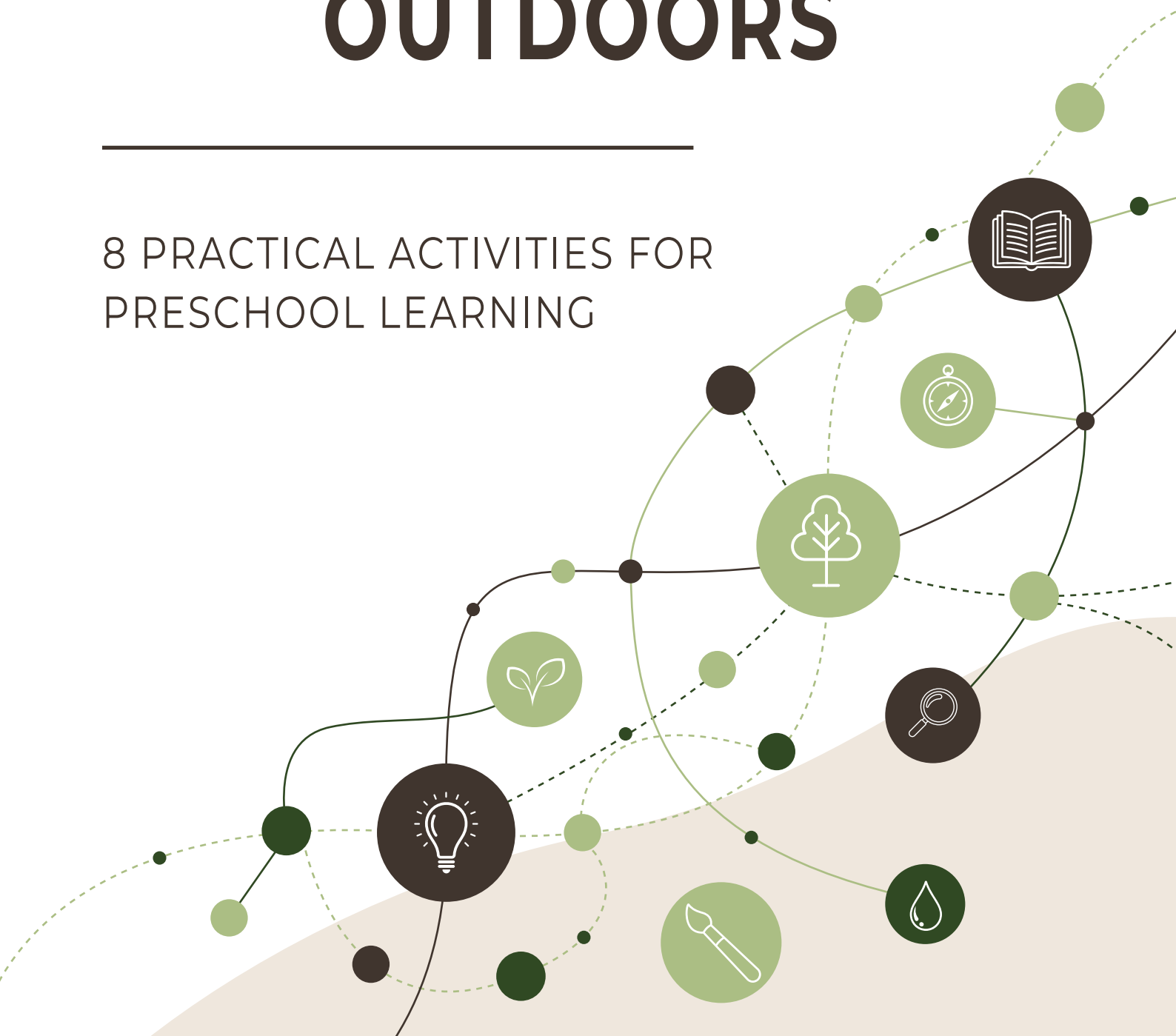
Nordplus

LET`S STEAM OUTDOORS

8 PRACTICAL ACTIVITIES FOR PRESCHOOL LEARNING



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1. INTRODUCTION

Early childhood is a very important stage of a child's development. During this time, sensory experiences and learning through practical activities play an essential role. Children learn by observing, touching, listening, comparing, trying, moving and experimenting. This is why it is important to create an environment in which children can explore, discover and look for answers themselves instead of simply receiving ready-made information.

The richer a child's practical and sensory experiences are, the more they learn about the world around them. They can later use this understanding in new learning situations. Real-life experiences help children understand more abstract ideas, develop their imagination and connect new ideas with what they have already seen, felt and experienced. Learning by doing therefore creates an important foundation for children's future learning and inquiry skills.

The STEAM approach offers many opportunities to create such experiences in early childhood education by connecting Science, Technology, Engineering, Arts and Mathematics. Children are encouraged to ask questions, observe, predict, compare, measure, build, experiment, make mistakes, look for new solutions and work together. In this kind of learning, the process of exploring and discovering is just as important as the final result.

The outdoor environment is especially well suited to STEAM learning. It provides children with a natural, changing and varied learning space. Natural materials, weather, plants, living things, water, sand and other elements of the surrounding environment become real resources for exploration and experimentation. Outdoors, children can not only observe but also test their ideas, discover cause-and-effect relationships and gain experiences that cannot be fully replaced by presentations, pictures, worksheets or explanations.

With this in mind, the mission of the "Let's STEAM Outdoors" project was to promote modern, child-centred and experience-based learning in the partner institutions by using the natural and changing outdoor environment as a rich and varied learning space. By combining STEAM with outdoor learning, the project helped develop children's environmental awareness and green thinking while creating opportunities to strengthen their natural curiosity and desire to observe, discover, explore and experiment.

5
schools

international collaboration

3
countries

Latvia, Estonia, Lithuania

8
ready to use STEAM lesson plans

ABOUT THE PROJECT

The Nordplus project No. NPJR-2025/10187 "Let's STEAM Outdoors" was developed to introduce in the partner institutions teaching tools that can be used over the long term, strengthen the practical use of STEAM in everyday early childhood education and encourage professional cooperation among educators in the Baltic States. Partners from Latvia, Lithuania and Estonia came together to share their experience, learn from one another and jointly explore how STEAM learning can be used outdoors in a meaningful and purposeful way.

During the project, educators developed their knowledge, took part in international mobilities and experience-sharing activities, created STEAM activity plans and established outdoor STEAM learning centres in their institutions. Both the plans and the centres were designed in line with the curriculum and learning methods used in each institution. The lesson plans developed during the project underwent piloting, testing, evaluation and improvement process.

This handbook brings together the partners' shared experience and the practical ideas developed and tested during the project.

PURPOSE OF THE HANDBOOK

The aim of this handbook is to inspire and provide practical support to preschool educators who want to use STEAM outdoors. It presents ideas developed, tested and improved by the project partners.

The handbook includes eight outdoor STEAM activity ideas created during the project. They show how the surrounding environment, natural materials and children's natural curiosity can be used to create meaningful learning experiences. The activities encourage children to learn by doing and experiencing: observing, exploring, comparing, measuring, experimenting, building, working together and finding their own solutions.

This handbook is more than a collection of ready-made activity plans. None of the plans should be seen as a finished or fixed model. They are open and flexible sets of activities that educators can adapt to the children's age, interests, abilities and needs, as well as to their institution's environment, learning goals and available resources.

We invite you to use this handbook as a starting point, go outdoors and discover STEAM together with children - letting their natural curiosity lead the way to new discoveries!



2. WHY STEAM OUTDOORS?

The outdoor environment offers much more than fresh air and physical activity, although both are very important for children's health and well-being. It can also become a rich and meaningful place for learning.

For preschool children, outdoor learning is especially valuable because they learn through play, movement and direct experience. Outdoors, children can use their senses, ask questions, explore real objects and situations, test their ideas, make mistakes and try again.

1. NATURE ENCOURAGES CURIOSITY

Outdoors a child doesn't have to imagine anything – nature itself raises questions: *Why do leaves change colour? How can we build a bridge over a puddle? Do the sounds of nature change with the seasons? How could we find out?*

Nature awakens natural curiosity, encouraging the child to become a little researcher and ask questions that start with "*Why...?"* and *"How...?"*

2. NATURE, WEATHER AND SIMPLE MATERIALS BECOME LEARNING TOOLS

You do not need to wait for a perfect sunny day to help children explore their surroundings or observe natural processes. Rain, wind, snow, sunlight, shadows, changes in temperature and the seasons all offer different opportunities for learning.

Many outdoor STEAM activities do not require expensive equipment—the learning materials are already around us. Stones, sticks, leaves, pine cones, water, sand and reusable materials can be used to sort, compare, measure, design, build and create.

The changing outdoor environment also allows children to explore how different conditions affect what they observe.

For example, they can compare insect hotels placed in sunny and shaded areas or watch bird feeders over time to see which birds visit during different weather conditions and seasons. And did you know that snow is not only a blanket for seeds to overwinter, but also an excellent building material?

3. OUTDOOR ENVIRONMENT AS A FREE SPACE FOR EXPERIMENTATION

Outdoors, children can move more freely, build larger structures and work with materials such as water, sand, soil and plants.Outdoors the restrictions of indoor limitations simply disappear – here you can get your hands dirty, scatter sand around and pour more water into the containers than they can hold.

This freedom reduces the fear of making mistakes and gives children more opportunities to experiment without expecting every attempt to succeed or every result to be the same. An unexpected result can become a reason to ask a new question and try a different solution.

4. CHILDREN CAN TAKE PART IN DIFFERENT WAYS

Outdoor activities offer many ways to participate. One child may collect materials, while another may build, measure, draw, take photographs or explain the group's idea. Movement, sensory experiences and practical tasks allow children to use their different interests, abilities and strengths.

Some children may also find it easier to concentrate and take an active role when they can move, touch materials and learn through practical experience. The activity can be adapted by changing the task, the materials, the level of support or the child's role.

WHY TO COMBINE OUTDOOR LEARNING WITH STEAM?

STEAM brings together Science, Technology, Engineering, Arts and Mathematics through a shared question, idea or practical challenge. These areas are not separate parts of the activity. They connect naturally and support one another during the learning process.

For example, while building a bridge, children may investigate the properties of natural materials, use simple tools, design and improve a structure and measure or compare the results. Not every activity needs to include all five STEAM areas. It is more important to choose the areas that meaningfully support the children's exploration.

STEAM OUTDOORS CAN HELP CHILDREN DEVELOP:

- **critical thinking and problem-solving skills** by making predictions, testing ideas and trying again;
- **communication and cooperation** by sharing materials, discussing ideas and working towards a common goal;
- **creativity and independence** by making choices and finding different solutions;
- **attention and well-being** through movement, fresh air and active involvement;
- **care for the environment** by learning about nature through direct experience and taking responsibility for plants, materials and shared outdoor spaces.

STEAM in an outdoor environment is not an additional burden or a complicated methodology – it is a response to the natural desire of a child to explore the world. By learning through experience, we do not simply provide ready-made answers, but teach the child to discover the world independently through sensations, emotions and curiosity.

3. HOW TO USE THIS HANDBOOK

This handbook brings together the practical experience we have gained during the project. Further in the material, you will find **8 ready-made STEAM lesson plans** developed by project partners. Each plan is presented in a **short and full version**.

The short version provides information about the plans in a general, concise and practical way, allowing you to decide whether the plan fits your teaching context and teaching needs.

To help you to quickly catch the idea and nature of each plan, they have been evaluated using following key STEAM indicators:	**Each indicator is assessed on a five-level scale:**	**In addition, each activity is marked according to its level of complexity:**
Interdisciplinarity Project-Based and Problem-Based Learning Creativity and Design Thinking Meaningful Use of Technology / Digital Tools Collaboration and Teamwork Real-World Context Involvement of External Partners / Stakeholders	●●●●● very strong and clearly visible integration ●●●●○ strong presence ●●●○○ moderate presence ●●○○○ limited presence ●○○○○ very low presence of the indicator	**EASY** Simple to implement, require minimal time and effort and can be completed quickly with little preparation **MODERATE** Require more time, planning and attention. They may involve some challenges. **CHALLENGING** More complex, require time, resources and careful preparation.

NB

If a particular lesson plan has raised your interest and you would like to learn more about it, simply click on the active link at the end of the short description of each plan and download the full version, so you can explore it in more depth and put it into practice.

Full versions of developed lesson plans include: a full lesson description, worksheets, additional tasks, required materials and tools etc. At the same time they are designed to be adaptable to different school contexts, curricula, age groups, skill levels, environments, available resources etc. All resources can be downloaded, used digitally or printed, so long as attribution is given to the creator.

4. EIGHT OUTDOOR STEAM IDEAS

The eight activity plans in this handbook show different ways in which preschool children can explore real questions and problems outdoors. The activities combine play, movement, sensory experiences, discussion, practical work and cooperation.

The plans can be used as they are or adapted to your group. When choosing and preparing an activity, consider the following:

Start with the children. Choose an activity that connects with their age, interests, previous experiences and individual needs. A good activity should awaken curiosity and encourage children to ask questions and share their ideas.

Use the outdoor environment. Think about what the children can explore in the preschool grounds or nearby natural area. Consider the season, weather, available space and whether the environment is safe and accessible to every child.

Keep the activity flexible. Young children need time to explore, move, repeat actions and return to their ideas. An activity may take place in one session or continue over several days or weeks. Children can take part in different ways and have different roles.

Observe the learning process. Listen to the children's questions and explanations. Notice how they explore and work together. Short notes, photographs, children's drawings and group conversations can help you understand what worked and what could be changed next time.

Use these plans as starting points rather than fixed instructions. Adapt the time, materials, questions and level of support to your children and the outdoor environment available to you.

BUILDING BIRD FEEDERS

EASY

SUBJECTS

Science, Mathematics, Design and Technology, Art

AGE GROUP

Preschool (5-6 years)

DURATION

Approximately 7-8 lessons (including seasonal outdoor observations)



LEARNING OUTCOMES

Children understand birds' needs throughout the year, develop environmental responsibility, apply STEAM skills through designing, building and observing bird feeders and strengthen cooperation, creativity and scientific observation in authentic outdoor learning.

ACTIVITY IN ACTION









STEAM INDICATORS

Interdisciplinarity	●●●●●
Project-Based and Problem-Based Learning	●●●●○
Creativity and Design Thinking	●●●●●
Meaningful Use of Technology / Digital Tools	●●●●○
Collaboration and Teamwork	●●●●●
Real-World Context	●●●●●
Involvement of External Partners / Stakeholders	●●●●●

OBJECTIVES

- Develop children's understanding of birds' basic needs and seasonal changes.
- Foster environmental awareness, responsibility and empathy towards wildlife.
- Develop observation, measuring, counting, creativity and cooperation skills through practical activities

RESOURCES

- Wooden boards, recycled materials, screws, hammer, screwdriver, rope or hooks.
- Birdseed, magnifying glasses, worksheets, picture cards, books and digital resources.
- Tablet/phone for photos, videos and QR code activities.

ACTIVITY FLOW

1 Exploration

Getting to Know Birds. Understanding birds, their needs and suitable bird feeders.

- Explore birds through books, pictures, videos and discussions.
- Learn what birds eat in different seasons.
- Compare materials (wood, cardboard, plastic) through simple experiments.
- Predict which birds may visit the feeder and record ideas.

2 Outdoor Activity

Designing, constructing and installing of bird feeders.

- Draw and compare bird feeder designs.
- Build feeders together with parents and classmates using suitable materials.
- Install feeders in different locations around the preschool.
- Refill feeders regularly and observe visiting birds.

3 Seasonal Observation

"Bird Detectives" - observing birds and connecting nature with learning.

- Observe birds during different seasons.
- Identify bird footprints and explore cardinal directions.
- Classify birds as winter, summer or year-round species.
- Create memory games and QR-code learning activities using collected observations.

TIPS

Involve families in building and maintaining bird feeders to strengthen home–school cooperation.

Encourage children to observe birds regularly and compare seasonal changes.

Use recycled materials whenever possible to promote sustainability.

Extend learning by creating QR codes, memory games and simple bird identification activities using children's observations.

LINK TO THE FULL VERSION OF STEAM LESSON PLAN "BUILDING BIRD FEEDERS"

MUSIC IN NATURE - OUTDOOR MUSICAL WALL

EASY

SUBJECTS

Music, Science, Design and Technology, Art, Language

AGE GROUP

Preschool (5-6 years)

DURATION

Approximately 2-3 weeks, including practical outdoor activities and continuous use of the musical wall.



LEARNING OUTCOMES

Children develop listening attention, phonemic awareness, rhythm, creativity and cooperation while exploring, designing, constructing and using an outdoor musical wall. They confidently recognize, compare and create sounds using natural and recycled materials, while strengthening STEAM skills through authentic outdoor learning.

ACTIVITY IN ACTION









STEAM INDICATORS

Interdisciplinarity	●●●●●
Project-Based and Problem-Based Learning	●●●○○
Creativity and Design Thinking	●●●●●
Meaningful Use of Technology / Digital Tools	●●●●○
Collaboration and Teamwork	●●●●●
Real-World Context	●●○○○
Involvement of External Partners / Stakeholders	●●●●●

OBJECTIVES

Children will explore different types of bridges and natural materials, then plan, build and test a bridge for strength and stability. They will measure and compare results, work together, solve problems and improve their design.

RESOURCES

- Wooden pallets or tabletops, fastening tools (zip ties, screws, hooks, rope).
- Metal cups, lids, pipes, wooden sticks, plastic bottles, rhythm sticks, mallets, safety gloves.
- Sound recording devices, speakers, microphones, tablets/phones, recycled materials.

ACTIVITY FLOW

1 Exploration

Discovering sounds around us: exploring natural and everyday sounds.

- Take listening walks and identify sounds in nature and the surrounding environment.
- Compare loud, quiet, high and low sounds.
- Experiment with natural and recycled materials to discover the sounds they produce.
- Predict and compare how different materials create different sounds.

2 Outdoor Activity

Building of the musical wall: designing and constructing an outdoor musical instrument.

- Explore examples of outdoor musical walls.
- Create individual ideas and combine them into one collaborative design.
- Build the musical wall together with parents and teachers using recycled materials.
- Test, compare and improve the sounds produced by different objects.

3 Practical outdoor music lessons

“Play, Listen and Create” - developing rhythm, listening and musical creativity.

- Listen to recorded and live sounds and compare them.
- Recognize, repeat and create different rhythms using the musical wall.
- Play listening games such as Sound Detective and Build the Rhythm and Play It.
- Reflect on sounds, rhythms and musical experiences through discussion and collaborative play.
- Creates musical instruments using available materials – wind chimes.

TIPS

Involve parents in collecting recycled materials and building the musical wall to strengthen home–school cooperation.

Encourage children to regularly experiment with new natural and recycled materials to discover different sounds.

Integrate the musical wall into language, mathematics, science and art activities throughout the year.

Use simple sound-recording devices or QR codes to document children’s rhythms and compare recordings over time.

LINK TO THE FULL VERSION OF STEAM LESSON PLAN “MUSIC IN NATURE - OUTDOOR MUSICAL WALL”

NATURE ARCHITECTS IN ACTION:
DISCOVERING BUGS AND BUILDING THEIR HOMES

MODERATE

SUBJECTS
Science, Mathematics, Design and Technology, Arts & Language

AGE GROUP
Preschool (6–7 years)

DURATION
~ 9 lessons (~ 360–400 minutes total) / 2–3 weeks



LEARNING OUTCOMES

- The child can name 2–3 insect species, can draw them and understands how digital tools (microscope, endoscope) assist in nature research.
- The child independently operates research tools, documents data and classifies insects by physical traits (number of legs and wings).
- The child demonstrates understanding of biodiversity and environmental care.
- The child can name needed materials and tools for Insect hotel

ACTIVITY IN ACTION






STEAM INDICATORS

Interdisciplinarity	●●●●●
Project-Based and Problem-Based Learning	●●●●○
Creativity and Design Thinking	●●●●○
Meaningful Use of Technology / Digital Tools	●●●●○
Collaboration and Teamwork	●●●●○
Real-World Context	●●●●●
Involvement of External Partners / Stakeholders	●●●●●

OBJECTIVES

- To observe, research and classify insects in their natural habitats using digital tools (digital microscope, endoscope) and document findings in an “Insect Book”.
- To design, construct and strategically place insect hotels in contrasting outdoor environments (sunny vs. shaded) to promote understanding of biodiversity and environmental sustainability.

RESOURCES

- Digital microscope, endoscope, tablets, wooden frame/box, natural materials (cones, sticks, twigs, reeds, bamboo, bark, dry leaves), cardboard, string, scissors, work gloves, garden tools worksheets (Attachment No. 1, No. 2, No. 3), references (Attachment No. 4)

ACTIVITY FLOW

1 Exploration

Exploring of natural insect habitats outdoors, creating a problem situation (“Where can insects hide?”), exploring of construction requirements, drawing sketches and creating an “Insect Book.”

2 Outdoor Activity

Building of insect hotels, using selected natural materials (reeds, cones, twigs, bark) based on drawn sketches; evaluating structural stability; placing one insect hotel in a sunny location and the other in a shaded location near the forest in collaboration with parents to enhance the local ecosystem.

3 Outdoor Activity

Acting as “Nature detectives” using digital microscopes and endoscopes to research living spaces inside the insect hotels; taking photos on tablets; counting legs/wings to classify insects; reflecting in a discussion circle on how sunny vs. shaded environments affect insect habitats.

TIPS

Safety First: Ensure children wear work gloves when handling rough natural materials and use scissors/garden tools under direct adult supervision.

Digital Guidance: Frame digital tools (endoscope/ microscope) as secret “detective tools” to keep children focused on investigation rather than viewing technology as a toy.

Role Assignment: Assign specific roles within groups (e.g., Detectives, Architects, Tech Experts, Data Recorders) to foster organized teamwork and active participation.

Parent Involvement: Engage parents in practical outdoor positioning and habitat improvement tasks to strengthen home-school community ties.

LINK TO THE FULL VERSION OF STEAM LESSON PLAN
“LET`S DISCOVER INSECTS AND BUILD THEM A HOTEL”

HOW TO COLLECT AND USE RAINWATER FOR WATERING PLANTS?

MODERATE

SUBJECTS

Science, Mathematics, Design and Technology, Arts / Visual Arts

AGE GROUP

Preschool (6–7 years old)

DURATION

385–440 minutes (10 lessons // 2–3 weeks)



LEARNING OUTCOMES

- Children understand the water cycle and explain it using paper models and digital references.
- Children safely construct and place a rainwater collection system as a team.
- Children measure collected water, record findings and use rainwater to care for garden plants.

ACTIVITY IN ACTION









STEAM INDICATORS

Interdisciplinarity	●●●●●
Project-Based and Problem-Based Learning	●●●●●
Creativity and Design Thinking	●●●●●
Meaningful Use of Technology / Digital Tools	●●●●●
Collaboration and Teamwork	●●●●●
Real-World Context	●●●●●
Involvement of External Partners / Stakeholders	●●●●○

OBJECTIVES

- To explore the water cycle using interactive digital tools and paper models, construct a rainwater collection system, measure and save water for garden plants and foster global environmental responsibility.

RESOURCES

- Interactive whiteboard (FasTracKids curriculum), paper, digital microscope, tablets, measuring cups, watering cans, containers, lids, connecting pipe segments, sponges, non-slip mats.

ACTIVITY FLOW

1 Exploration

Exploring dry vs. wet soil with microscopes. Interactive learning on the whiteboard (FasTracKids) to study the water cycle, creating paper models and testing evaporation in various containers.

2 Implementation of the Plan

Brainstorming collector designs, sketching placement plans, assigning team roles (engineer, measurer, documenter), building the collection system and measuring rainwater levels.

3 Outdoor Lesson

Hands-on rainwater collection at garden beds, watering plants with watering cans, identifying/fixing pipe leaks with sponges and reflecting on global water issues via a short video.

TIPS

Enforce the “Dry Zone” policy using non-slip mats and towels during indoor water experiments.

Use visual badges for team roles (engineer, measurer, documenter, resource manager) to streamline collaboration.

Encourage iterative problem-solving—let children discover and fix leaks with sponges independently.

Keep digital devices on dry tables and handle them only with clean, dry hands

LINK TO THE FULL VERSION OF STEAM LESSON PLAN
“HOW TO COLLECT AND USE RAINWATER FOR WATERING PLANTS?”

BUILDING A STRONG BRIDGE FROM NATURAL MATERIALS

MODERATE

SUBJECTS

Science, Mathematics, Design and Technology

AGE GROUP

Preschool (5-6 years)

DURATION

385–440 minutes (10 lessons // 2–3 weeks)



LEARNING OUTCOMES

- Children explore and compare natural materials and develop a simple understanding of strength, stability, support and weight;
- Children plan, build, measure, test and improve a bridge using observation and creative problem-solving skills;
- Children work together, share ideas and explain why one bridge is stronger or more stable than another.

ACTIVITY IN ACTION









STEAM INDICATORS

Interdisciplinarity	●●●●●
Project-Based and Problem-Based Learning	●●●●●
Creativity and Design Thinking	●●●●●
Meaningful Use of Technology / Digital Tools	●●●○○
Collaboration and Teamwork	●●●●●
Real-World Context	●●●●●
Involvement of External Partners / Stakeholders	●●○○○

OBJECTIVES

Children will:

- explore different types of bridges and their purpose;
- investigate the properties of natural materials;
- plan and build a bridge using sticks, branches and other natural materials;
- test the strength and stability of the bridge;
- measure and compare the results;
- work collaboratively, solve problems and improve their design.

RESOURCES

- Wooden sticks, branches, twigs, tree bark, pinecones, moss, stones, string, measuring tools, weights (up to 5 kg), pictures/videos of bridges, camera/tablet.
- These materials and testing criteria are based on the full plan.

ACTIVITY FLOW

1 Exploration

Children observe real bridges, pictures and videos. They explore natural materials, compare their properties and discuss what makes a bridge strong and stable. Children predict which materials and bridge designs will work best.

2 Implementation of the Plan

Children work in groups, choose a bridge design and plan its construction. They select materials, decide where the supports should be placed and build the bridge step by step.

3 Outdoor activity

Children build a bridge over a small gap using natural materials. They measure its length and check whether the supports are stable. The bridge is tested by gradually adding weight up to 5 kg. Children observe, discuss and improve the structure if necessary.

TIPS

- Let children make predictions before giving solutions.
- Allow children to test several bridge designs and learn from failure.
- Divide children into roles and rotate the roles during the activity.
- Use simple questions: What makes the bridge strong? Where should we put the supports? What can we change?
- Keep the testing practical and visible – measure the bridge and gradually add weight.

LINK TO THE FULL VERSION OF STEAM LESSON PLAN
“BUILDING A STRONG BRIDGE FROM NATURAL MATERIALS”

LET'S LEARN TO SORT - LET'S SAVE THE EARTH

MODERATE

SUBJECTS

Science, Mathematics, Design and Technology

AGE GROUP

Preschool (5-6 years)

DURATION

120 minutes // 2-3 weeks



LEARNING OUTCOMES

Children understand that there are different types of waste/garbage. They understand that each type of waste has its own place. Sorting helps nature: pollution decreases, nature becomes cleaner and sorted waste can be recycled and reused. There is less waste in landfills.

ACTIVITY IN ACTION









STEAM INDICATORS

Interdisciplinarity	●●●●●
Project-Based and Problem-Based Learning	●●●●●
Creativity and Design Thinking	●●●●●
Meaningful Use of Technology / Digital Tools	●●●○○
Collaboration and Teamwork	●●●●●
Real-World Context	●●●●●
Involvement of External Partners / Stakeholders	●●●○○

OBJECTIVES

- To introduce children to sort waste.
- To develop fine and gross motor skills.
- To develop teamwork skills.
- To promote nature conservation.

RESOURCES

6 boxes or buckets:

- Blue – paper
- Yellow – plastic
- Green – glass
- Brown – mixed
- Compost bin – green waste
- Textile bin – clothes, shoes, fabric toys.

Clean packaging waste: plastic containers, boxes, newspapers, bags, plastic yogurt containers, glass containers.

Gloves for children, pictures with garbage, rulers, hammers, nails and tablets.

ACTIVITY FLOW

1 Exploration

Learning about the damage that waste does to nature; Getting to know different types of waste; Learning to sort the waste/recycled materials.

2 Implementation of the Plan

Conversation with children about garbage sorting, the danger it creates to humans and nature. A teacher demonstrates slides to the children about the issue.

3 Outdoor activity

Children collect and sort litter in the yard, placing it into containers designated for plastic, glass and paper. They count which type of waste they collected the most of. Later, they arrange the waste items into a repeating pattern. Finally, they use the collected waste to create a garden scarecrow. The scarecrow must stand, be one meter tall and make a sound when the wind blows.

TIPS

Allow children to make mistakes and correct themselves while sorting waste.

Before creating a garden scarecrow, show the children examples of what scarecrows are and what they look like.

Explain the purpose of garden scarecrows and why they are needed.

When asking children to create a sequence of objects, demonstrate examples of what such a sequence looks like.

LINK TO THE FULL VERSION OF STEAM LESSON PLAN
"LET'S LEARN TO SORT - LET'S SAVE THE EARTH"

LITTLE ENGINEERS: TOWERS AND SKYSCRAPERS

MODERATE

SUBJECTS

Science, Mathematics, Design and Technology

AGE GROUP

Preschool (5-6 years)

DURATION

120 minutes // 2-3 weeks



LEARNING OUTCOMES

Children understand how shape, material and design influence the strength and stability of structures while developing their ability to plan, build, test and improve designs, solve problems, collaborate and connect their constructions to real-world engineering.

ACTIVITY IN ACTION









STEAM INDICATORS

Interdisciplinarity	●●●●●
Project-Based and Problem-Based Learning	●●●●●
Creativity and Design Thinking	●●●●●
Meaningful Use of Technology / Digital Tools	●●○○○
Collaboration and Teamwork	●●●●●
Real-World Context	●●●●●
Involvement of External Partners / Stakeholders	●●●○○

OBJECTIVES

- Develop children problem-solving and critical thinking, as well as collaboration and communication skills.

RESOURCES

- Recycled and reusable construction materials,
- Painter's tape
- Measuring tape
- Digital sources
- Paper and markers

ACTIVITY FLOW

1 Exploring stability

Children explore different shapes and building materials through practical construction challenges. They predict and test which designs are strong and stable and connect their discoveries with real structures in the surrounding environment.

2 Designing and building towers

Children design a tower or skyscraper, create sketches and work together to build it safely. They test and improve its stability while developing planning, construction, cooperation and problem-solving skills.

3 Building for the outdoors

Children apply what they have learned by building towers outdoors with different materials. They test stability in real conditions and adapt their designs to overcome challenges.

TIPS

- Involve families in collecting safe, clean recycled and reusable materials.
- Connect activities to children's surroundings using photos of local towers and buildings.
- Encourage children to predict, test, observe and improve their designs.
- Give children opportunities to sketch, measure, compare and explain their ideas.
- Treat unsuccessful constructions as learning opportunities and encourage children to revisit and modify their designs.



LINK TO THE FULL VERSION OF STEAM LESSON PLAN
"LITTLE ENGINEERS: TOWERS AND SKYSCRAPERS"

THE SECRET LIFE OF SEEDS

MODERATE

SUBJECTS

Science, Environment & Nature, Technology, Arts, Digital Literacy, Engineering

AGE GROUP

4-5 years

DURATION

8–10 lessons /
4 parts (spread over several weeks)



LEARNING OUTCOMES

Children understand plant growth and needs while developing observation, prediction, planning, problem-solving, cooperation and plant-care skills through hands-on gardening.

ACTIVITY IN ACTION









STEAM INDICATORS

Interdisciplinarity	●●●●●
Project-Based and Problem-Based Learning	●●●●○
Creativity and Design Thinking	●●●●○
Meaningful Use of Technology / Digital Tools	●●●○○
Collaboration and Teamwork	●●●●○
Real-World Context	●●●●●
Involvement of External Partners / Stakeholders	●●●○○

OBJECTIVES

- Develop children understandanding of plant growth and care while developing observation, planning, prediction and fine motor skills through sustainable practices.

RESOURCES

- The Tiny Seed by Eric Carle
- Seeds
- Gardening tools
- Hairdryer
- Digital tools and resources

ACTIVITY FLOW

1 Exploring seeds

Children are introduced to seeds through The Tiny Seed by Eric Carle, its illustrations and a tactile “Mystery Box”. They explore seeds with their senses, investigate seed dispersal in “The Wind’s Dance” experiment, make predictions and share their ideas.

2 From seed to plant

Children plan and plant seeds under different conditions, then observe and photograph their growth to create a time-lapse. They compare the results, discuss what helped the plants grow and reflect on what they could change.

3 From learning to gardening

Children explore the garden, identify what plants need and arrange them according to their sunlight needs. Through planting, watering and working together, they observe changes, predict growth, compare plants in different conditions and reflect on how to care for them.

TIPS

- Involve families in collecting seeds and reusable gardening materials.
- Follow children’s curiosity and give them time to observe, predict and explore.
- Encourage children to explain their thinking and revisit their predictions.
- Give children meaningful responsibilities in caring for plants and the garden.
- Document and reflect on children’s observations to identify new questions and follow-up investigations.



LINK TO THE FULL VERSION OF STEAM LESSON PLAN “THE SECRET LIFE OF SEEDS”

5. CREATE YOUR OWN STEAM LESSON PLAN OR ADAPT AN EXISTING ONE

It does not matter whether you adapt one of the plans in this handbook or create your own. Start with the children and their interests—not with the available equipment or the need to include every STEAM discipline or key indicators characterising STEAM approach.

A good plan gives children time and space to explore, ask questions, compare, make choices, test ideas, make mistakes and try again.

HOW TO START?

1. Notice what interests the children

Observe children during play, walks and other outdoor activities. Listen to their conversations and questions. Notice what they return to, what catches their attention and what they bring or talk about from home. Find out what they already know and what they would like to discover.

A real-life situation, something found outdoors, an interesting story or a simple problem can all be good starting points. You can also spark children's interest with a story, an unexpected object or a problem-solving situation.

2. Turn the idea into one clear challenge

To turn the topic or field of interest into a question that children can explore, use open-ended questions that are easy to understand allow more than one possible answer. Avoid questions that can be answered only with "yes" or "no".

A good challenge encourages children to discuss, share ideas, observe, build, compare, test or discover something for themselves.

A question will be suitable if it does not require specific knowledge and asking it invites children to discuss the topic, share their opinion and to think.

Try in the learning process use questions such as:

- *What do you already know about this // what would you like to find out?*
- *How could we find out? // How could we test your idea?*
- *What do you think will happen?*

Let children know that they do not need to give one correct answer. Encourage them to think, discuss and explain their ideas.

The challenge should be meaningful and understandable to the children. It should connect with their everyday life or nearby environment, include practical activities and match their age, abilities and interests.

3. Choose a few learning goals

Think about the children's age, previous experience, abilities and individual needs. Choose only a few goals and connect them with the curriculum. Understand what children should be able to do, e.g. to compare two materials, build a stable structure, work with others to solve a problem, use simple tools etc.

The goals should be clear enough for the teacher to notice children's progress. They should also give children a realistic chance to experience success.

Before choosing the goals, ask yourself:

- *What could the children gain from this lesson plan?*
- *What knowledge or skills could they develop?*
- *What could I see or hear if learning is taking place?*

4. Choose only the STEAM areas that fit

STEAM brings together five disciplines: Science, Technology, Engineering, Arts and Mathematics which work together and create an interdisciplinary approach.

You do not need to include all five areas in every lesson plan. Start with two or three areas that naturally help children to explore the challenge. Include a specific STEAM area only when children will actually do something connected with it.

- **Science:** observe, investigate, predict or compare;
- **Technology:** use tools, devices or simple digital resources;
- **Engineering:** design, build, test and improve;
- **Arts:** draw, create, design, make music or express ideas;
- **Mathematics:** count, measure, sort, compare or find patterns.

The links between the STEAM areas should develop naturally through the activity. There is no need to add an area only to complete the STEAM list.

5. Think about the place and materials for the lesson plan

First decide what the children will do. Then choose a suitable outdoor place and the objects and materials they will need.

Use simple, safe and reusable materials when possible. Materials should support the learning goal, not become the goal themselves. Ask children what they think will be needed. When useful, involve families, colleagues or local partners in collecting or preparing materials. Giving children a role in choosing, using and putting away materials can strengthen their sense of ownership and responsibility.

Also consider:

- *whether the place is safe and easy to use;*
- *how the weather may affect the planned activities;*
- *whether all children can reach and use the materials;*
- *whether the activities will need one session or several visits outdoors.*

6. Plan the teacher's role

The teacher's role is to foresee and prepare a safe and inviting environment, provide suitable materials and guide the process. The teacher does not need to give detailed instructions or show children exactly what to do.

Provide only as much help as the children need. Instead of giving answers or deciding the next step, use short, open-ended questions to support their thinking (e.g., "Why?"; "What do you think?"; What do you notice?; What else could be done or what could be changed?"; Can you explain your idea? etc.)

Foresee possibilities and encourage children to talk to one another, compare ideas and make decisions together. Show them that mistakes, failed attempts and unexpected results are a normal and useful part of learning.

Think in advance about how every child can take part. Children can have different roles - for example, collecting materials, building, measuring, drawing, taking photographs or explaining the group's idea.

7. Put the plan together

Turn your idea into a clear and structured lesson plan. This works best when you discuss the plan with colleagues and use their feedback.

What to do:

- Develop your ideas into a structured lesson plan (examples of lesson plan structures can be downloaded here: LESSON PLAN STRUCTURE V1, LESSON PLAN STRUCTURE V2).
- Clearly describe the learning objectives, steps of the planned activities and expected outcomes
- Plan the materials, time and learning environment needed
- Think through how the activities will work in practice
- Decide what you will observe or listen for to recognise children's learning.

A simple development path could look like this:

- create the first version of your plan;
- review and improve the structure and/or ask colleagues to review your plan and check if it is understandable;
- refine the plan, adjust details to make the activities clearer and more practical;
- prepare it for testing, gather feedback// record observations - to evaluate the developed plans, we used following LESSON PLAN ASSESSMENT form;
- do the improvement work after the testing (if needed).

Your plan should remain flexible and child-centred. Children do not need to follow the same path or reach the same result. The plan should provide direction while still leaving room for children's ideas, choices, discoveries and repeated attempts.

A well-described plan will make the next step – testing with cildren – much easier.

6. WHAT WE LEARNED FROM TESTING

All partners tested the activities with children and then reviewed the lesson plans and outdoor STEAM centres. The following is based on teachers' observations, conversations with children and discussions with partners following the testing.

WHAT CHILDREN ENJOYED MOST

Children especially enjoyed:

- being outdoors and moving freely;
- exploring materials through their senses;
- making choices and developing their own ideas;
- building, creating and experimenting;
- seeing a clear result, such as a growing plant or a working construction;
- having a real responsibility, such as watering plants or caring for a shared area;
- working with other children and explaining their ideas.

EXAMPLES

During the tower activity (Plan: “Little Engineers: towers and skyscrapers”), children especially enjoyed building on a larger scale. Drawing construction sketch before building helped them to think about their ideas. When a tower fell, the children changed the construction and tried again. The unsuccessful attempt became part of the learning process rather than the end of the activity.

In the building bridge activity (Plan: “Building a strong bridge from natural materials”), children were especially motivated by testing how much weight their bridge could hold. When it bent or collapsed, they strengthened weak parts, moved the supports and tried different materials or building methods.

WHAT WAS DIFFICULT

Some activities required more patience than the children expected. Growing a plant, for example, takes time and changes cannot always be seen immediately.

Other challenges included:

- materials that did not work as expected;
- prepared instructions were too long;
- tasks were too easy or too difficult;
- different interests, abilities and attention spans within the group;
- construction tasks that required fine motor skills;
- waiting for materials or for a turn;
- changing weather and unsuitable clothing.

Younger children and children who needed extra support benefited from shorter instructions, visual examples, simpler tasks and additional time. We also found that it was important to demonstrate only the first step and then allow children to continue exploring in their own way.

Weather did not always stop an activity, but it affected its timing and preparation. Suitable clothing and materials, flexible plans and safe working conditions were important.

WHAT CHANGED AFTER TESTING

Testing showed that the first version of a plan should remain flexible. Based on observations we:

- shortened and simplified some instructions;
- changed the type or amount of materials;
- prepared more materials so that children did not have to wait;
- divided larger groups into smaller teams;
- added pictures and other visual guidance;
- offered children different roles;
- adjusted constructions and outdoor learning spaces;
- allowed more time for exploring, testing and trying again.

HOW WE HELPED EVERY CHILD TO TAKE PART

Children did not all need to complete the same task or take part in the same way. Different roles helped more children join the activity and share responsibility.

For example, one child could:

- collect or choose materials;
- build or arrange objects;
- measure or count;
- draw the group's idea;
- take photographs;
- record results;
- water plants;
- explain what the group had discovered.

If needed, roles were changed every 10–15 minutes so that each child could try different tasks and take an active part.

Teachers prepared enough materials, used encouragement and visual support and gave additional help only when it was needed. Children were also given time to observe before joining the activity. This was important for children who needed more time to understand the task or feel comfortable in the group.

WHAT OTHER PRESCHOOL EDUCATIONAL INSTITUTIONS SHOULD KNOW

Based on our testing experience, we recommend:

- begin with one clear question and a few familiar materials;
- try the activity with a small group first;
- use short instructions and visual examples;
- prepare alternative materials in case the first choice does not work;
- check the weather and make sure children have suitable clothing;
- choose safe, durable materials that children can use;
- store materials in labelled boxes that children can reach and tidy independently;
- involve children, families, colleagues and community partners in collecting or preparing materials;
- observe how children respond and be ready to change the time, group size, instructions or level of support;
- after the activity, discuss what worked, what was difficult and what should be changed before the next try.

Our main lesson: the first version of an activity plan is only a starting point. By observing children, listening to their ideas and making changes after testing, teachers can turn a good idea into an activity that works in everyday preschool practice.

7. MEET THE PARTNERS

ŠĶIBE BASIC SCHOOL (PRE-SCHOOL)

Latvia, Lead Partner

Šķibe Basic School (Šķibes pamatskola) initiated and, in close cooperation with Project department of Jelgava Local Municipality, ensured the implementation of the project. As the lead partner, the school ensured responsible project management, smooth communication between partners and the quality of project activities and results.

Šķibe Primary School is a municipal educational institution in Nākotne, Glūda Parish, Jelgava Municipality, Latvia. It provides preschool and basic education and is committed to inclusion and equal learning opportunities for every child. The school is proud to be an Eco-school, reflecting its long-term commitment to environmental education and sustainable thinking.

A key focus is outdoor STEAM, known at the school as Green STEAM. Learning takes place not only in the classroom but also in the schoolyard, the surrounding environment and in cooperation with local partners. Children learn through practical activities, observation, exploration, experimentation, problem-solving and teamwork. They are encouraged to ask questions, test ideas, learn from mistakes and use their knowledge in real-life situations.

In recent years, the school has actively strengthened teachers' knowledge and practical use of STEAM. One of its strategic goals is to introduce STEAM gradually across the learning process, starting in preschool. International projects, professional cooperation and the exchange of good practice support this development.

ŠĶIBE BASIC SCHOOL`S MAIN CONTRIBUTIONS TO THE PROJECT:

- project coordination and overall quality assurance;
- sharing of experience in outdoor learning and existing STEAM activities
- sharing of practices for implementing inclusive education and inclusive teaching methods;
- sharing of practices for building a local STEAM ecosystem.

PARTICIPATION IN THE PROJECT HAS HELPED THE SCHOOL TO ADDRESS FOLLOWING DEVELOPMENT NEEDS:

- **Professional development and international learning** – teachers gained new knowledge, exchanged experience and explored different STEAM teaching approaches together with colleagues from the Baltic States.
- **Improvement of preschool education** – the project strengthened the learning process and provided practical STEAM activity plans and methodological tools linked to the preschool curriculum.
- **Development of outdoor learning area** - new outdoor STEAM activity centres created more opportunities for practical learning, environmental awareness, responsibility and green thinking.

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KINDERGARTEN "ZĪĻUKS"

Latvia

Jelgava City Preschool Educational Institution "Zīļuks" is a modern and open learning environment operating since 2015. The institution's main goal is to promote holistic, competence-based child development in a safe, supportive and stimulating environment. "Zīļuks" actively participates in the Eco-Schools program and holds Eco-School Ambassador status for the second consecutive year.

Key Working Methods and Approaches:

- Inquiry and Play-Based Learning: Learning builds on children's natural curiosity, fostering independence, critical thinking and problem-solving skills.
- Outdoor Pedagogy and STEAM Activities: Active use of outdoor environments and natural resources, integrating science, technology, engineering, arts and math into real-world investigations.
- Physical Activity and Healthy Lifestyle: Special emphasis is placed on physical development, movement joy, coordination and building healthy habits from an early age.
- Collaboration-Based Approach: Close partnership among children, educators and parents to achieve shared goals.

ZĪĻUKS MAIN CONTRIBUTIONS TO THE PROJECT:

- sharing of experience and knowledge about the possibilities of organizing the learning process in outdoor environment;
- supporting the development of STEAM lesson plans;
- sharing of practical experience in creating outdoor learning spaces.

PARTICIPATION IN THE PROJECT HAS HELPED THE SCHOOL TO ADDRESS FOLLOWING DEVELOPMENT NEEDS:

- **Improvement of outdoor learning practice** – educators gained and tested new ideas for using the outdoor environment as a meaningful learning space in different seasons and weather conditions.
- **More active and adaptable learning for children** – children had more opportunities to learn through movement, exploration and practical activities and to feel comfortable learning in changing outdoor conditions.
- **Development of green thinking** – children and educators strengthened their understanding of nature, environmentally responsible behaviour and the value of spending time outdoors.
- **Greater involvement of families** – families and other members of the kindergarten community were encouraged to support outdoor activities and develop a shared positive attitude towards nature and outdoor learning.

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JELGAVA STATE GYMNASIUM

Latvia

Jelgava State Gymnasium (Jelgavas Valsts ģimnāzija) joined the project as a methodological partner, providing the theoretical and practical foundation for the development of STEAM lesson plans.

JSG acts as a methodological centre for educational institutions in Jelgava Local Municipality and has strong experience in teacher professional development and curriculum support. Regularly organising conferences, seminars, open lessons and professional development courses for teachers from the Zemgale region and across the country, JSG has developed strong expertise in curriculum development and teacher training.

At the beginning of the project, to ensure that all partners had a common understanding of the STEAM approach, JSG provided in-service training for teachers and continued its role as a mentor during the further implementation of the project, supporting partners with consultations, reviewing the developed lesson plans, as well as ensuring their compliance with the main STEAM principles.

By combining JSG's methodological expertise with the practical experience of all partners, the project partners were able to develop STEAM lesson plans that fit their national curricula while following common STEAM ideas.

JSG`S MAIN CONTRIBUTIONS TO THE PROJECT:

- providing STEAM training to project partners;
- mentoring and consulting during the development of the lesson plans;
- reviewing lesson plans to ensure compliance with STEAM principles.

CONTACTS

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FOUNDATION FOR FOSTERING EDUCATION (TERAKE)

Estonia

TERAKE is a private kindergarten in Tartu, where teaching and educational activities are inspired by the Reggio Emilia approach.

Our mission is to support every child's courage to act and their creativity and to contribute to the development of a well-rounded personality who cares about themselves, others and the surrounding environment, is open-minded and knows and dares to think, speak, act and take responsibility. We value COURAGE, CREATIVITY AND OPENNESS.

TERAKE`S MAIN CONTRIBUTIONS TO THE PROJECT:

- sharing of experience and knowledge about the possibilities of using IT and digital tools in learning process;
- supporting the development of STEAM lesson plans;
- encouraging innovative teaching approaches and teacher motivation;
- sharing of practical experience in creating outdoor learning spaces.

PARTICIPATION IN THE PROJECT HAS HELPED THE SCHOOL TO ADDRESS FOLLOWING DEVELOPMENT NEEDS:

- **New knowledge and practical ideas for educators** - better understanding of outdoor STEAM and learned from examples and teaching approaches shared by partners.
- **Development of outdoor learning environment** – the project provided practical experience in developing outdoor spaces and enhancing existing activity centers.
- **Improvement of the kindergarten curriculum** – the knowledge and activities developed during the project can be included in everyday preschool learning and adapted to the institution's curriculum.
- **Stronger cooperation with families and the local community** – parents and local partners contributed materials, knowledge and practical support and took part in introducing STEAM activities.

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PAŽAGIENIAI PRIMARY SCHOOL-KINDERGARTEN

Lithuania

Pažagieniai School

Pažagieniai School in Panevėžys District is a close-knit state school providing early childhood, pre-primary and primary education. Our practice is guided by a child-centred approach and the principles of humanistic pedagogy. We strive to create an environment where every child is encouraged to explore, discover their strengths, address challenges and learn through meaningful, experiential activities.

PAŽAGIENIAI SCHOOLS CONTRIBUTIONS TO THE PROJECT:

- presenting our practical experience and inviting experts in outdoor education to share outdoor pedagogy principles with all project partners.
- initiating and developing different ideas for practical STEAM learning tailored for pre-primary age children.
- collaboratively creating, field-testing and refining of STEAM activity plans and learning tasks alongside project partners.
- sharing of practical experience in creating outdoor learning spaces.

PARTICIPATION IN THE PROJECT HAS HELPED THE SCHOOL TO ADDRESS FOLLOWING DEVELOPMENT NEEDS BROUGHT TANGIBLE OUTCOMES TO DAILY EDUCATIONAL PRACTICE:

- **Professional Growth:** The project helped our teaching staff build a shared understanding of STEAM education and deepened our knowledge of outdoor pedagogy, which is now seamlessly integrated into daily learning activities.
- **Outdoor Learning Environments:** Inspired by the project, we established dedicated outdoor STEAM learning stations on our school grounds, turning the outdoor environment into an active space for inquiry and discovery.
- **Community Engagement:** The initiative fostered stronger collaboration with families and social partners, bringing the wider community together around meaningful learning experiences for children.

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