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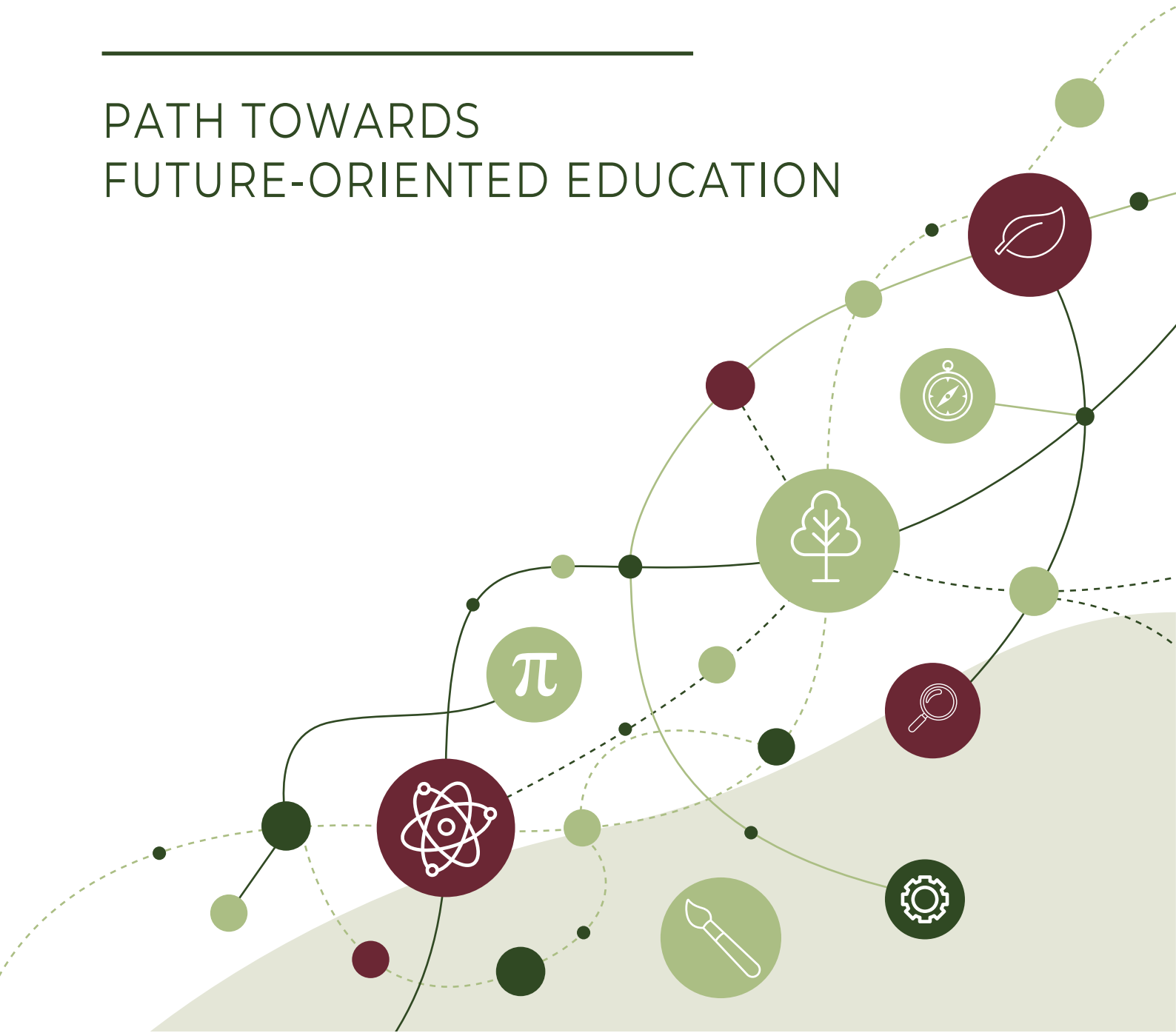
STEAM

TAKE IT OUTSIDE!

PATH TOWARDS
FUTURE-ORIENTED EDUCATION



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No. 2024-2-LV01-KA210-SCH-000293066 “STEAM - take it outside!”

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1. INTRODUCTION

ABOUT THE PROJECT

"STEAM - Take it Outside!" is the story of a 17-month journey, from February 1, 2025 to June 30, 2026, undertaken by four schools with a total budget of € 60 000,00 to move together, step by step, towards a more open, greener and future-oriented way of teaching and learning.

The project was initiated by Šķibes pamatskola (Latvia) and implemented together with Jelgava State Gymnasium (Latvia), Palade Põhikool (Estonia) and Agrupamento de Escolas Henriques Nogueira (Portugal). Although we come from different countries and different national education systems, we were united by one common goal – to create a common platform for cooperation, where, by combining the strengths and experiences of each partner, we would try to reimagine how to make the learning process for our students more interesting, meaningful and at the same time more inclusive. The solution – STEAM outdoors.

STEAM OUTDOORS, in context of this project, combines the traditional understanding of STEAM, which is science, technology, engineering, art and mathematics, with green thinking, environmental awareness, inclusion and moving learning from classrooms to schoolyards, parks and local communities, making education more relevant to everyday life.

When students learn outside, they ask more questions. They explore, test ideas, work together more naturally and see how information in books connects with the real world. Outdoor STEAM activities help to support the development of essential future-oriented skills such as systems thinking, critical thinking, creativity, problem-solving and cooperation in more natural way, at the same time, helping students to develop respect for nature and a sense of responsibility for their environment.

4
schools

international collaboration

3
countries

Latvia, Estonia, Portugal

9
ready to use STEAM lesson plans

PURPOSE OF THE HANDBOOK

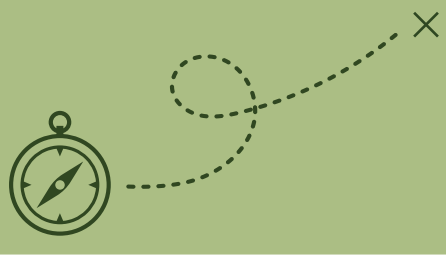
This handbook is more than just a collection of STEAM lesson plans. It brings together the experience gained during a shared journey, during which we brainstormed, explored, tested ideas, learned from mistakes and improved step by step.

The aim of this material is to support you in your own practice. It can serve both as a practical guide and as a source of inspiration — whether you are just starting with STEAM or looking for new ideas to enrich your lessons.

You can use this handbook in different ways. You might choose to follow the process step by step and develop your own activities, or you can take the ready-made plans and adapt them to your needs.

Rather than offering one fixed approach, the handbook provides a flexible model. It invites you to explore, experiment and gradually build your own path towards STEAM learning.

Welcome to our shared journey towards future-oriented education!



2. STRUCTURE AND USE OF THE HANDBOOK

This handbook brings together the practical experience we have gained during the project. It will guide you through the process we went through – from identifying the problems to be solved, planning and generating ideas, to development, benchmarking, testing, improvement and final approbation of the created STEAM lesson plans. Our journey was not always straight. There were discussions, adjustments and reflections and we share this process so you can better understand how to start and shape your own STEAM path.

Further in the material, in the main part of the handbook, you will find **9 ready-made STEAM activity and lesson plans** developed by project partners. Each activity 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:

- 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

Each indicator is assessed on a five-level scale:

●●●●● very strong and clearly visible integration

●●●●○ strong presence

●●●○○ moderate presence

●●○○○ limited presence

●○○○○ very low presence of the indicator

In addition, each activity is marked according to its level of complexity:

EASY

Simple to implement, require minimal time and effort and can be completed quickly with little preparation.

MODERATE

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.

We invite you to explore, experiment and continue the journey we have started in your school - in the STEAM approach, the journey never ends - it continues with every teacher who decides to engage in STEAM lessons outdoors.

3. THE IMPLEMENTED COLLABORATION MODEL AND PROCESS OF DEVELOPING STEAM LESSON PLANS

Developing STEAM lesson plans to address local challenges identified by the partners was one of the main tasks of this project. Each partner contributed their educational traditions, strengths and teaching practices. Through close collaboration, the partners created a shared learning environment where ideas could be discussed, tested, refined and adapted to different school contexts. This diversity proved to be one of the project's greatest strengths, ensuring that the developed lesson plans are flexible and transferable.

3.1. COLLABORATION MODEL

The collaboration model in the project combined **local teamwork within each school with coordinated international cooperation between partners**.

At the school level, teachers worked closely together to develop and test the lesson plans. Teams held regular meetings to discuss ideas, divide responsibilities and review progress. Teachers supported one another in many practical ways — preparing materials, translating worksheets and plan content, documenting activities with photos and reflecting on the outcomes of the lessons.

Each partner developed lesson plans in alignment with their national curriculum and local teaching context. At the same time, the overall development process was supported and monitored through continuous communication with project partners, clearly defined deadlines and online benchmarking meetings. These meetings and transnational exchanges made it possible for the lead partner to stay closely informed about each team's progress while also receiving direct feedback and suggestions for improvement.

The collaboration process was further strengthened by mentoring and methodological support from Jelgava State Gymnasium, which supported partners through training, consultations and feedback on the developed materials.

This cooperation model – working individually yet progressing together – ensured that the lesson plans reflected both the specific needs of local education systems and the shared STEAM principles and focus areas defined by the project.

Through this collaborative approach, partners not only created high-quality STEAM lesson plans but also deepened international cooperation, exchanged good practices and built lasting professional relationships.

3.2. DEVELOPMENT OF STEAM LESSON PLANS

The STEAM lesson plans included in this handbook were not created overnight. They grew step by step through a shared process of planning, discussion, testing and improvement. **This process now can serve as a useful guide for those of you who want to develop your own Outdoor STEAM activities.**

Throughout the development journey, partners worked together closely and followed common quality standards. The process was guided by Jelgava State Gymnasium, which provided methodological support, consultations and feedback. This helped to turn the first ideas into practical, tested and reusable teaching materials.

1. IDENTIFYING AND DEFINING PROBLEMS

Before starting to develop your own STEAM activities, take a moment to reflect on what challenges you have, what are the needs and how STEAM can help to solve them?

We started by looking at the everyday realities in our schools. Even though each school was different, many of the challenges were quite similar:

- learning often feels too theoretical and classroom-based;
- students are not always engaged in STEM subjects;
- outdoor environments are rarely used for learning;
- there is a lack of practical, interdisciplinary teaching materials;
- teaching does not always meet the needs of all students;
- teachers may feel unsure about using new approaches.

Identifying these problems helped to define a clear starting point for the further development process.

TIP: Involve students in identifying the problems - students' questions, observations and interests can reveal needs and opportunities that adults may not always notice.

2. RESEARCH AND PLANNING

Once the scope of the problems has been identified, the next step is to decide how to address them.

At this phase focusing on setting a clear direction for lesson plans and making practical decisions about their development and implementation take place.

- Some guiding questions that supported this process:
- What learning goals do we want to achieve?
- Which topics work best for outdoor and practical learning?
- Where will the activity take place?
- What resources, outdoor space opportunities and skills do we already have?
- What materials and support do we need?
- Which local stakeholders or community partners could be involved?

It is important to see STEAM not as an goal in itself, but as a tool to support wider educational aims and addressing identified challenges.

Taking time for this step helps ensure that the planned activities are structured, realistic and easy to implement in your context.

TIP: When planning a STEAM activity, look at your outdoor spaces, local environment and community resources as part of the learning setting.

3. IDEA GENERATION

With a clear plan in place, it is the time to get creative. This is the stage where your ideas start turning into real STEAM activities that students can experience.

What to do:

- Think of practical lessons that bring your curriculum topics to life
- Look for ways to combine different subjects in one STEAM activity

- Explore how outdoor spaces: schoolyards, parks, local nature or urban areas can be a part of the lesson
- Consider how to make each activity engaging and inclusive for all students

Tips for your team:

- Work together and share your ideas openly- present your ideas to your colleagues, listen to feedbacks and suggestions
- Don't worry about making them perfect at first - this is about exploring possibilities
- Take inspiration from previous projects, your own experience and the expertise of your colleagues

TIP: STEAM emphasizes and encourages experimentation, iteration, collaboration, hands-on activities, teamwork and the combination of different perspectives in problem solving.

4. COLLABORATIVE DEVELOPMENT WORK

Once you have your ideas, the next step is to turn them into clear and structured lesson plans. This stage works best when you collaborate.

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 activity and expected outcomes
- Plan the materials, time and learning environment needed
- Think through how the activity will work in practice

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 activity clearer and more practical;
- prepare it for testing.

Keep in mind: at this stage your goal is not to create new ideas, but to make your existing idea clear, structured and ready to use. A well-described plan will make the next step – testing with students – much easier.

TIPS:

- Keep it real and practical. When developing your plan, always think about how it will work in a real learning situation. Clear steps, simple instructions and realistic timing will make your activity much easier to implement.
- Plan for collaboration. Design your activity so that students can work together, share ideas and solve problems as a team.

5. PILOTING WITH STUDENTS

This is where your idea becomes real. Testing the activity will help you to understand what works well and what could be improved.

Implement the activity with your students and, if possible, involve your colleagues as well – asking them to test the activity in their classes can give you a broader perspective and valuable additional insights.

During the lesson, pay attention to how students engage with the activity, how they collaborate and whether the planned learning goals are being reached.

Short reflections or feedback forms from both students and teachers can help you better understand: how the activity worked in practice?, what challenges appeared? and what adjustments might be needed? The assessment forms used during the project can be downloaded here: form for teachers, form for students.

It is equally important to reflect on your own experience as a teacher — what felt clear and smooth and what could be improved.

Keep in mind: Not everything has to work perfectly the first time – be ready to adjust your plan based on feedback and real classroom experience. In STEAM learning, improvement comes through trying, reflecting and gradually making your activity stronger.

TIPS:

- Learn by doing. The real value of your activity appears when you test it in practice. Let students explore, experiment and learn through experience.
- Use feedback as a tool. Student and colleagues feedback is not just evaluation — it is a key part of improving your activity. Small insights can lead to meaningful changes.

6. FINALISATION

After testing your activity, the next step is to bring your plan into a clear and well-structured final version.

At this stage, review your lesson plan and make final adjustments based on your experience made or received during piloting. Make sure that the instructions are easy to follow, the learning goals are clear and the activity can be implemented smoothly in practice. It is also helpful to check once again whether the timing is realistic and the chosen materials and learning environment the most appropriate and well thought through.

Keep in mind: it is important to remember that in STEAM education, an activity is never truly “finished”. STEAM learning is based on continuous development, experimentation and adaptation, so your plan should be seen as an open and flexible resource that can be supplemented and developed over time.

You can continue to develop your activity by adding new elements, integrating additional subjects or skills, adapting it for different age groups, or improving it based on future experience and collaboration with colleagues. This flexibility allows your teaching materials to remain relevant, dynamic and responsive to students’ needs.

The same idea or principle applies to the lesson plans included in this handbook. They are not fixed models to be followed exactly, but starting points that you can adapt, expand and improve in your own teaching context.

Once your plan reaches a clear and well-structured form, it becomes a resource that can be reused and further developed in the future.

TIPS:

- Adapt to your context. Use the activity as a flexible model. Adjust it to your students, environment and available resources — this is what makes STEAM learning effective and relevant.
- Keep improving your plan and try to expand your activity by adding elements from other subjects. STEAM works best when different disciplines are connected in meaningful ways.

4. UNIFIED CONCEPT OF PLANS

All STEAM lesson plans in this handbook are built on a shared idea and a common approach. Even though each partner developed activities based on their own curriculum and local context, all plans follow the same direction, values and structure.

This makes the activities easier to understand, compare and adapt in different schools.

4.1. FOCUS AREAS OF THE PLANS

All lesson plans were designed for students aged 10–13 (Grades 4–6) and aim to support both learning and personal development:

- develop **future-oriented skills** such as critical thinking, creativity and problem-solving;
- move learning **beyond the classroom** into outdoor environments;
- promote **green thinking and awareness of sustainable technologies**;
- support an **inclusive education ecosystem** based on EU values such as inclusion, equality and non-discrimination;
- strengthen **cooperation with local actors and community partners**;
- encourage **interdisciplinary collaboration among teachers**;
- increase students' **interest in STEM/STEAM subjects**;
- promote **hands-on and practical learning experiences**.

4.2. Why to take STEAM outdoors?

Learning beyond the classroom plays a central role in the concepts of all lesson plans. It enables students to link theoretical knowledge with real-world experiences, transforming abstract ideas into concrete situations that promote deeper engagement and strengthen critical thinking skills, problem solving and creativity.

FURTHER BENEFITS OF TEACHING STEAM OUTDOORS INCLUDE:

Practical and experiential learning - outdoor environments allow students to observe natural phenomena, conduct experiments and solve real-life problems. Lessons encourage students to apply theoretical knowledge in practical situations, allows complex STEM concepts easier to understand.

Motivation and engagement - learning outside the classroom increases curiosity and motivation. Activities are designed to encourage teamwork, creativity and active participation.

Physical Health & Well-being - spending time in nature reduces stress, improves mood, enhances concentration and encourages physical activity.

Interdisciplinary learning - outdoor lessons provide natural opportunities to combine Science, Technology, Engineering, Arts and Mathematics. Students analyse data, test ideas, model solutions and interpret real-world situations.

Environmental awareness and sustainability - activities focus on understanding natural processes and developing responsible attitudes towards the environment and resources.

Flexibility and adaptability – once designed, the activities can be implemented in different environments such as schoolyards, parks, community spaces or other local locations. Teachers can adapt them for different subjects, student groups and learning contexts.

4.3. SHARED METHODOLOGICAL FRAMEWORK

All lesson plans follow a **similar structure**, which helps teachers easily understand and use them.

Each plan includes:

- a short description of the activity and its learning goals;
- information about the subjects involved and required materials;
- suggested steps for lesson implementation;
- ideas for student tasks and discussion;
- evaluation and reflection elements.

This common structure allows teachers to quickly review the plans and choose activities that best fit their teaching needs.

5. LESSON PLANS PREPARED BY PARTNERS

The lesson plans included in this handbook are **designed to support** your daily teaching practice in a flexible and practical way. You can **use them as ready-made ideas, adapt them to your needs or combine them with your own lessons**. The activities are not fixed – they can be adjusted, simplified or expanded depending on your teaching context.

Think about how and when **outdoor learning** fits best into your teaching process. Using spaces such as **schoolyards, nature areas, local businesses** or **community environments** can help make learning more **meaningful** and connected to **real life**.

Encourage students to take an **active role**. Let them **explore, experiment, discuss** and **collaborate**. This kind of engagement is at the core of **STEAM learning** and helps students better understand and remember what they learn.

Use reflection, discussion and evaluation forms to collect feedback and improve future lessons. Simple **discussions, observations** or **feedback tools** can help you see what worked well and what could be improved.

Most importantly, see these plans as a **support**, not a limitation – a **starting point** for your own ideas and your own path towards **STEAM learning**.

BIRDWATCHING

EASY

SUBJECTS
Science, Mathematics, Design and Technology

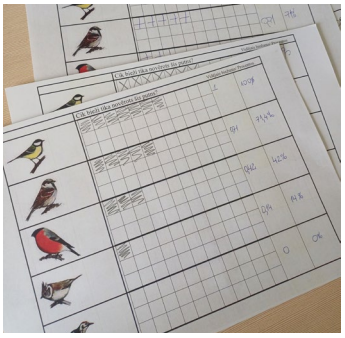
GRADE LEVEL
4th–6th Grade

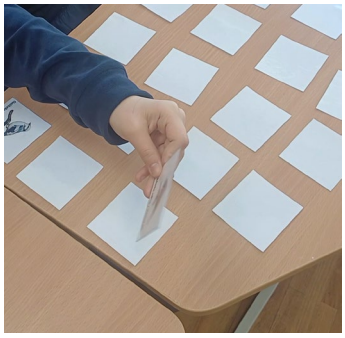
DURATION
120 minutes

LEARNING OUTCOMES

Students gain knowledge about local birds, improve analytical and teamwork skills and apply STEAM principles through real-life outdoor learning.

ACTIVITY IN ACTION





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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

- Promote students' interest in nature and birds.
- Develop observation, logical thinking, data analysis and collaboration skills.

RESOURCES

- Bird feeder materials (wooden boards, nails/ screws, tools).
- Visual materials about birds (pictures, books, digital sources).
- Tablets/phones, worksheets.
- Paper, scissors, laminator.

ACTIVITY FLOW

1 RESEARCH: "WHY ARE BIRDS IMPORTANT?"

- **Focus:** Understanding bird diversity and their role in nature.
- Brainstorming about birds and their importance in ecosystems.
- Research using books and digital resources.
- Creating a table of birds students know or expect to see.
- Group work with images and bird names.

2 OUTDOOR ACTIVITY: "BIRD DETECTIVE"

- **Focus:** Bird observation and data collection.
- Observing birds in the school area or nearby park.
- Recording data with tablets and worksheets.
- Counting birds, identifying species, comparing locations and time periods.
- Basic mathematical analysis (totals, percentages, averages, most common species).
- Collecting pictures of birds, creating a memory game file.

3 QUIZ: "WHAT BIRDS LIVE IN OUR SCHOOL?"

- **Focus:** Knowledge consolidation.
- Quiz created on the Quizizz platform using collected data.
- Interactive learning and self-assessment.
- Creating and playing a memory game.

QUIZ IN ENGLISH

QUIZ IN LATVIAN

TIPS

Provide students with clear questions and simple tables so they know exactly what to observe and record.

Organize group work by assigning specific roles, such as observer, recorder, or photographer, to ensure active participation.

Encourage students to focus on observable features like color, size and behavior, not only on identifying bird species.

Structure the outdoor activity by setting time intervals and reinforce learning through hands-on tasks such as building bird feeders with parents and creating simple learning games.

LINK TO THE FULL VERSION OF STEAM LESSON PLAN "BIRDWATCHING"

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SOLAR SYSTEM

MEDIUM

SUBJECTS
Science, Mathematics, Art

GRADE LEVEL
4th–6th Grade

DURATION
120 minutes

LEARNING OUTCOMES

Students collaboratively create a scaled outdoor model of the Solar System, understand relative planet sizes and distances and strengthen mathematical and cooperation skills through hands-on STEAM learning.

ACTIVITY IN ACTION

Calculation and prototype drawing.

Measuring the positions of the planets and drawing the solar system outdoors.

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 students' understanding of the Solar System and planet distances.
- Apply mathematical calculations using scale in a real-life context.

RESOURCES

- Asphalt chalk, measuring tape, calculator, string (for drawing circular shapes).
- Digital sources, textbooks, encyclopedias.

ACTIVITY FLOW

1 RESEARCH: "THE SOLAR SYSTEM"

- **Focus:** Understanding planets, their sizes and distances.
- Watch a short educational video about the Solar System.
- Brainstorm prior knowledge about planets (mind map).
- Research planet facts using books and digital resources.
- Calculates the distance of a planet from the sun, draws a prototype on a sheet of paper.

2 OUTDOOR ACTIVITY: "BUILD THE SOLAR SYSTEM"

- **Focus:** Applying scale and mathematical calculations.
- Students work in groups; each group is assigned one planet.
- Mark distances on the asphalt using measuring tape and chalk.
- Draw planets in correct scaled sizes using string and chalk.

3 REFLECTION: "WHAT DID WE DISCOVER?"

- **Focus:** Analysis and cooperation.
- Discuss accuracy of the model and make corrections if needed.
- Reflect on teamwork: what worked well and what was challenging.
- Agree on improvement ideas for future group activities.

TIPS

Provide students with a clear formula for calculating scale for both outdoor environments and paper-based work, taking into account different paper sizes.

In the outdoor activity, begin by drawing the Sun and the largest planet first, then add the remaining planets to ensure correct proportions.

Promote collaboration between groups, as effective coordination is essential for creating a consistent and accurate model.

LINK TO THE FULL VERSION OF STEAM LESSON PLAN "SOLAR SYSTEM"

Erasmus+ programm project: 2024-2-LV01-KA210-SCH-000293066 "STEAM - take it outside!"

SUNDIAL: TIME AND SHADOWS

MEDIUM

SUBJECTS
Science, Mathematics, Design and Technology

GRADE LEVEL
4th–6th Grade

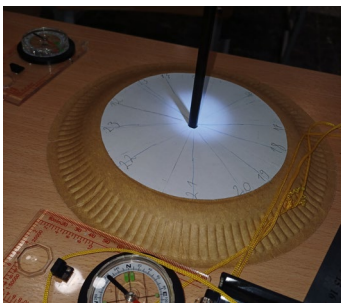
DURATION
120 minutes

LEARNING OUTCOMES

Students create a functional sundial, understand the relationship between the Sun, shadows and time and apply mathematical concepts of angles through hands-on STEAM outdoor learning.

ACTIVITY IN ACTION

Create a sundial model



Shine a flashlight on the rod, representing the Sun and observe how the length of the shadow changes

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

- Understand how the Sun and shadows can be used to measure time.
- Explore the movement of the Sun and changes in shadow length and direction.

RESOURCES

- Paper plates, skewers or pencils (gnomon), ruler, protractor, markers, pencils.
- Compass or smartphone compass app.
- Flashlight.

ACTIVITY FLOW

1 RESEARCH: "TIME AND SHADOWS"

- **Focus:** Understanding shadows and the Sun's movement.
- Discuss how people told time in the past using the Sun.
- Explore how shadows change during the day.
- Learn how a sundial works using visuals and short videos.

2 OUTDOOR ACTIVITY: "BUILD A SUNDIAL"

- **Focus:** Practical construction and mathematical calculations.
- Create a simple sundial using a paper plate and a skewer.
- Find north using a compass and mark "12:00" correctly.
- Compare shadow time with a real clock.

3 REFLECTION: "WHAT DID WE LEARN?"

- **Focus:** Analysis and understanding.
- Discuss how shadow length and direction changed during the day.
- Reflect on accuracy of the sundial and teamwork.
- Solve simple angle–time tasks (e.g., which time matches a given angle).

TIPS

When planning the work, you need to think about the weather. It should be sunny for everything to go well. The best time of year to do this plan is spring.

Before starting the plan, it is important to review lessons about angles and their measurements, circles, diameter and radius. Students with learning difficulties need simple reminder notes.

It is recommended that students with learning difficulties be placed with students who are doing well on assignments so that they can work together and learn from each other.

Be brave and experiment! If something doesn't work, that's normal — feel free to adjust the plan to your class's needs.

LINK TO THE FULL VERSION OF STEAM LESSON PLAN "SUNDIAL: TIME AND SHADOWS"

EVERY DROP COUNTS

MEDIUM

SUBJECTS
Science, Technology, Art, Engineering, Mathematics

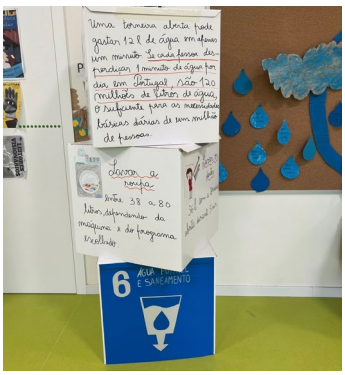
GRADE LEVEL
4th–6th Grade

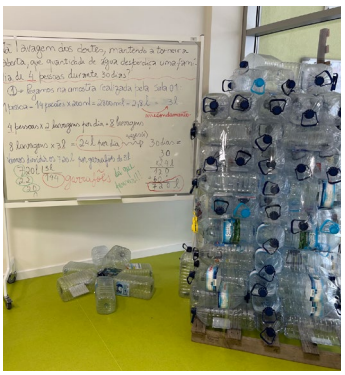
DURATION
560 minutes

LEARNING OUTCOMES

Students collaboratively investigate water waste, apply STEAM skills, create visual and physical representations and reflect on sustainability and environmental responsibility.

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

- Raise awareness about water waste and SDG6.
- Observe, describe and discuss environmental issues.
- Collect data, perform calculations and create visual representations.

RESOURCES

- School library, computer, tablet, interactive whiteboard, recycled/recyclable materials.

ACTIVITY FLOW

1

LESSONS 1–2

Awareness & Introduction

- Discuss: "How much water do we waste brushing our teeth?"
- Watch a video or infographic on SDG6.
- Introduce project and organize groups.

2

LESSONS 3–5

Investigation & Calculations

- Simulate water waste using 1.5 L pierced bottles.
- Record data, calculate totals, averages and equivalents in bottles.

3

LESSONS 6–8

Visual Representation & Communication

- Create manual and digital graphs.
- Begin building physical structure with bottles.
- Sketch posters and panels.

4

LESSONS 9–11

Construction & Artistic Creation

- Assemble structures (towers, cascades, water cycles).
- Create illustrations and environmental messages.

5

LESSONS 12–13

Presentation & Reflection

- Exhibit final project.
- Present group work orally.
- Reflect on experience, teamwork and learning outcomes.

TIPS

Strengthen the connection with language use by including persuasive writing activities (e.g., "Save Water" campaign slogans or letters to the community).

Include Physical Education by calculating water consumption during sports activities or hydration habits.

Invite a local environmental technician or water company representative.

Collaborate with the municipality or environmental organizations for dissemination of results.

Involve families in home water-saving missions.

LINK TO THE FULL VERSION OF STEAM LESSON PLAN "EVERY DROP COUNTS"

WELCOME TO THE INSECT HOTEL!

EASY

SUBJECTS
Mathematics, Art, Science

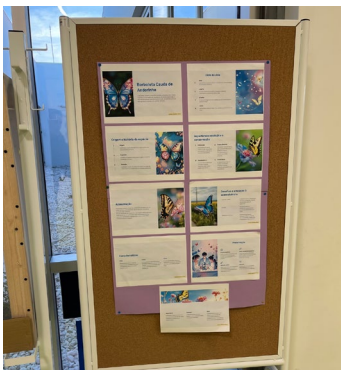
GRADE LEVEL
4th–6th Grade

DURATION
400 minutes

LEARNING OUTCOMES

Students explore insect habitats, apply STEAM skills in observation, measurement, research and art and present a collaborative insect hotel promoting biodiversity and environmental awareness.

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

- Explore insects and their role in ecosystems.
- Apply measurement, classification and observation skills.
- Develop creativity through artistic and hands-on activities.
- Promote sustainable thinking and environmental awareness.
- Strengthen research, writing and teamwork skills.

RESOURCES

- Rulers, strings, colored pencils, drawing paper, microscope, tablets/phones, glue, brushes, paint, cards.

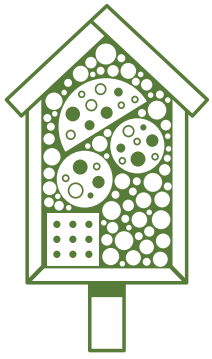
ACTIVITY FLOW

LESSON 1 - 10

- Observe hotel; discuss inhabitants.
- Watch insect videos; discuss.
- Collect & classify natural materials.
- Draw, collage, paint hotel.
- Measure areas/perimeters.
- Habitat card game.
- Research insects; write short texts.
- Microscope observation & notes.
- Create info panels.
- Assemble, decorate, present hotel.

TIPS

- Extend the project into long-term observation of insects visiting the hotel.
- Develop investigation questions such as: “Which materials attract more insects?”
- Create interactive exhibition elements (games, quizzes, insect passports).
- Use tablets for photographing insects and creating digital portfolios.
- Connect the project with pollination, food production and environmental sustainability.
- Invite a beekeeper, gardener or environmental educator to visit the school.



LINK TO THE FULL VERSION OF STEAM LESSON PLAN “WELCOME TO THE INSECT HOTEL!”

3, 2, 1... LAUNCH A PROBE INTO THE LIBRARY!

MEDIUM

SUBJECTS
Science, Technology, Math, Art

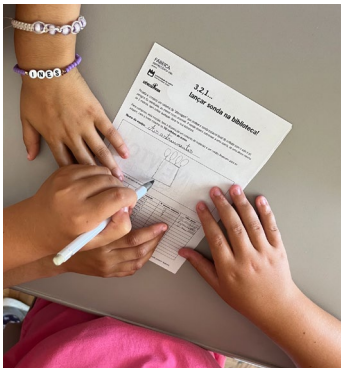
GRADE LEVEL
4th–6th Grade

DURATION
240 minutes

LEARNING OUTCOMES

Students design, build and test a space probe landing system, apply STEAM skills in problem-solving, measurement and collaboration and present their prototypes in a hands-on, engaging project.

ACTIVITY IN ACTION



Erasmus+ programm project: 2024-2-LV01-KA210-SCH-000293066 "STEAM - take it outside!"

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

- Explore principles of gravity, forces and material resistance.
- Apply problem-solving and engineering design skills.
- Develop teamwork and budget planning.
- Promote creativity and scientific thinking through hands-on activity.

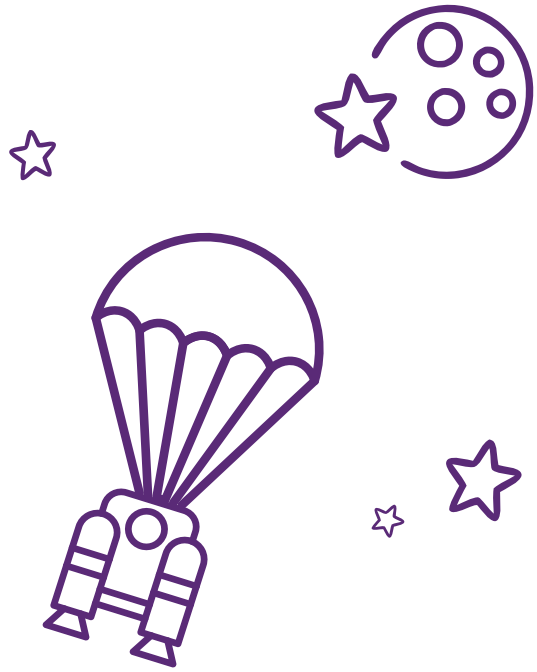
RESOURCES

- Eggs (one per group), balloons, cotton balls, skewers, plastic cups, paper, aluminum foil, string, tape measures, scissors, glue, markers, poster board or digital tools, classroom/staircase for drop testing.

ACTIVITY FLOW

LESSON 1 - 6

- Introduction to space probes and mission launch.
- Team formation and material/budget planning.
- Build landing system prototype.
- Test landing system (egg drop).
- Reflect & report results (written/oral).
- Present prototypes & class exhibition.



TIPS

Add redesign stages after the first landing test to reinforce iterative engineering thinking.

Encourage teams to compare and justify different engineering solutions.

Create digital mission reports or presentations.

Share the exhibition with families and the wider school community.

LINK TO THE FULL VERSION OF STEAM LESSON PLAN
"3, 2, 1... LAUNCH A PROBE INTO THE LIBRARY!"

Erasmus+ programm project: 2024-2-LV01-KA210-SCH-000293066 "STEAM - take it outside!"

OUR DREAM OUTDOOR CLASSROOM

CHALLENGING

SUBJECTS
Science, Technology, Math, Art

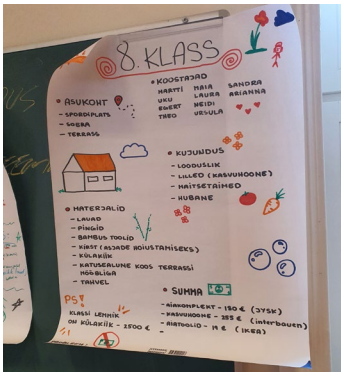
GRADE LEVEL
4th–6th Grade

DURATION
6–7 week project (90 min/week)

LEARNING OUTCOMES

Students collaboratively design, build and test an outdoor classroom, applying STEAM skills, teamwork and creativity, while reflecting on their learning and environmental awareness.

ACTIVITY IN ACTION



Erasmus+ programm project: 2024-2-LV01-KA210-SCH-000293066 "STEAM - take it outside!"

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

- Engage students in hands-on design and building of an outdoor learning space.

RESOURCES

Possible list of materials – select according to your needs:

- Natural: stumps, stones, branches, bamboo, clay, sand, soil, plants.
- Recyclable: tires, wooden pallets, bottles, jars.
- Construction: wood, screws, nails, cement (supervised).
- Tools: shovels, rakes, saws, hammers, measuring tapes, levels, gloves, safety glasses.
- Planning & presentation: paper, pencils, markers, rulers, computers, camera.
- Other: plant labels, string, tape.

ACTIVITY FLOW

WEEK 1 **Idea Generation**	Visual prompts; share ideas via drawing, modeling, or discussion. Group work with students: open discussion: Define the Challenge (Main Problem/Need), Explore Causes (Why the Problem Exists), Imagine Possibilities (Solutions & Features), Consider Benefits (Why It Matters)
WEEK 2 **Planning & Design**	Sketch designs, measure, use digital tools if helpful.
WEEK 3 **Material Research & Budgeting**	Explore material properties; plan and budget.
WEEK 4-6 **Building & Designing**	Construct space; assign tasks by ability; supervise tools.
WEEK 7 **Testing & Feedback**	Test space with games/activities; collect feedback.

TIPS

Start by gathering ideas - the most effective way to do this is through an open discussion with students. Older students may choose to visualise their ideas on a poster or write them down.

Based on students' input, compile a list of materials, set a budget and identify the resources needed to carry out the activities.

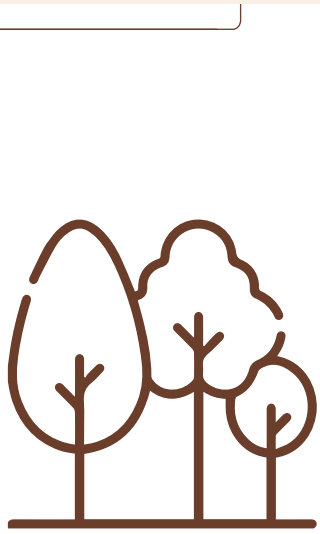
Keep in mind that everything does not need to be done at once – the outdoor learning environment can be developed and improved gradually, according to available opportunities and resources. You don't always have to build everything yourself—make use of reuse and recycling.

Choose different approaches: older students can independently visualise ideas on a poster based on the discussion; guide younger students with questions and record their ideas on a shared poster or board; for students with special educational needs, take a personalised approach according to their abilities and involve them in the discussion.

Think through the activities for each age group based on students' input. If you are working with only one age group, differentiate the activities according to students' abilities.

The biggest challenges are time and weather: set a schedule that fits your class, taking into account the timing and frequency of lessons available. Some activities, such as idea generation and design, can be carried out within the same lesson or over the course of a single week. Take your time and remember that everything does not have to be done at once.

Think about additional activities that could take place in the outdoor learning space—games, tasks and other options where students can spend their lesson breaks and engage in interesting activities outside the formal curriculum.



LINK TO THE FULL VERSION OF STEAM LESSON PLAN "OUR DREAM OUTDOOR CLASSROOM"

NATURE'S MATH LAB

EASY

SUBJECTS
Science, Technology, Art, Mathematics

GRADE LEVEL
4th–6th Grade

DURATION
90 minutes
(or 2×45 minutes)

LEARNING OUTCOMES

Students explore math in the natural world, apply measurement and observation skills, work collaboratively and reflect on the presence of mathematics in everyday life and nature.

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

- Discover math in nature: shapes, patterns and measurements.
- Apply measurement and observation skills.
- Work collaboratively in small groups.
- Record and present data through notes, drawings, or photos.
- Reflect on math in everyday life and the environment.

RESOURCES

According to the worksheet:

- Leaves, sticks, stones, cones, seeds; measuring tapes, rulers, string; pencils, worksheets, clipboards; optional cameras/tablets.

ACTIVITY FLOW

1

INTRODUCTION (15 min)

Open discussion "Math Around Us"; introduce a challenge to find math in nature: "Where can you spot math in nature around you?", "What shapes, patterns, or numbers do you notice outside?"

2

OUTDOOR EXPLORATION (45 min) "Discover Math in Nature"

In small groups, measure and compare natural objects; identify shapes and patterns; take notes, draw, or photograph findings.

3

DATA SHARING & DISCUSSION (20 min)

Present findings; discuss math skills, patterns and surprises; explore ways to present data.

4

WRAP-UP & REFLECTION (10 min)

Summarise lesson; reflect on other examples of math in nature; assign homework to observe math in surroundings.

TIPS

To better integrate mathematics with art, students can be encouraged to explore symmetry in nature, such as patterns, repetitions and natural forms.

Symmetry can also be effectively explored during outdoor learning in the winter season by focusing on snowflakes, including symmetry and geometric shapes.

LINK TO THE FULL VERSION OF STEAM LESSON PLAN "NATURE'S MATH LAB"

BUILDING ROBOTS
FROM RECYCLED AND NATURAL MATERIALS

MEDIUM

SUBJECTS
Science, Technology, Art, Engineering, Mathematics

GRADE LEVEL
4th–6th Grade

DURATION
2×90 min sessions, 1×45 min session

LEARNING OUTCOMES

Students design, build and present robots from recycled and natural materials, apply STEAM skills, collaborate creatively and reflect on environmental impact and sustainability.

ACTIVITY IN ACTION




Erasmus+ programm project: 2024-2-LV01-KA210-SCH-000293066 "STEAM - take it outside!"

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

- Explore biodegradable and non-biodegradable materials.
- Apply creativity and problem-solving in hands-on building.
- Collaborate to design and construct robots.
- Make environmentally conscious decisions.
- Reflect on sustainability and waste reduction.

RESOURCES

- Student-collected clean waste: plastic, paper, cardboard, bottles, boxes, egg cartons, sticks, leaves, etc.
- Natural materials: branches, pinecones, stones.
- Tools: scissors, glue, tape, optional hot glue, measuring tools.
- Worksheets, sorting charts, assessment criteria.

ACTIVITY FLOW

Session 1 (90 min)
INTRODUCTION & PLANNING

- Warm-up discussion: “What is waste? What is a robot?”.
- Support critical thinking: “What if everything we used was reusable?”, “Can something made from ‘trash’ be more valuable than something new?”, “How can technology help the planet?”
- Mini-lesson: biodegradable vs. non-biodegradable materials.
- Sorting challenge: classify materials.
- Hands-on material exploration & brainstorming.
- Robot design planning using worksheets.
- Exit reflection: material preference.

Session 2 (90 min)
BUILD & CREATE

- Outdoor material collection / cleanup.
- Collaborative robot building using selected materials.
- Checkpoints & design iteration.
- Open discussion & conclusions.

Session 3 (45 min)
PRESENT & REFLECT

- Finishing touches on robots.
- Team presentations & gallery walk.
- Final reflection: fun moments, environmental choices, improvement ideas, waste reduction.

TIPS

Build robots in smaller groups so students can complete them in one session. This allows for more personalized guidance and reduces time pressure.

For the introductory lesson, consider using a different activities for younger age group

Incorporate more hands-on activities to help younger students and SEN students better understand recycling and related concepts.

LINK TO THE FULL VERSION OF STEAM LESSON PLAN
“BUILDING ROBOTS FROM RECYCLED AND NATURAL MATERIALS”

Erasmus+ programm project: 2024-2-LV01-KA210-SCH-000293066 “STEAM - take it outside!”

6. SUMMARY AND RECOMMENDATIONS

FROM NEEDS TO STEAM ACTIVITIES

- The lesson plans in this handbook were created based on the **needs and challenges** identified by project partners in their schools. Although each school worked in a different context, many challenges were similar – how to make learning more practical, engaging and connected to real life.
- The result is a collection of **flexible STEAM activity plans** that can be adapted to different schools, student groups and learning environments.

SUPPORTING STEAM LEARNING OUTDOORS

- Outdoor learning can make STEAM more practical, engaging and meaningful for students. It gives them the chance to explore ideas through observation, experimentation and hands-on tasks in a real environment.
- Our experience during the project showed that even simple outdoor activities can create valuable learning experiences. We encourage teachers to use outdoor spaces whenever possible – not as something extra, but as a natural part of the learning process.
- Even small steps can be a great starting point.

ADAPTING THE PLANS TO YOUR CONTEXT

- The plans can be used across different educational levels – from **primary to secondary education**. They can be adapted by changing the task difficulty, duration, learning goals, materials or environment.
- We encourage teachers to use these plans flexibly and adjust them to the needs, age and interests of their students.

COLLABORATION EXPERIENCE AND FUTURE PERSPECTIVES

- Working together in this project gave partners the opportunity to exchange ideas, test activities and learn from each other. This collaboration helped improve the activity plans and inspired new approaches to STEAM teaching.
- We hope this handbook encourages teachers to **explore, adapt and continue developing** STEAM learning in their own schools.
- In STEAM education, the process is never finished – it continues to grow with every new lesson, experience and idea.

7. INFORMATION ABOUT PARTNERS

ŠĶIBE BASIC 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 basic school is a rural school that provides preschool, primary and lower secondary education, including special education programmes at all levels. The total number of students: around 260. The school is known for its strong focus on inclusion and equal learning opportunities for all students. It is proud to hold the status of an Eco-school, which reflects its long-term commitment to environmental education and sustainable thinking. Accordingly, special attention is paid to outdoor STEAM, which we call the Green STEAM at the school, where learning takes place not only in classrooms, but also in the schoolyard, in the surrounding environment and in cooperation with local stakeholders. To ensure this, in recent years the school has actively worked on developing teachers' knowledge of the STEAM educational approach and has also set an important strategic goal in its activities - the gradual introduction of the STEAM teaching approach into the educational process, already starting from preschool.

ŠĶIBE BASIC SCHOOL`S MAIN CONTRIBUTIONS TO THE PROJECT:

- project coordination and overall quality assurance;
- sharing of experience in outdoor learning and green classrooms;
- 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 several development needs, such as strengthening teachers' openness to innovations, improving cross-curricular lesson planning, increasing students' interest in STEM subjects (especially mathematics) and expanding the learning process to outdoor environments and real-life contexts.

CONTACTS

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PROJECT GROUP

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AGRUPAMENTO DE ESCOLAS HENRIQUES NOGUEIRA

Portugal

Agrupamento de Escolas Henriques Nogueira (AEHN) is a public school grouping that offers a broad and inclusive educational pathway, from kindergarten to secondary school education/VET education and adult education, with a strong emphasis on inclusive education, active citizenship and lifelong learning. It serves approximately 2,170 students ranging from age 3 to adult learners.

The teaching is the schools is organised through collaborative educational teams and includes project-based work, curriculum flexibility and the integration of citizenship education. In recent years the school has also focused on the transition to digital learning environments, the continuous professional development of teachers in order to keep teaching methods up to date and as the first school in the Portugal hosts digital fabrication laboratory FabLab.

AEHN`S MAIN CONTRIBUTIONS TO THE PROJECT:

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

Participation in the project helped to address the following development needs at the school:

- the need for new working methods to diversify daily teaching practices and respond to growing educational challenges, such as culturally diverse classrooms, student motivation and dropout risks
- students' perception that STEM subjects are too theoretical and therefore less engaging.

The STEAM approach, which focuses on hands-on learning, experimentation and solving real-life problems, offered practical ways to address these challenges - teachers were able to test new teaching strategies that make learning more active, practical and meaningful. This gave greater integration of STEAM methodologies into planning and pedagogical practice.

CONTACTS

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PROJECT GROUP

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PALADE BASIC SCHOOL

Estonia

Palade Basic School (Palade Põhikool) is a small village school located on Hiiumaa island. The school provides basic education for students from grades 1–9 and has just over one hundred students aged 7–15. As a small rural school, Palade Basic School offers a close-knit learning community and a flexible, learner-centred educational approach.

The school's key strengths are inclusive education, environmental education and outdoor learning. Palade Basic School actively promotes inclusive education by integrating students with diverse learning abilities, special educational needs and different social backgrounds into mainstream education. Teaching practices are adapted to individual needs, ensuring equal learning opportunities, well-being and a strong sense of belonging for all learners.

Environmental education and outdoor learning are an integral part of the school's identity. Learning regularly takes place outside the traditional classroom, making use of the local natural environment and the nearby nature education centre. Through hands-on, inquiry-based activities, students develop environmental awareness, sustainability skills and a deeper connection with nature.

PALADE BASIC SCHOOL`S MAIN CONTRIBUTIONS TO THE PROJECT:

- sharing of experience in organising outdoor and nature-based learning;
- supporting the development of STEAM lesson plans outdoors;
- promoting environmental awareness and green thinking;
- encouraging innovative teaching approaches and teacher motivation;
- sharing practical experience in creating outdoor learning spaces.

Participation in the project supported the school's goal to continue developing previously initiated educational initiatives and solutions for implementing the learning process in an outdoor environment and to add new elements to the learning process (interactive and practical learning opportunities). The project created opportunities for cooperation with parents and the local community, strengthening mutual cooperation ties, addressing the need for the involvement and support of all parties involved in the educational process, as well as helping to strengthen students' environmental awareness.

CONTACTS

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PROJECT GROUP

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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;
- supporting collaboration through consultations and meetings;
- reviewing lesson plans to ensure compliance with STEAM principles.

CONTACTS

vgim.jelgava.lv

facebook.com/vgim.jelgava?locale=lv_LV