LESSON PLAN

HOW TO COLLECT AND USE RAINWATER FOR WATERING PLANTS?



Subjects: Science, Mathematics, Design and Technology, Arts / Visual Arts
Age Range: Preschool, 6-7 years old

Actuality/ problem to be solved: We have beautiful raised garden beds where our plants are growing. But what happens when the sun is very strong and there hasn't been rain for a long time? And when it does rain, the water quickly disappears into the ground.

Message for the Child: We need to invent a magical system that holds the rain when it comes, so we don't have to waste tap water! We will become smart water savers!

Planned Activities: Exploration – Planning – Construction – Practical Activity – Reflection

Knowledge and skills to be acquired:

- **Natural processes:** understanding plant needs and resource conservation;
- **Research skills:** observing, collecting data and documenting changes;
- **Practical skills:** plant care and safe use of tools (watering cans, measuring cups);
- **Cognitive skills:** understanding cause-and-effect, drawing conclusions, and repeating actions;
- **Collaboration:** teamwork and solving engineering challenges (fixing leaks)

Required Resources/equipment: digital microscope, tablet, interactive whiteboard (FasTracKids curriculum), paper, measuring cups, watering cans, lids for containers, connecting pipe segments.

Follow up plans

- Using collected rainwater for garden plants; further discussions about saving water in everyday life.

STEAM outdoor activity center - Rainwater collection and watering station

Part 1 - Exploration | 2 lessons, duration 40 – 45 minutes

Lesson 1 “Where did the water go?”

Expected Learning Outcome	Children show awareness of how to care for garden plants and the value of conserving natural resources.
Engagement:	**Teacher’s actions:** • Shows images and videos of dry, cracked soil with wilting plants and wet, healthy soil with thriving plants. • Leads a discussion about what plants need to grow. • Asks guiding questions, for example: “What happens to plants when the sun is very strong and it hasn’t rained for a long time?” • Guides the discussion and asks open-ended questions. • Uses brainstorming to allow children to express even the wildest ideas on how to help plants without wasting tap water. • Encourages children to explain and justify their answers. • Introduces the digital microscope and explains safety rules (tablets are used only while sitting at the table with clean hands). **Children’s activities:** • Express ideas and assumptions. • Participate in discussion and brainstorming. • Examine plant leaves and soil using the digital microscope. • Notice differences between wet and dry soil and make comparisons. **Attachment nr. 1 “ General safety rules and Teamwork guidelines”** - 4. Use of digital tools and safety
Making assumptions	Children make assumptions: • Where is the best place to put a container to collect rain water? • What happens to plants without rain? • Where does rainwater go after it falls?
Comparison and evaluation	Children place various containers (wider narrower) in different playground areas. After the rain, children measure and compare the amount of water in each container. Children conduct research and draw conclusions - dry soil versus wet soil; plants with water versus without water. **Plant and soil experiment (pair work):** Each pair takes two pots with soil. One pot is watered, while the other remains dry. Children touch the soil and describe how it feels – wet or dry. Then they plant the same seeds or plants in both pots. One plant is watered regularly, while the other is not watered. Every day children observe the plants, compare the changes, and discuss what they see. In the end, children make a simple conclusion that plants need water to grow.

Lesson 2 “The water’s journey” (Ecosystem)

Expected Learning Outcome	Children understand the water cycle in nature, recognize that rainwater is a natural resource, and use it appropriately to care for plants.
Engagement	**Teacher’s actions:** • Organizes an interactive learning session using the interactive whiteboard (FasTracKids curriculum, Science Block 1–2), where the whiteboard presents and explains the water cycle. • Guides children to use the displayed image on the interactive whiteboard as a visual guide to present and explain the water cycle in their own words. • Supports children in constructing their own physical water cycle models out of paper. • Explains the water cycle: clouds → rain → ground/plants → evaporation. • Uses a transparent container with a lid and sun (or heat source) to demonstrate evaporation and condensation (creating a cloud in jar) • Prompts children to think: “Where does rainwater go after it falls?” **Child actions:** • Interactively explore and study the water cycle presented on the interactive whiteboard (FasTracKids). • Use the image on the interactive whiteboard as a reference to present and explain the water cycle in nature in their own words. • Construct a hands-on water cycle model using paper. • Draw a “waters journey” diagram on tablets or paper, including clouds, rain and garden beds. • Experiment with containers of different widths, guessing which one will collect more “rain” using a watering can as a simulation.
Making assumptions	Children make assumptions such as: • Where will the rainwater go after it falls? • Which container will collect more water? • How does water return to the clouds? • Why does soil in some areas stay wet longer than in others? • How can we represent the water cycle using our paper model and the whiteboard image?
Comparison and evaluation	Children measure and compare the amount of water in containers of different sizes and record or draw their results. They compare their constructed paper models and “water’s journey” diagrams with the real water cycle shown on the interactive whiteboard, discussing similarities and differences. Additionally, children observe how water evaporates under various conditions—such as sun, shade, and soil moisture—and discuss what affects the evaporation process. Finally, with the teacher’s guidance, children draw conclusions that water continuously moves in nature and that rainwater is a valuable resource for plants.

Part 2 - Implementation of the Plan | 6 lessons

Lesson 1 “Identifying the Problem and Observing Plants” | Time: 30 - 40 min

Expected Learning Outcome	Children understand that plants need water to grow and that rainwater can be collected and used for this purpose.
Engagement	The teacher introduces the problem by asking children how they can ensure that plants receive enough water when it doesn’t rain. Images of healthy and dry plants are shown to stimulate discussion. The teacher asks questions: 1. “What do plants need to grow?” 2. “What happens if it doesn’t rain for a long time?” to guide conversation, encouraging children to share their own experiences. Children observe the images, answer questions, share experiences with watering plants, and start thinking creatively about potential solutions. The teacher listens actively and helps children notice patterns between water availability and plant health, and observing garden growth.
Choosing the design of the plan	**Teacher’s Actions:** 1. Facilitate a brainstorming session: “What containers or tools could we use to collect rainwater?” 2. Ask guiding questions to support ideas: • “Where could we place them to collect the most rainwater?” • “Which places are safe for collecting water?” 3. Encourage children to sketch their initial ideas individually or in small groups, emphasizing creativity while considering practicality. 4. Support children in explaining their sketches and reasoning to peers. **Children’s Actions:** 1. Suggest possible containers, tools, and placement locations for collecting rainwater. 2. Sketch initial designs individually or in small groups. 3. Discuss their ideas with peers and justify their choices. 4. Begin thinking about which ideas are most practical and safe.
Developing / constructing the plan	**Teacher’s Actions:** 1. Lead a discussion on feasibility: “Which idea is easiest to build and use?” 2. Ask reflective questions: • “Are there any challenges we might face while building this?” • “How can we ensure safety during construction?” 3. Guide children to select a preliminary plan for construction. 4. Support children in organizing materials and steps for building the rainwater collection system. **Children’s Actions:** 1. Compare sketches and discuss which design is most practical. 2. Agree on a preliminary plan for construction. 3. Gather materials and prepare the steps needed for building the system. 4. Follow the planned steps, cooperating in small groups and ensuring safety.
Evaluating the work	After construction planning, the teacher encourages children to reflect critically. Questions like: • “Do you think this will really collect enough water?” • “What could go wrong?” prompt children to think about improvements. Children respond by reflecting on whether the proposed solution will provide sufficient water, suggesting adjustments, finalizing the plan, and documenting it with sketches, notes, or tablets. They share reflections with peers and teacher, discussing successes and possible improvements for future attempts.

Lesson 2 “Planning Rainwater Collection Placement” | Time: 40 - 45 min

Expected Learning Outcome	Children understand that placement affects water collection efficiency and soil moisture, and can plan accordingly.
Engagement	The teacher asks children to recall what they learned about where water collects and why some areas stay wet longer. Children discuss previous observations of soil moisture and plant health. The teacher encourages children to think about the best placement for their rainwater collectors in the school garden or playground.
Choosing the design of the plan	**Teacher’s Actions:** 1. Ask questions: “Which spots will collect the most rain?” 2. Guide children to consider sun/shade, roof runoff, and soil absorption. 3. Prompt children to evaluate safety: “Are these areas safe for all children?” 4. Encourage sketching placement ideas. **Children’s Actions:** 1. Suggest potential locations for collectors. 2. Sketch placement diagrams. 3. Discuss pros and cons of different locations with peers. 4. Decide on the best positions for collecting water effectively.
Developing / constructing the plan	**Teacher’s Actions:** 1. Guide children in matching containers with selected locations. 2. Discuss practical steps: transporting, placing, and securing containers safely. 3. Ensure children understand safety and supervision requirements. **Children’s Actions:** 1. Place containers in selected locations. 2. Cooperate to ensure containers are stable and safe. 3. Record placement and expected collection in sketches or tablets
Evaluating the work	The teacher asks: “Do you think the containers will collect enough water in these positions?” Children reflect on placement effectiveness, adjust positions if needed, and record final diagrams. They discuss why placement matters and share insights with peers.

Lesson 3 “Building the rainwater collection system” | Time: 40 - 45 min

Expected Learning Outcome	Children can safely construct a simple rainwater collection system and understand roles in collaborative work, perform specific roles within a team.
Engagement	Teacher introduce safety pictograms and demonstrates the “dry zone” rules for water activities. The teacher introduces the task: building the rainwater collection system based on sketches and placement decisions. Children recall previous ideas and discuss how the system will function.
Choosing the design of the plan	**Teacher’s Actions:** 1. Review sketches and placement plans with children. 2. Confirm that materials and steps are ready. 3. Discuss safety rules for handling containers and tools. **Children’s Actions:** 1. Revisit preliminary designs and placement diagrams. 2. Prepare materials for construction. 3. Listen to and follow safety instructions 4. Assign team roles (engineer, measurer, documenter) using visual badges.

Developing / constructing the plan	**Teacher's Actions:** 1. Guide children step-by-step in assembling the system. 2. Support teamwork and role assignment: filling, placing, securing. 3. Ensure supervision and reinforce safety throughout. **Children's Actions:** 1. Follow instructions to assemble collectors. 2. Work in teams to place and secure containers. 3. Observe and adjust for stability and water flow.
Evaluating the work	The teacher encourages children to test stability and anticipate how water will flow. Children evaluate how their roles were performed. Children discuss what went well, note challenges, and consider improvements. They document the constructed system with photos, sketches, or simple notes.

Lesson 4 "Measuring and Recording Collected Water" | Time: 40 - 45 min

Expected Learning Outcome	Children can measure water and record observations, comparing container efficiency.
Engagement	The teacher reviews the purpose of collection and explains that measuring water helps us understand efficiency. Children recall placement and container differences.
Choosing the design of the plan	**Teacher's Actions:** 1. Ask: "Which container will collect the most water?" 2. Guide children to hypothesize outcomes. **Children's Actions:** 1. Discuss and predict which containers will collect more water. 2. Record predictions in charts or drawings.
Developing / constructing the plan	**Teacher's Actions:** 1. Demonstrate measuring water using cups or standard units. 2. Guide children to record results. **Children's Actions:** 1. Measure water collected. 2. Record amounts in charts. 3. Compare results to predictions.
Evaluating the work	The teacher asks: "Which container was most effective? Why?" Children reflect on observations, discuss factors affecting water collection, and update charts. Children evaluate how their roles were performed and identify technical improvements for system.

Lesson 5 "Using Collected Rainwater to Water Plants" | Time: 40 - 45 min

Expected Learning Outcome	Children can safely use collected rainwater to care for plants and observe plant growth.
Engagement	The teacher discusses the importance of using collected water for plants, linking to previous observations of plant health and soil moisture. Children recall watering needs.

Choosing the design of the plan	**Teacher's Actions:** 1. Ask: "How should we distribute water evenly?" 2. Discuss safe pouring techniques. **Children's Actions:** 1. Suggest methods to water plants effectively. 2. Discuss roles in watering.
Developing / constructing the plan	**Teacher's Actions:** 1. Demonstrate proper watering. 2. Supervise children as they water plants. **Children's Actions:** 1. Water plants using collected rainwater. 2. Observe changes in plant health. 3. Record observations through notes, drawings, or photos.
Evaluating the work	Children reflect on plant growth and effectiveness of watering. The teacher facilitates discussion on why rainwater is valuable and how it benefits plants. Children share results and ideas for improvement.

Lesson 5 "Using Collected Rainwater to Water Plants" | Time: 40 - 45 min

Expected Learning Outcome	Children can safely use collected rainwater to care for plants and observe plant growth.
Engagement	The teacher discusses the importance of using collected water for plants, linking to previous observations of plant health and soil moisture. Children recall watering needs.
Choosing the design of the plan	**Teacher's Actions:** 1. Ask: "How should we distribute water evenly?" 2. Discuss safe pouring techniques. **Children's Actions:** 1. Suggest methods to water plants effectively. 2. Discuss roles in watering.
Developing / constructing the plan	**Teacher's Actions:** 1. Demonstrate proper watering. 2. Supervise children as they water plants. **Children's Actions:** 1. Water plants using collected rainwater. 2. Observe changes in plant health. 3. Record observations through notes, drawings, or photos.
Evaluating the work	Children reflect on plant growth and effectiveness of watering. The teacher facilitates discussion on why rainwater is valuable and how it benefits plants. Children share results and ideas for improvement.

Lesson 6 "Reflecting and Sharing Learning" | Time: 40 - 45 min

Expected Learning Outcome	Children can reflect on learning, evaluate collaboration, and understand the broader importance of water conservation.

Engagement	The teacher asks children to recall the whole process of rainwater collection, construction, and watering. Children share experiences.
Choosing the design of the plan	**Teacher's Actions:** 1. Prompt reflection on design choices: "What worked well?" "What could be improved?" 2. Encourage sharing of learning with peers or parents. **Children's Actions:** 1. Discuss successes and challenges. 2. Suggest improvements for future designs. 3. Share reflections through drawings, charts, or oral presentations.
Developing / constructing the plan	**Teacher's Actions:** 1. Facilitate a summary of steps followed. 2. Encourage discussion on teamwork and roles. **Children's Actions:** 1. Reflect on collaboration and personal contribution. 2. Identify which strategies helped achieve goals.
Evaluating the work	The teacher asks children to consider how saving water affects plants, the school garden, and the wider environment. Children consolidate their learning, present their observations, and discuss the importance of environmental responsibility.

Part 3 — Practical / Outdoor Lesson

Expected Learning Outcome	Children are able to practically use the created "rain tunnel" system and tools to save water resources and care for plants. They understand the importance of water conservation and observe how water supports plant growth.
Engagement	The teacher gathers children at the raised garden beds and asks: "How can we help our plants today without using tap water?" The discussion reminds children of previous lessons about rainwater collection, soil moisture, and plant needs. Children respond by observing the garden, discussing ideas in pairs or small groups, and preparing for hands-on activities.
Practical part (hands-on activity)	**Teacher's Actions:** 1. Guide children in collecting rainwater from the rain tunnel system. 2. Explain how to measure water using cups or other standard units safely. 3. Demonstrate how to water plants gently with watering cans to avoid soil erosion. 4. Observe children's work, providing support for measuring, pouring, and system adjustments. 5. Reinforce digital safety: tablets or growth diaries are used only while seated with clean hands. **Children's Actions:** 1. Suggest possible containers, tools, and placement locations for collecting rainwater. 2. Sketch initial designs individually or in small groups. 3. Discuss their ideas with peers and justify their choices. 4. Begin thinking about which ideas are most practical and safe.
"Circle" - reflection and discussion	After the practical activity, the teacher gathers the children in a circle for reflection. The discussion begins with questions such as: • "What worked well?" • "What was difficult?" • "How did we help nature?" • "Did our system work as expected?" • "Were there any leaks, and how did you fix them?" To connect the practical experience to a wider context, the teacher shows a short video (2–5 minutes) about global water problems, demonstrating how water scarcity affects people, communities, and ecosystems worldwide. After viewing, the teacher asks: • "How does saving water in our garden help the planet?" • "What could happen if people waste water?" • "How can small actions, like collecting rainwater, make a difference globally?" Children discuss the video, reflect on how their hands-on activity relates to global water issues, and share ideas for conserving water at home, school, and in their community. This integrates environmental responsibility and global awareness into the lesson.

Part 4 - Conclusions

Feedback	Children can evaluate their roles, collaboration skills, and the effectiveness of their rainwater collection system. They analyze data on soil moisture and plant growth and plan creative improvements for future use. The teacher facilitates a discussion on roles within the group: • "How well did you perform as a planner, builder, or measurer?" • "What helped your group work together effectively?" Children reflect on their contributions, discuss successes and challenges in fulfilling roles, and consider how collaboration affected the overall outcome. **Collaboration Skills** – the teacher prompts groups to evaluate teamwork and goal alignment. Children discuss how they agreed on common goals, resolved disagreements, and shared responsibilities in constructing and using the rainwater system. **Solution Effectiveness** The teacher asks children to evaluate: • "How did we solve the problem of keeping water for plants?" • "Did the rain tunnel system work as expected?" Children share observations, highlighting effective strategies and identifying areas for improvement.
Observation and improvement	**Teacher's Actions:** 1. Guide children in analyzing data from the digital "growth diary" and microscope observations, focusing on how soil moisture affects plant cells. 2. Supervise testing the rain tunnel system for leaks and suggest methods to improve water storage, such as adding lids or adjusting placement. 3. Facilitate creative problem-solving discussions to plan improvements safely. **Children's Actions:** 1. Analyze observations in the digital growth diary, linking moisture levels to plant growth. 2. Test the rain tunnel system, identify leaks, and fix them using sponges. 3. Plan and implement improvements, such as adding lids to containers or adjusting placement for better efficiency. 4. Share improvements and reflect on how changes affect water conservation and plant health. **Reflection on Global Impact** The teacher encourages children to consider: • "How does conserving water locally connect to global water issues?" • "What small actions can we take every day to help the planet?" Children discuss ways their efforts in the school garden can make a difference and relate practical learning to environmental responsibility and sustainability.

Attachment No. 1

General safety rules and Teamwork guidelines

1. Safety protocols

- **“Dry zone “ policy :** to prevent slipping, all water activities must be conducted on non - slip mats or trays.
- **Spill management** - children are taught to immediately notify the teacher and help dry any spills using sponges or towels.
- **Device safety :** digital tablets and microscopes are used only while sitting at a table with clean, dry hands.
- **Tool handling :** use of watering cans and measuring cups must be supervised to ensure gentle handling and prevent soil erosion.
- **Material safety :** all containers and pipes must be checked for sharp edges before the construction phase begins.

2. Teamwork and role distribution

To ensure effective collaboration and engineering quality, children are assigned specific roles using visual badges :

- **The engineer (builder)** : responsible for assembling pipe segments and fixing leaks using sponges.
- **The measurer :** responsible for using measuring cups to collect data and water levels.
- **The documenter :** responsible for recording observations and findings in the digital growth diary or sketches.
- **The resource manager:** Responsible for gathering and organizing required materials (lids, pipes, containers).

3. Methodological Guidance for Teachers

- **Scaffolding:** Use "Step Cards" with pictures to demonstrate assembly before children start building.
- **Conflict resolution:** If a team disagrees on a design, use a "Discussion Circle" where each child explains their idea before the group votes.
- **Iterative thinking:** Encourage children to test their system, identify failures, and plan improvements rather than providing ready-made solutions.

4. Use of digital tools and safety

Teacher actions:

1. Demonstrates:
    - how to use a digital microscope
    - how to use a tablet
2. Reminds children of safety rules:
    - use only with an adult
    - hold carefully (do not drop or shake)
    - do not look directly at the sun through the device
    - do not put the device in the mouth or eyes
    - do not use near water or moisture (if not intended)

Child actions:

- Uses digital tools with adult assistance
- Follows safety rules
- Observes and explores
- Asks questions about what they see

Focus: Digital tools are a research aid, not a toy

References

- **Vides izglītības fonds (VIF).** (2020). *Ekoskolu rokasgrāmata: Ūdens resursu ilgtspējīga pārvaldība un tēmas "Ūdens" īstenošana izglītības iestādēs*. Rīga: Vides izglītības fonds
- **Dabas aizsardzības pārvalde.** (2021). *Iepazīsti ūdens pasauli: Metodiskais līdzeklis pirmsskolas un sākumskolas skolotājiem*. Sigulda: DAP
- **Latvijas Universitāte & Skola2030.** (2019). *Metodiskie ieteikumi dabaszinātņu jomā pirmsskolā: Pētnieciskā darbība un eksperimenti un dabas resursu ilgtspēja*. Rīga: VISC.
- **Zaļā josta.** (2022). *Mācību un metodiskie materiāli par ūdens un dabas resursu saglabāšanu*. Rīga: Zaļā josta
- **FEE (Foundation for Environmental Education).** (2022). *Eco-Schools Water Theme Guide: Practical Activities Water Harvesting and Conservation for Early Years*. Copenhagen: FEE *on*
- **WET Foundation.** (2019). *Project WET Curriculum and Activity Guide: Rainwater Collection and Garden Ecosystems for Young Learners*. Bozeman, MT: Project WET Foundation