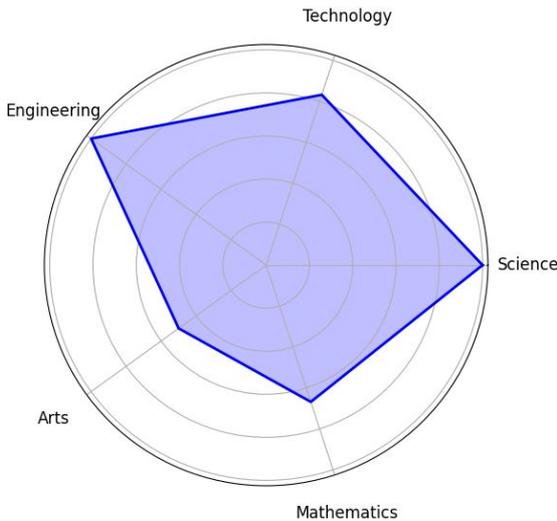




Curricular



CleanDrop Challenge: Designing DIY Water Filters

Duration	Age	Difficulty
45	17-18 y/o	Medium
#EXPERIMENTATION #SCIENCE#ENGINEERING#ART		

DESCRIPTION

Do you drink tap water at home? Have you ever noticed a strange taste or color in your water? In many parts of the world, clean water is something people cannot take for granted.

Through this activity, students will become water detectives: testing the quality of different water samples and designing their own DIY filtration systems using everyday materials.

By analyzing, experimenting, and redesigning their prototype, they will use science, creativity, and collaboration to answer this challenge: Can you build a better way to clean dirty water?

In the process, they'll also reflect on real-world applications: Could your filter be useful in emergencies? Could it help someone in a different part of the world?

ACTIVITY OBJECTIVES

- Develop curiosity about water quality and health through experimentation.
- Apply the scientific method to test and analyze contamination indicators.
- Explore material properties and use them to prototype and improve a working filter.
- Practice data collection and visualization with graphs.
- Work in teams with rotating leadership roles to ensure inclusion and participation.
- Communicate results clearly through artistic posters and/or digital storytelling

KEY COMPETENCES (EU)

- STEM competence
- Citizenship competence
- Cultural awareness and expression competence



MATERIALS



2 plastic bottles per team



Cotton



Small stones



Paper towels



Funnel (optional)



Scissors



Stopwatch



Sand/dirt



Charcoal



Plastic cups (for pouring and collecting water)



Iodine, vinegar, liquid soap (for basic water tests)



Computer with internet connection



Provided by students



Provided by the teacher/institution



Downloadable Elements



["Filter Tracker Sheet"](#)



[Real-life contexts examples](#)



[Mini-bios of STEAM female figures in water innovation \(editable worksheet\)](#)



[Visual aids showing global filtration systems](#)

PREVIOUS PREPARATION

- Group students into teams of 3–4, ensuring balanced gender participation and rotating leadership roles.
- Print enough copies of the "Data Tracker Sheet," and female STEAM bios for all teams.
- Prepare activity stations with a full set of filtering materials (sand, cotton, charcoal, bottles, etc.) at each table.
- Preview optional media such as a short video or article on real-world DIY water filters (e.g., Deepika Kurup's TEDx). For example, <https://youtu.be/3uzXeCnzf0c>
- Ensure access to timers (stopwatches or phones) and simple testing agents: vinegar, soap, iodine.



CONTEXTUALIZATION AND ADAPTATION

Imagine this: You're hiking in the mountains, or maybe you're in a place where the water from the tap looks cloudy or smells strange. Would you drink it? Could you clean it?

We often take clean water for granted. But over 2 billion people around the world don't have access to safe drinking water every day. And even in cities, a natural disaster or plumbing issue can make water unsafe. That's why engineers and scientists—and people like you—are coming up with creative, low-cost solutions to this problem. One of them is Deepika Kurup, a teenager who invented a water purifier when she was just 14 (check out her video about her water invention to understand her insight better in the box for complementary tools and exercises). Her invention helped communities without access to clean water, if she could do it, why not you?

Today, you'll become a real-world problem solver, you're about to create something with real impact. This isn't just a science experiment—it's a challenge where your ideas could matter far beyond the classroom. So, let's dive in and see what you can build!

Your challenge will be to design a DIY water filter that can turn dirty water into something safer and clearer, using materials like cotton, sand, and charcoal. Therefore, in order to do it, you will learn the following:

- What makes water "dirty" (and how to test for it).
- Which materials can filter water effectively.
- How to design, test, and improve a filtration system.
- How to collect and visualize your results like real scientists.
- How to explain your invention using a creative poster or pitch.

Apart from what has been mentioned, keep these in mind during the activity:

- What makes a good water filter?
- Why do some materials work better than others?
- Could your design help someone in need?
- How would your filter need to change for different situations?



Watch video 🎥 - “A young scientist's quest for clean water | Deepika Kurup”

<https://www.youtube.com/watch?v=AkUcaludrcl&t=32s>



Classroom activity 💡

Display or project 3–4 different real-life contexts (you can also hand out small cards or visuals):

- A family camping in the mountains with only a river nearby.
- A village affected by a recent flood.
- A neighborhood during a citywide plumbing failure.

Ask each team to choose one scenario or assign different ones to each group and ask them to discuss:

- What are the biggest water safety risks in this scenario?
- What materials might be available or limited in that setting?
- How would they adapt their design for this situation?

Note for the teacher 📝

- Use visual aids to represent each context (e.g., desert photo, flood aftermath, remote village).
- You can turn this into a competitive design prompt: “Which team can best adapt their filter to survive the scenario they’ve been given?”
- Optionally, have students draw sketches or storyboards of their scenario to visually express the problem space.
- Emphasize rotation of roles for equity: everyone leads at some point (testing, design, speaking).
- Encourage reflection on what “success” means: it’s not only the clearest water but also teamwork, learning, and problem-solving.





ACTIVITY

STEP 1: Investigate Your Water Sample

- **Materials used:**
 - Plastic cup (with water sample)
 - Data tracker sheet
 - Stopwatch
 - Iodine, vinegar, liquid soap
- **Instructions:**
 - Pour your collected water sample into the plastic cup.
 - Use your senses—look, smell, observe. Is it cloudy? Does it smell?
 - Conduct 3 simple tests:
 - Add vinegar → Does it fizz? (Acidity test)
 - Add iodine → Any color change? (Organic content)
 - Add soap → Does it foam easily or not? (Water hardness)
 - Write down all results in the Filter Tracker Sheet (use the downloadable or printed version). Use a stopwatch to measure how long each test reaction takes (e.g., soap foaming, iodine reaction).

STEP 2: Learn from Real Experts

- **Materials used:**
 - WHO Water Safety reference sheet: [Link here](#)
 - Visual aids showing global filtration systems
 - Mini bios of STEAM female figures
 - Editable worksheet for bios
- **Instructions:**
 - Quickly scan the WHO Water Safety [link](#). What are the global water safety concerns?
 - Review the infographics/slides showing real-world filtration examples.
 - Use online searches to find information about: What water purification methods were traditionally used by rural communities? Bare in mind the following questions: What traditional materials or techniques were used for water purification? Might they help respond to current climate challenges, like floods or droughts?
 - Read the mini bios of 3 women innovators in water science (e.g., Deepika Kurup).
 - Reflect on: “Which female scientist inspired you the most and why?”

STEP 3: Design Your Filter

- **Materials used:**
 - 2 transparent plastic bottles
 - Funnels and scissors
- **Instructions:**
 - Use scissors to cut the top off one bottle, creating a funnel.
 - Sketch your planned filter design on the poster template.
 - Decide the order of materials: sand, cotton, charcoal, paper towels, stones.
 - Use the second bottle to collect filtered water.
 - Discuss: “Why did we choose this material order?”
 - Add your filter name and a short slogan on your poster!



STEP 4: Build It and Test It

- **Materials used:**
 - Bottle filter setup
 - Sand, cotton, charcoal, paper towels, stones
 - Water sample
 - Stopwatch
 - Funnel
 - Data tracker sheet
- **Instructions:**
 - Place materials inside the bottle in your chosen order.
 - Use the funnel to pour the water sample into the filter.
 - Time the filtering process using your stopwatch.
 - Collect the filtered water in the second bottle.
 - Record how the water has changed:
 - Clearer? Less odor? Fewer particles?
 - Log all data into your Data Tracker Sheet.

STEP 5: Analyze and Improve

- **Materials used:**
 - Filter Tracker Sheet
 - Stopwatch
- **Instructions:**
 - Based on the data: What worked? What didn't?
 - Choose one variable to change (e.g., swap material order, increase sand layer).
 - Rebuild the filter and test again.
 - Use graphs (drawn or digital) to compare before vs. after results.
 - Add these findings to your poster template.

STEP 6: Final Presentation

- **Materials used:**
 - Mini-bios worksheet
 - Canva (optional for digital teams)
 - Funnel + filtered water (for show & tell)
- **Instructions:**
 - Finalize your poster including:
 - Sketch of the best-performing filter
 - Bar graph or comparison chart
 - Quote/image of a STEAM female leader
 - Slogan and logo (optional)
 - Prepare a 1-minute pitch:
 - What problem did you solve?
 - What worked best?
 - How could your design help people?
 - Present to the class or record a short video.



CONCLUSION AND SHARING

You've just completed a full engineering cycle—investigating a real-world problem, designing a creative solution, testing it with scientific methods, and communicating your findings like real professionals.

This activity wasn't just about building a water filter—it was about understanding the global importance of clean water, the role of STEAM in everyday life, and the power of teamwork and inclusive leadership.

Classroom activity

Organize a circle discussion, small-group talk, or written reflection using the following prompts:

- **Science & Design**
 - What surprised you about your filter's performance?
 - What scientific principle do you think was most important in making it work?
 - If you could access professional lab tools, how would you improve your design?
- **Real-World Impact**
 - Where do you think your filter could actually be used?
 - Could your design help in places where clean water is scarce?
 - How do you think engineers design filters that work in extreme conditions (e.g., floods, deserts)?
- **STEAM & Equity**
 - What role did each person play in your team? Did everyone get to lead something?
 - What did you learn about how women or gender-diverse people are helping solve water problems globally?
 - Did this activity change how you see your potential in STEAM?
- **Future Thinking**
 - What other problems could you try to solve with this kind of design process?
 - Do you think you'll use what you learned here in real life? How?

Don't forget to take a photo of your experience and share it with us!



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