PRIMARY LEVEL

FACILITATOR'S PACK

Water for Everyone Everywhere is a hands-on enquiry-based workshop that enables pupils to explore the global issues associated with water access and the role that engineering plays in water distribution.

UK
ENGINEERS
WITHOUT BORDERS

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This document and the accompanying materials are available to download from: www.ewb-uk.org/water-for-everyone-everywhere.

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OVERVIEW

Water for Everyone Everywhere is a workshop designed to encourage pupils to explore the challenges associated with access to safe, clean drinking water around the world. Pupils learn about the importance of water to people's everyday lives and the role that engineering infrastructure plays in the distribution of water. Pupils design, build and test their own model water filter as part of this workshop. This workshop builds on the Sustainable Development Goals and the concept of global citizenship.

This document is a guide for Engineers Without Borders Ambassadors delivering the workshop. Teachers and youth group leaders can also use it. It should be used in conjunction with the accompanying slides, slide notes and printouts. Please note that this resource is periodically updated. The date of the last update is on the inside front cover.

If you are not a teacher/youth group leader, please sign up to become an Engineers Without Borders Ambassador to be able to deliver this resource. Find out more and register on our website. For any queries, please contact Engineers Without Borders UK directly using the email address: outreach@ewb-uk.org.

CONTENTS

THE WORKSHOP IN BRIEF

PUPIL'S LEARNING OBJECTIVES

- Understand the importance of clean water and that access to it is not equal
- Describe the role of an engineer in bringing about access to clean water
- Consider the challenges engineers face to give people around the world access to clean water
- Design your own model water filter

TEACHER'S EDUCATIONAL OBJECTIVES

- Incorporate global issues into classroom learning
- Provide careers related learning within subject lessons
- Hands-on activity that develops the pupils' ability to use cross curricular knowledge and skills, and work as team

SUITABLE AGE GROUP & SIZE

The session is designed for a standard school class of approximately 30 pupils with the class divided into groups of two to six pupils for the build activity. However, the content can be easily modified to suit smaller or larger groups. Please contact us for guidance on this.

This particular resource is suitable for upper KS2 (9-11 years of age, Years 5-6). There are separate resources suitable for KS3-4 (11-16 years of age, Years 7-11) on the Engineers Without Borders UK website.

WORKSHOP LESSON PLAN & RISKS

Overall workshop length is 100 minutes. To amend for a shorter session only do one of the activities (e.g. the build activity for science lessons, the reflection activity for geography lessons) and present some of the Q&A rather than ask the pupils.

Workshop section description	Time (min)
INTRODUCTION: HOW WE USE & RELY ON WATER (slides 1-7)	
Introduction to the facilitator/s and to Engineers Without Borders UK. Starter activity to encourage pupils to think about how we use and rely on water and brief overview of the session. *Encourages critical thinking and self-reflection.*	10
ACCESS ACTIVITY: WHAT IF I DON'T HAVE ACCESS TO CLEAN WATER? HOW DOES EVERYONE EVERYWHERE GET ACCESS TO CLEAN WATER? (slides 8-24)	
Encourages pupils to think about how essential clean water is to their lives. The importance of access to water is emphasised, supported by some key facts. Written activity to get the pupils to think about how their lives would change without access to clean water. Introduces the notion of unequal access to safe water in the world and the impact this can have on people's lives. Reflective activity encouraging pupils to think through the issue of not having access to water. Presents a case study to introduce pupils to how other communities in other countries are affected and have overcome issues of not having water access. *Introduces a global dimension to understanding water access and raises the issue of global inequality. Highlights local and global initiatives addressing this.*	20
THE ROLE OF ENGINEERING (slides 25-39)	
Introduces the pupils to thinking about where water comes from. Discussion about water sources, water source technologies and getting access to water. Introduces the role that engineering plays in access to water, from water source technologies to getting access to water. Class discussion of the factors that may affect access. Optional activity to further explore factors which affect access to water. Teaches the class about what contaminants are, and how they can be classified. **KEY RISKS:** Use of scissors – only facilitator to handle scissors. *Encourages critical thinking to discover where water comes from, the technologies used to collect & distribute it & raises the issue of water contamination. Encourages pupils to explore some of the reasons why people may not have access to safe water supplies and consolidate learning on the importance of safe water access.*	20

BUILD ACTIVITY: BUILDING A WATER FILTER (slides 40-48)	
General principle of how sediment filters work is explained. Hands-on, creative team activity to build a small water filter. Filter performances are then tested. *Teambuilding activity encouraging critical creative thinking to understand and apply the principles of filtration. Discussion of performance issues and relevant design adjustments.* **KEY RISKS:** Sharp edge on cut-off plastic bottle – highlight risk to children. Messy materials (sand & water) – only facilitator to handle water. Materials requiring cutting (plastic bottle, cheese cloth) to be prepared beforehand by facilitators.	35
LOOKING AFTER WATER & WHAT YOU CAN DO (slides 49-52)	
Revisits the impact to people's lives when they do not have access to clean water. Explains that engineering can be used to ensure that everyone has access to clean water. Brief overview of water conservation actions individuals can undertake and written activity for pupils to identify what they have learned in the workshop. *This helps pupils understand how their actions can have an impact on the world and encourage self-reflection.*	10
REFLECTIONS ON LEARNING (slides 53-55)	
Recaps the learning objectives accompanied by quizzing the pupils on the key messages and lessons from the workshop. End of the workshop. Gives the pupils an opportunity to ask any questions they have about the workshop, STEM, or higher education.	5

GUIDANCE FOR ADJUSTING WORKSHOP LENGTH

LENGTHENING THE WORKSHOP TO 120 MINUTES

Increase the workshop length by spending more time on activities such as taking answers from pupils, designing and building the water filter, and taking questions at the end of the workshop.

DECREASING THE WORKSHOP TO 60 MINUTES

Save time by focusing more on talking through the slides, and asking closed questions to maintain pupil engagement, rather than open questioning and pupil discussion. As well as this, you can decrease workshop length by:

- Instead of having the 'WHAT HAPPENS IF I DON'T HAVE ACCESS TO CLEAN WATER' printout on **slides 10-11**, complete the spider-diagram on the board, using suggestions from the class.
- Do not run the optional 'EXPLORING ACCESS ACTIVITY: WATER' on **slide 31**.

SPLITTING THE WORKSHOP INTO TWO 60 MINUTE SESSIONS

LESSON NUMBER	SLIDES TAUGHT	LEARNING OBJECTIVES MET	TIME TAKEN (MINUTES)
1	1-33	Understand the importance of clean water and that access to it is not equal. Describe the role of an engineer in bringing about access to clean water.	50
1	53-55		10
2	1-4	Consider the challenges engineers face to give people around the world access to clean water. Design your own model water filter.	5
2	6-7		5
2	34-55		50

PREPARATION

PRESENTATION

Familiarise yourself with the slides and accompanying slide notes. Know how long each section of the workshop should take. If you are delivering the workshop in a small team, decide how to split delivery of the sections up between you.

MATERIALS & RESOURCES

The activities are an important part of the workshop, so spend extra time ensuring you have all the materials for these well in advance of the workshop date. Printouts are also needed for the workshop and are available to download. A checklist is provided, so check carefully to make sure that you have all materials and resources before the scheduled workshop. You may wish to group build activity resources so they can be easily distributed. Ask the school in advance if they can provide any of the materials or equipment for the workshop and inform them of the amount required.

ROOM SETUP

A normal classroom is fine for this workshop but check that it is okay to do the build activity in this environment, as it can get messy. Be prepared to help clean up afterwards. Enquire about audio-visual facilities at the school as you will need to be able to present a PowerPoint slide show.

GETTING FEEDBACK

Ensure you know how you are going to receive feedback. The guidance provided in these resources indicates how to get feedback from the pupils during the final section of the workshop. Please request feedback from the teacher/youth group leader using these online forms before and after the workshop. See the Engineers Without Borders Ambassador's handbook for further guidance on asking for feedback from teachers/youth group leaders.

PHOTOGRAPHY

We would really like photos for our publicity materials and rely on you to send us photographs of your workshops to show our work in action. Ensure you have asked for permission for photography from the school and that you follow any procedures they have in place. Photographs should be high quality and preferably of landscape orientation. Submit photos to outreach@ewb-uk.org with captions to describe them.

MATERIALS & EQUIPMENT LIST

Read the activity notes to understand any preparation you need to do. You will need to calculate how much you need depending on the total class size and number of groups receiving the workshop.

Item	Number required
FOR PRESENTATION	
Laptop/computer connected to projector	1
Water for Everyone Everywhere PowerPoint presentation	1
Flip chart, A3 or A4 paper for starter activity	2 per group (optional)
FOR ACCESS ACTIVITY: WHAT IF I DON'T HAVE ACCESS TO WATER?	
Access Activity Printouts	Print out 1 worksheet per pair
FOR BUILD ACTIVITY: BUILDING A WATER FILTER	
Build Activity Printouts	Print out 1 worksheet per group
Pens/pencils	1 per pupil
Cut-off 2L plastic bottle	1 per group
Cups (plastic/card) to hold filtration materials	8 per group
Coarse gravel	Enough for 2 cups per group
Fine gravel	Enough for 2 cups per group
Coarse sand	Enough for 2 cups per group
Fine sand	Enough for 2 cups per group

Cheesecloth	1 x10cm square per group
Cotton wool ball	1 per group
Rubber band	1 per group
Contaminated water	Enough to test all water filters
FOR EXPLORING ACCESS ACTIVITY (OPTIONAL): WATER	
Exploring Access Activity Printouts	Print out 1 set of sheets
Ball of string	1
Scissors	1
FOR REFLECTIONS ON LEARNING & GETTING PUPIL FEEDBACK	
Large sticky notes ('super' size if possible)	Enough for up to 4 per pupil
Large board for sticking the sticky notes on	1

ACTIVITY NOTES

ACCESS ACTIVITY: WHAT IF I DON'T HAVE ACCESS TO CLEAN WATER

This activity allows pupils to reflect on either their own experience or use their imagination to understand what role water plays in our everyday lives and the impact of lacking access.

Preparing the materials

- Read through all instructions as well as speaker's notes in **slides 10-23**
- Source all the materials and print printouts well in advance of the workshop

Delivery instructions

- Read out the activity instructions to the class from **slide 10**
- Encourage the pupils throughout and provide help where needed. Keep them to time. When the task is complete conclude with **slides 12-23** and collect in all the worksheets (suggest the teacher could keep sheets for pupil exercise books)

BUILD ACTIVITY: BUILDING A WATER FILTER

This activity allows pupils to explore the principles of water filtration, apply them and work in teams to build a model sand water filter which is then tested.

Preparing the materials

- Read through all instructions as well as speaker's notes in **slides 40-48**
- Source all the materials and print printouts well in advance of the workshop
- Make sure the cheesecloth and plastic bottles are cut PRIOR to attending the workshop. This prevents the use of scissors by participating children reducing the risk of injury. If possible, protect the sharp edge of the plastic bottles using tape (e.g. electrical tape or duct tape)
- If possible, fill the cups with the materials before the workshop (leave the top third of the cups empty, to moderate spills, and stack them in a bucket or similar container to secure them), or before the pupils enter the classroom
- This reduces the risk of mess created by the children doing this themselves and saves time. You may also want to group the materials for each group to save time and confusion. Locate paper towels or other drying equipment to be able to respond quickly to spillages.

Delivery instructions

- Read out the information about the underlying principle of filtration from **slides 40-45**
- Read out the activity instructions to the class from **slide 46**
- Split the class into groups of between 2–5 pupils
- Give each group a worksheet to produce a labelled design of their water filter (10min). Remind pupils of time limits
- After the designs are completed, give each group their materials and tell them to get started making their filter. Remind pupils to follow their design sheets and reiterate the time limit for the building activity (10-15 mins)
- Encourage the pupils throughout, highlighting skills they are showing that are important for engineering. Provide help where needed, referring back to the filtration process. Keep the pupils to time
- When the time is up, move onto the instructions on **slides 47-48**
- After testing, encourage pupils to complete the evaluation section on their worksheet
- Lead by example by clearing up during and afterwards, leaving as little mess as possible

EXPLORING ACCESS ACTIVITY (OPTIONAL): WATER

This activity allows pupils to consolidate their learning regarding the issues that arise due to not having access to clean, safe water and explore some of the causes of this.

Preparing the materials

- Read through all instructions as well as speaker's notes in **slides 29-33**
- Source all the materials and print printouts well in advance of the workshop
- Make sure the print outs are cut up prior to attending the workshop, to save time
- When you arrive, identify which area of the room you can use for this activity

Delivery instructions

- Take the group through the activity following the instructions on **slide 31**
- Be careful to only use the scissors yourself when cutting the string
- Encourage the pupils throughout and provide help where needed. Keep them to time
- When the activity is finished, ask the pupils to sit back down and move onto the summary on **slides 32-33**
- Clear up during and afterwards, leaving as little mess as possible

REFLECTIONS ON LEARNING & GETTING PUPIL FEEDBACK

This activity allows pupils to reflect on their learning from the session as well as enabling you to collect feedback from them about the key points that they have remembered.

Preparing the materials

- Read through all instructions as well as speaker's notes in **slide 53**
- Source all the materials well in advance of the workshop

Delivery instructions

- Read out the activity instructions to the class from **slide 53**
- Encourage the pupils throughout and provide help where needed. Keep them to time
- When the time is up, ask the pupils to bring up their sticky notes and stick them to some plain paper for you to take away or add them to the board you have brought with you
- Clear up during and afterwards, leaving as little mess as possible

ABOUT ENGINEERS WITHOUT BORDERS UK

Engineering is vital for human development and key to addressing urgent global issues such as the effects of climate change, resource depletion, increasing urbanisation and rapid population growth. Engineers Without Borders UK brings people, ideas and engineering together to respond to these complex issues. We work in sub Saharan Africa, southern Asia, Latin America and the UK to ensure that the engineers of tomorrow have the necessary skills and information to apply their knowledge in a globally responsible way. We work with individuals, local partners, the education sector and the engineering community. Together, we are ensuring that people everywhere have equal access to the benefits of engineering.

This resource is part of our strategic objective to inspire the next generation of globally responsible engineers. We want to broaden the profile of engineering and the wider understanding of the role it plays in society so that we attract a more diverse cohort of talent to the engineering sector and ensure that the next generation of engineers are able to apply their skills and ability in a globally responsible way. For more information please visit our website: www.ewb-uk.org

ACKNOWLEDGEMENTS

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This resource and the accompanying materials are available to download from: www.ewb-uk.org/water-for-everyone-everywhere.

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