



Practical ACTION

This written resource, along with the accompanying PowerPoint forms a step-by-step guide to make running the Stop the Spread challenge day easy and straightforward.

A circular inset image with a teal tint shows a young man in a lab coat and tie, looking intently at a pipette he is holding. In the foreground, several small glass vials with white caps are visible.

STOP THE SPREAD

If you would like your students to achieve a CREST Discovery Award for taking part in the day, please go to www.crestawards.org. Alternatively, if you do not wish to register for the full CREST Discovery Award, you can still use these activities and resources on their own.

TEACHER PACK



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**Practical
ACTION**

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1 INTRODUCTION



This resource will guide you to deliver a hands-on enquiry based STEM project, challenging your students to find a real solution to a global problem. The focus of the Stop the Spread challenge is on improving hygiene as a way of reducing the spread of communicable diseases. For this challenge, pupils will work in teams to build a model of a hand washing device and produce education materials suitable for primary school children in Kenya.

The Stop the Spread challenge is designed to be run as a Discovery Day, enabling participating students to achieve a CREST Award - but is flexible enough to be carried out during lessons, in STEM clubs, transition, or as a collapsed curriculum day. In total, the Stop the Spread challenge will take between 3-5 hours to complete. The Guide to timings is based on the challenge taking place in one five-hour day.

Background: communicable diseases

Communicable diseases cause death and illness to millions of people each year in the developing world.

Communicable diseases are caused by pathogenic microorganisms, such as bacteria, viruses, parasites or fungi. They can be spread, directly or indirectly, from one person to another.

The focus of this challenge is on improving hygiene as a way of reducing the spread of infectious diseases. It is important that pupils understand this is just one of the methods of prevention. The need for better sanitation in developing countries is clear. Forty percent of the world's population—2.5 billion people—practice open defecation or lack adequate sanitation facilities. Poor sanitation contributes to about 700,000 child deaths from diarrhoea each year. Chronic diarrhoea can hinder child development by impeding the absorption of essential nutrients and reducing the effectiveness of life-saving vaccines.

Creating sanitation infrastructure that works for everyone is a major challenge. The toilets, sewers, and wastewater treatment systems used in developed countries require vast amounts of land, energy, and water, and they are expensive to build, maintain and operate. Existing alternatives that are less expensive are

often unappealing because they don't kill disease-causing pathogens, have impractical designs, or retain odours and attract insects.

To find out more about what is being done to tackle this challenge go to: www.gatesfoundation.org/What-We-Do/Global-Development/Water-Sanitation-and-Hygiene

In 2015 the UN set out 17 Global Goals (also called the Sustainable Development Goals or SDGs). These aim to end global poverty by 2030. The following global goals are linked to preventing the spread of infectious diseases.

Global Goal 3 - Health and Well-being

- One of the targets is: By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases.

Global Goal 6 - Water and Sanitation

- One of the targets is: By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation.

For information from the UN on global goals including facts, figures and targets go to:

www.un.org/sustainabledevelopment/sustainable-development-goals/

2 TEACHER GUIDELINES

The following guidelines are designed to be used with the accompanying Stop the Spread PowerPoint. Beginning with an introduction and starter activities and then taking you through the main challenge: pupils will first design and build a model handwashing device, and then produce supporting educational materials suitable for primary school children in Kenya.

By working in small teams to complete the challenge pupils can work towards achieving a CREST Discovery Award, and then enter the Youth Grand Challenges competition.

INTRODUCTION AND STARTER ACTIVITIES

- **Slides 1&2** - Talk about different illnesses, how some occur more in some countries than others, see if pupils have ideas about this.
- **Slide 3** - In pairs, ask pupils to make a list of any diseases/illnesses they know about and to divide them into communicable (e.g. malaria, AIDs, flu, glandular fever) and non-communicable (e.g. cancer, diabetes, scurvy, muscular dystrophy). Explain that in their challenge they will be focusing on communicable diseases.
- **Slide 4** - Ask pupils to think about the different ways communicable diseases spread. Show the slide to see how many they identified.
- **Slide 5** - Explain that this challenge will focus on diseases that are spread by human contact. Run one or both starter activities, demonstrating how diseases are spread and how hand-washing may or may not help reduce that spread. (see separate sheet for instructions) NB. These activities work best in larger groups.
- **Slide 6** - Find out if pupils already know about the global goals, discuss.
- **Slide 7** - Watch the video and ask pupils to look at the case study to help pupils understand what is already being done to help 'stop the spread'. This will help with the communication part of their challenge later.

MAIN CHALLENGE

- **Slide 8** - Introduce the details of the challenge. Emphasize that the second part, which is about research and communication, is as important as building the model.
- **Slide 9** - Explain that after the challenge groups will present to the rest of the class for peer-to-peer assessment according to certain criteria. Hand out 'Evaluating the Work of Others' worksheet and again emphasise the model is only part of the challenge.
- **Slide 10** - If pupils are working towards a CREST Discovery Award make sure they have a Discovery passport and fill it in as they go along.
- **Slide 11** - You may like to leave this slide up as a prompt for pupils when carrying out the challenge.
- Divide the pupils into groups of 3-5.
- Explain the challenge, hand out the 'Drop by Drop' student pack to each pupil and allow time to ask questions. Remind them that as well as producing a model of a hand washing device they will be designing education material for primary pupils and presenting their work to the rest of the class. The test for the model will be pouring 250 ml of water onto the model and then demonstrating how it would be used to wash hands.

MAIN CHALLENGE cont.

- Encourage pupils to think of a name for their team and decide on roles. Product Designer; Engineer; Finance manager; Science Researcher and Science Communicator are suggestions and all STEM careers. In smaller teams pupils can have more than one role. N.B. encourage a mix of roles for both genders.
- Allow pupils time to develop their designs before they start building their hand washing models. Encourage them to annotate their designs and think about their budget. We have suggested pupils can choose any material themselves and have a budget of 125 credits. You may want to provide a 'starter kit' with a pulley, some string and some K'NEX pieces for say 85 credits to save time in a large group, and to encourage them to use a pulley in their design.
- Once they have something on paper allow pupils to start building their models. At the same time other members of the group can start their research into communicable diseases and the importance of hand washing needed for the education materials. Tip - If a group is struggling rather than making suggestions just hand them a useful resource.
- Encourage 'trading' between groups. Once materials have been purchased they cannot be put back but can be traded.
- About 20 mins before the end of the time allowed for model making stop the class and say that you have just found out that the charity Practical Action are working on a project and have just received some Government funding that they want to put into helping their community in Kenya. They have seen the work the pupils are doing and are so impressed they are going to give them an extra 25 credits to use.
- Allow pupils time to focus on preparing their presentation. Encourage them to look at the criteria on the Evaluating the Work of Others sheet.
- Ask each group to present their model, test it in front of the class and show their education materials for the primary children. Ask pupils for feedback on other groups' work. Offering constructive feedback on the work of others should be seen as an important part of the reflective process.



3 KIT LIST

YOU WILL NEED

- PowerPoint presentation
- 'Drop by Drop' Student Packs (one per student)
- CREST Discovery passport (one per student)

Starter materials

- small pieces of paper (approx. 10x10cm)
- glitter
- Vaseline
- three washing up bowls
- soap

Materials for modelling

- K'NEX (including pulleys)
- skewers
- straws
- string
- plastic water/fizzy drinks bottles (different sizes)
- scissors
- Blu Tack
- paper clips
- split pins
- card (varying thicknesses)
- sticky tape/masking tape
- plastic cups
- craft knives
- glue
- hole borer
- plus, any other junk modelling materials that you may have
e.g. milk bottles with handles, yogurt pots, cotton reels

Materials for testing

- small watering can with sprinkle attachment
- trays to place model in

Materials for research/communications activity

- access to internet
- useful apps for animation e.g. stick man
- large pieces of paper for poster making
- coloured paper
- card
- other craft materials
- scissors
- glue
- sticky tape

4 EXAMPLE TIMETABLE

This challenge is very flexible and will take approximately 3-5 hours to complete. The exact length is dependant up whether you do all the starter activities and how long you allow for the main challenge of building the hand washing station and producing the materials for primary pupils.

The following is a guide to timings based on pupils carrying out the challenge in a five-hour day to achieve a CREST Discovery Award. It can of course be used as a guide for a number of separate sessions.

| Slide | Time (mins) | Activity |
|-------|-------------|--|
| 1-3 | 10 | Introduce the topic. Brainstorm communicable and non-communicable diseases. |
| 4 | 5 | Discussion around Global Goals. |
| 5 | 5 | How do communicable diseases spread? Discussion. |
| 6 | 5 | Prevention - what stops disease from spreading? |
| 7 | 15 | Starter Activity 1. |
| | 15 | Starter Activity 2. |
| 8 | 5 | Introduce the main challenge. |
| 9 | 15 | Watch the video and discuss. |
| 10 | 10 | Divide pupils into groups of 3-5. Hand out the 'Drop by Drop' Guide and make sure pupils understand the challenge. Look at 'Evaluating the Work of Others' sheet and discuss how the challenge will be evaluated. |
| 11 | 5 | If your pupils are taking part in the CREST Discovery Award hand out the CREST Discovery passports and explain what they will need to do. |
| | 5 | Ask pupils to sort out roles within their group. |
| | 20 | Ask pupils to begin designing their model and start doing research into infectious diseases. |
| | 120 (2h) | Encourage pupils to start building and testing their models and at the same time producing materials for the primary school pupils. 20 mins from end add in extra credits. |
| | 15 | Pupils practice their presentation. |
| | 40 | Pupils present their model and other materials to the class to feedback. |
| | 10 | Pupils finish filling in their CREST Discovery passport. |
| 12 | 10 | Show pupils the real example of a hand washing station; discuss how this compares to their models. |

5 GUIDE TO STARTER ACTIVITIES

STARTER ACTIVITY 1 STOP THE SPREAD SIMULATION GAME

Materials: Starter Activity 1 cards

- 1 Prepare cards for every pupil in the class. For every 10 students one piece should have 'infected' written on the top; all the others have 'clear'.
- 2 Explain at the start of the activity one that a certain number of people are infected and you are going to see how quickly that infection can spread. Hand out the cards and tell pupils to not let other pupils know what they have written on their piece.
- 3 Ask pupils to move around the room and after 10 seconds shout 'stop' or blow a whistle and ask them to shake hands with the person next to them then show that other person their card.
- 4 When two people meet if one or both has 'infected' on their card, they both write 'infected' underneath the word they have already. If they are both 'clear' they write 'clear' (this way everyone writes something so it is not obvious who is infected).
- 5 Repeat the process.
- 6 Explain that once someone has 'infected' written down three times they will start to show symptoms and should sit down so they don't infect anyone else.
- 7 You can stop the activity at any time. This is to demonstrate how quickly infection spreads.

STARTER ACTIVITY 2 HAND WASHING GAME

Materials: glitter, Vaseline, soap, hand towels and 2 washing up bowls

- 1 Divide the class into three groups. Choose a 'volunteer' from each group to be the person with the disease.
- 2 All three 'volunteers' rub their hands in the Vaseline/glitter mix.

Group 1 infected person - doesn't wash their hand.

Group 2 infected person - washes hand with water for five seconds.

Group 3 infected person- washes hands with water and soap for five seconds.
- 3 Ask each group to stand in a line, one student behind another. The infected person should turn and shake hands with the next pupil, who shakes hands with pupils behind him etc. until the last person is reached.
- 4 Ask the three last students to shake hands to show their hands to the rest of the class.
- 5 Discuss the results.

Tip: in a small group pupils can repeat the activity using the three different methods and discuss the differences.

These activities are adapted from British Council's Emerging Infectious Diseases starter resource.

6 CREST DISCOVERY AWARDS ASSESSMENT CRITERIA

If you register your students for a CREST Discovery Award, you will be recognizing the skills that students will gain through participation in the day. To help with this, there is a CREST Discovery passport for each student to complete.

CREST Discovery passport

This is primarily intended as a self-reflection tool for students. Each student is assessed as an individual even when working within a team. Teachers should remind students at regular intervals to add comments to their own passports.

The passports should be collected at the end of the day and may be used to confirm (or not) if a student has met the assessment criteria. This should only be needed if teachers have any concerns about the performance of particular individuals.

It is not intended that teachers must review all CREST Discovery passports after the event.

Assessing your students

Teachers should observe students individually throughout the day and record any information which could be used to provide evidence of students meeting the following assessment criteria:

1 Self-management

Readiness to accept responsibility, flexibility, effective time management, motivation to improve own performance; confidence when tackling tasks

2 Team-working

Respecting others' work and views, working collaboratively, negotiating/persuading, contributing positively to discussions

3 Problem-solving

Analysing facts and circumstances in order to apply creative (imaginative) approaches in developing realistic, innovative and original solutions

4 Research

Acquiring new knowledge relevant to the task and applying it appropriately

5 Communication

Following written and verbal instructions (the brief), talking and listening to other team members, producing a structured presentation which relates to the original brief and which reflects the creativity applied by the group during the day

6 Reflective practice

The ability to recognise: what knowledge and skills have been gained, where they could have worked more effectively, where they achieved/exceeded expectations.

If the student has met the assessment criteria, they can receive a CREST Discovery Award.

7 PRINTABLE CARDS



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