Engage Teacher Conference

The Discovery effect: empower collaboration, communication and reflection

Explore Discovery CREST projects and find out how they can empower your students, plus learn about a new Discovery challenge coming soon!

Catherine Davies
Education Resources Manager,
British Science Association

Simon Watt
Public Engagement Manager,
University College London

Engage Teacher Conference

Engage

Welcome, please be aware:

- Talks are recorded
- There will be time for questions at the end
- You can send messages in the chat or raise your hand.

CREST AWARDS | DISCOVERY

Engage Teacher Network

The Discovery effect

Empower collaboration, communication and reflection

Catherine Davies
Education Resources Manager, British Science Association

Simon Watt
UCL Hawkes Institute Public Engagement Manager

UCL

Session outline

- What is a CREST Discovery project and how do they work?
- Discovery resources showcase
- How can my students get their CREST Award?
- Exclusive preview: an exciting new Discovery project, coming soon to the CREST Resource Library!
- Q&A

CREST AWARDS | DISCOVERY

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What is a CREST Discovery project?

- CREST Discovery projects are carried out across 5 hours and can be completed in a day, or over a number of sessions
- Typically completed by students aged 10-14, they work well at both upper primary and secondary level
- Discovery projects are centred around collaboration and communication, with students taking on different roles within a team to complete a group challenge

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Resources showcase: Machines of the Future

Students work in teams to explore Artificial Intelligence and its applications before coming up with their own idea for a household product that uses machine learning

- Research workshops
- Concept development
- Establish and outline data needed
- Detailed design
- Marketing plan
- Team presentation

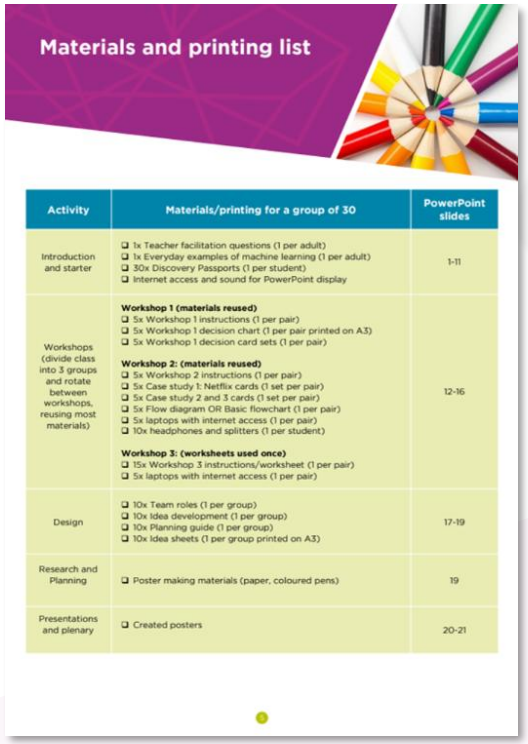
https://www.crestawards.org/resources/crest-discovery-machines-of-the-future/

crestawards.org

Resources showcase: Machines of the Future

The **Teacher pack** provides full planning, including equipment lists and timings for running the project in one day, or over a series of lessons

A step-by-step guide takes you through pre-project preparation and a full outline for the session(s), including suggested facilitation questions



Materials and printing list

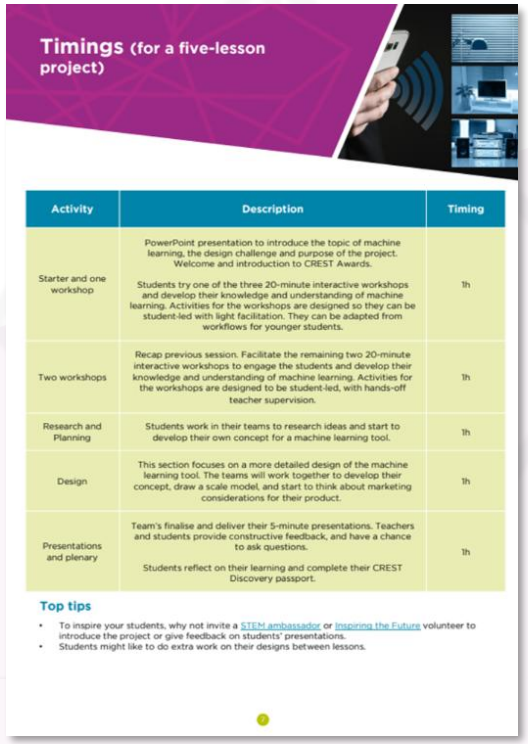
Activity	Materials/printing for a group of 30	PowerPoint slides
Introduction and starter	❑ 1x Teacher facilitation questions (1 per adult) ❑ 1x Everyday examples of machine learning (1 per adult) ❑ 30x Discovery Passports (1 per student) ❑ Internet access and sound for PowerPoint display	1-11
Workshops (divide class into 3 groups and rotate between workshops, reusing most materials)	**Workshop 1 (materials reused)** ❑ 5x Workshop 1 instructions (1 per pair) ❑ 5x Workshop 1 decision chart (1 per pair printed on A3) ❑ 5x Workshop 1 decision card sets (1 per pair) **Workshop 2: (materials reused)** ❑ 5x Workshop 2 instructions (1 per pair) ❑ 5x Case study 1: Netflix cards (1 set per pair) ❑ 5x Case study 2 and 3 cards (1 set per pair) ❑ 5x Flow diagram OR Basic flowchart (1 per pair) ❑ 5x laptops with internet access (1 per pair) ❑ 10x headphones and splitters (1 per student) **Workshop 3: (worksheets used once)** ❑ 15x Workshop 3 instructions/worksheet (1 per pair) ❑ 5x laptops with internet access (1 per pair)	12-16
Design	❑ 10x Team roles (1 per group) ❑ 10x Idea development (1 per group) ❑ 10x Planning guide (1 per group) ❑ 10x Idea sheets (1 per group printed on A3)	17-19
Research and Planning	❑ Poster making materials (paper, coloured pens)	19
Presentations and plenary	❑ Created posters	20-21

Timings (for a one-day project)

Activity	Description	Timing
Starter	PowerPoint presentation to introduce the topic of machine learning, the design challenge and purpose of the project. Welcome and introduction to CREST Awards.	40m
Workshops	A rotation of three 20-minute interactive workshops to engage the students and develop their knowledge and understanding of machine learning. Activities for the workshops are designed so they can be student-led with light facilitation. They can be adapted from workflows for younger students.	1h 10min
Break		
Research and Planning	Students work in their teams to research ideas and start to develop their own concept for a machine learning tool.	1h 10min
Lunch		
Design	This section focuses on a more detailed design of the machine learning tool. The teams will work together to develop their concept, draw a scale model, and start to think about marketing considerations for their product.	1h 20m
Presentations	Team's finalise and deliver their 5-minute presentations. Teachers and students provide constructive feedback, and have a chance to ask questions.	30m
Plenary	Students reflect on their learning and complete their CREST Discovery passport.	10m

Top tips

- To inspire your students, why not invite a STEM ambassador or Inspiring the Future volunteer to introduce the project or give feedback on students' presentations.
- When considering timings, start with the end of your school day and work backwards.
- Account for timings that cannot be changed, such as lunch breaks, and schedule around them.
- Try and plan the day to give your students as much time as possible for the practical activities.
- Before presentations, allow 5 minutes for students to clear their tables and tidy away any equipment.
- You may wish to adapt these timings, depending on the age and ability of your students.



Timings (for a five-lesson project)

Activity	Description	Timing
Starter and one workshop	PowerPoint presentation to introduce the topic of machine learning, the design challenge and purpose of the project. Welcome and introduction to CREST Awards. Students try one of the three 20-minute interactive workshops and develop their knowledge and understanding of machine learning. Activities for the workshops are designed so they can be student-led with light facilitation. They can be adapted from workflows for younger students.	1h
Two workshops	Recap previous session. Facilitate the remaining two 20-minute interactive workshops to engage the students and develop their knowledge and understanding of machine learning. Activities for the workshops are designed to be student-led, with hands-off teacher supervision.	1h
Research and Planning	Students work in their teams to research ideas and start to develop their own concept for a machine learning tool.	1h
Design	This section focuses on a more detailed design of the machine learning tool. The teams will work together to develop their concept, draw a scale model, and start to think about marketing considerations for their product.	1h
Presentations and plenary	Team's finalise and deliver their 5-minute presentations. Teachers and students provide constructive feedback, and have a chance to ask questions. Students reflect on their learning and complete their CREST Discovery passport.	1h

Top tips

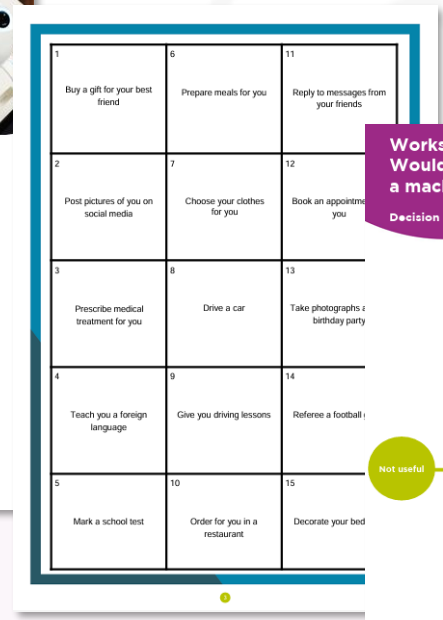
- To inspire your students, why not invite a STEM ambassador or Inspiring the Future volunteer to introduce the project or give feedback on students' presentations.
- Students might like to do extra work on their designs between lessons.

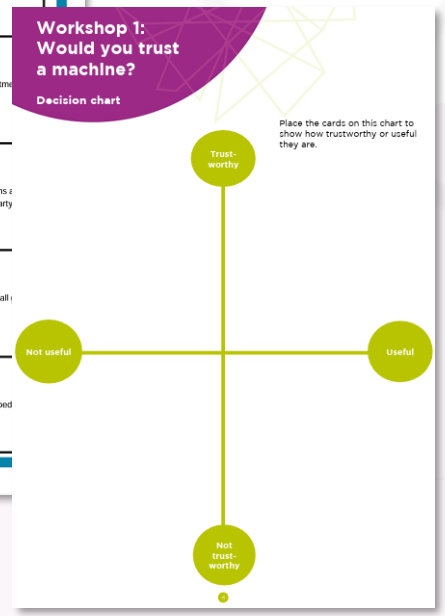
https://www.crestawards.org/resources/crest-discovery-machines-of-the-future/

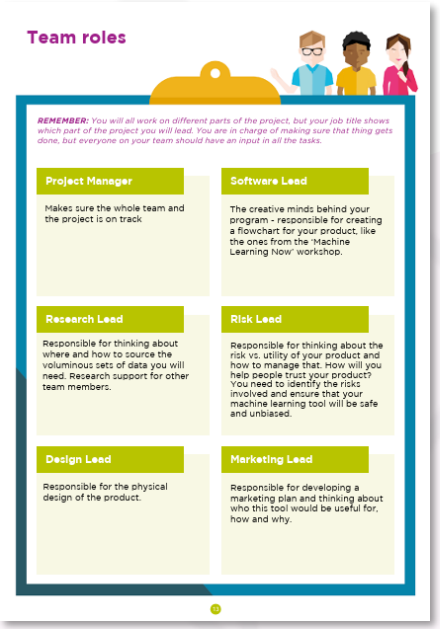
Resources showcase: Machines of the Future

The **Student pack** takes learners through the project, providing resources for each of the research workshops

The pack also includes a planning guide and an outline of the different team roles, to support students in running their project







https://www.crestawards.org/resources/crest-discovery-machines-of-the-future/

crestawards.org

Resources showcase: Machines of the Future

Classroom slides are also available, to support you with introducing and running the project with your students

These can be edited, allowing the content to be adapted to the needs of your learners if necessary

https://www.crestawards.org/resources/crest-discovery-machines-of-the-future/

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Resources showcase: Sustainable Solutions

Students work in teams to explore industrialisation and sustainability, before designing a sustainable start-up business concept linked to their community

- Teams consider the balance between economic and social needs, whilst also protecting the environment and natural resources
- Research sustainable businesses
- Develop a concept for a sustainable product or service
- Team presentation

https://www.crestawards.org/resources/crest-discovery-sustainable-solutions-teacher-pack/

Resources showcase: Wild Creations

Students work in teams to design and build a 'wild creation' (an outdoor or indoor sculpture) that reflects or celebrates an aspect of their culture

- Consider case study examples of wild creations
- Teams develop their own concept and design, before creating a scale model and estimated costs
- Team presentation

https://www.crestawards.org/resources/crest-discovery-wild-creations-teacher-guide/

crestawards.org

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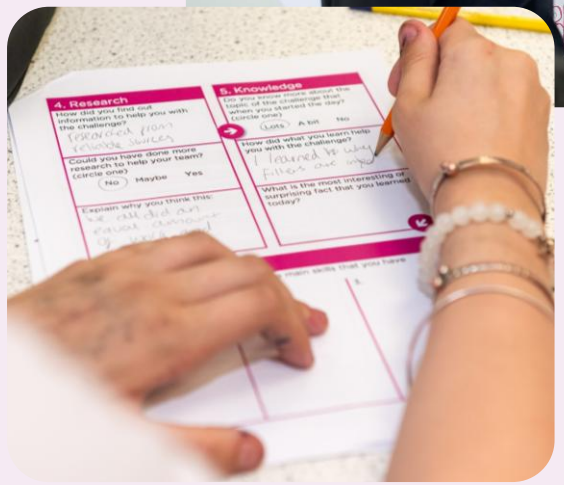


How can my students get their CREST Award?

- At the end of the project, teams plan and deliver a short presentation to showcase their work
- Students then complete a CREST Discovery Passport. This prompts them to reflect on their learning and think about the skills they have developed within their team
- Discovery projects are teacher-assessed, based on participation and engagement throughout the session(s)

https://www.crestawards.org/resources/crest-discovery-passport/

CREST AWARDS | DISCOVERY

Engage Teacher Network

How can my students get their CREST Award?

Plan

Discover free activities in our Resource Library and choose a challenge to enjoy with your pupils!

You're also welcome to use your own activity. Don't forget to pre-order your Discovery certificates so they're ready in time for your event!

Browse our Resource Library

1

Challenge

Pupils complete either a single project or a series of connected challenges, all rooted in real-world STEM contexts.

Working in self-managed teams, pupils collaborate on their chosen challenge(s), documenting and reflecting on their progress using a CREST Discovery passport. They share their findings through a group presentation, showcasing both their learning and teamwork.

Download Discovery passport

2

Apply

Create a free account on CREST application platform to order your certificates.

Complete the application, pay for the Discovery certificates and they will be delivered to your delivery address.

Apply now

3

Achieve!

Celebrate the incredible achievement of the pupils as they earn their Discovery CREST Awards!

Share your experience with us or tag us in your posts. Let's spread the joy and inspire others with the children's success!

Share your experience

4

https://www.crestawards.org/secondary-further-education/discovery/

Exclusive preview! New Discovery resources coming soon...

- An exciting new Discovery project, developed in partnership with UCL
- Connecting students with real academic research around the transmission of airborne viruses
- The project prompts students to explore ways to reduce the spread of infections in school, boosting health and attendance!
- Launching later this year

CREST AWARDS | DISCOVERY

Engage Teacher Network

The Air Safety Programme: working with CREST

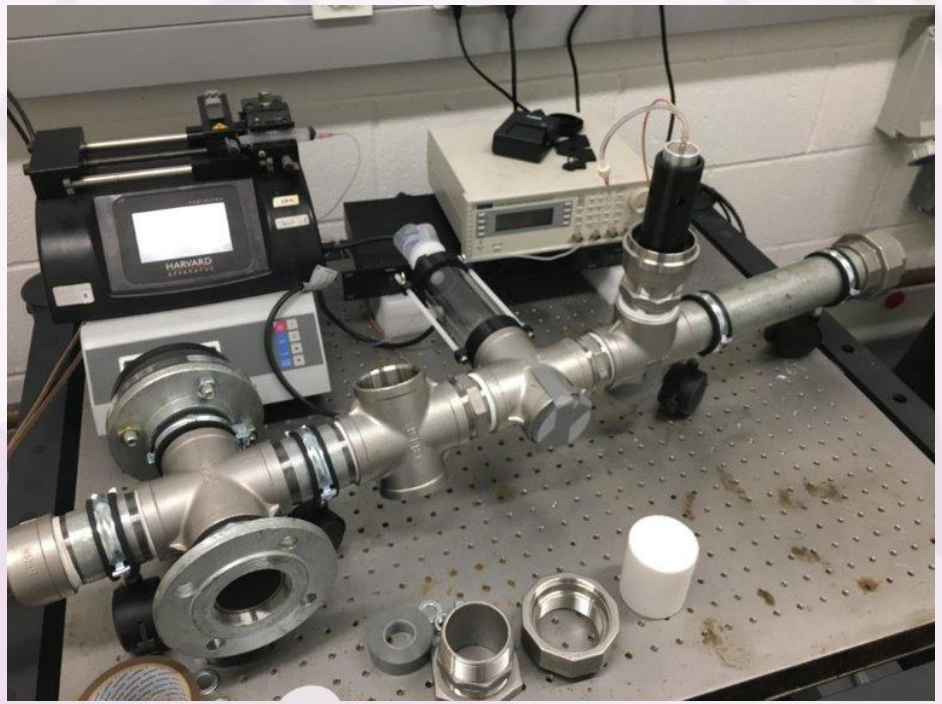
Simon Watt
UCL Hawkes Institute Public Engagement Manager

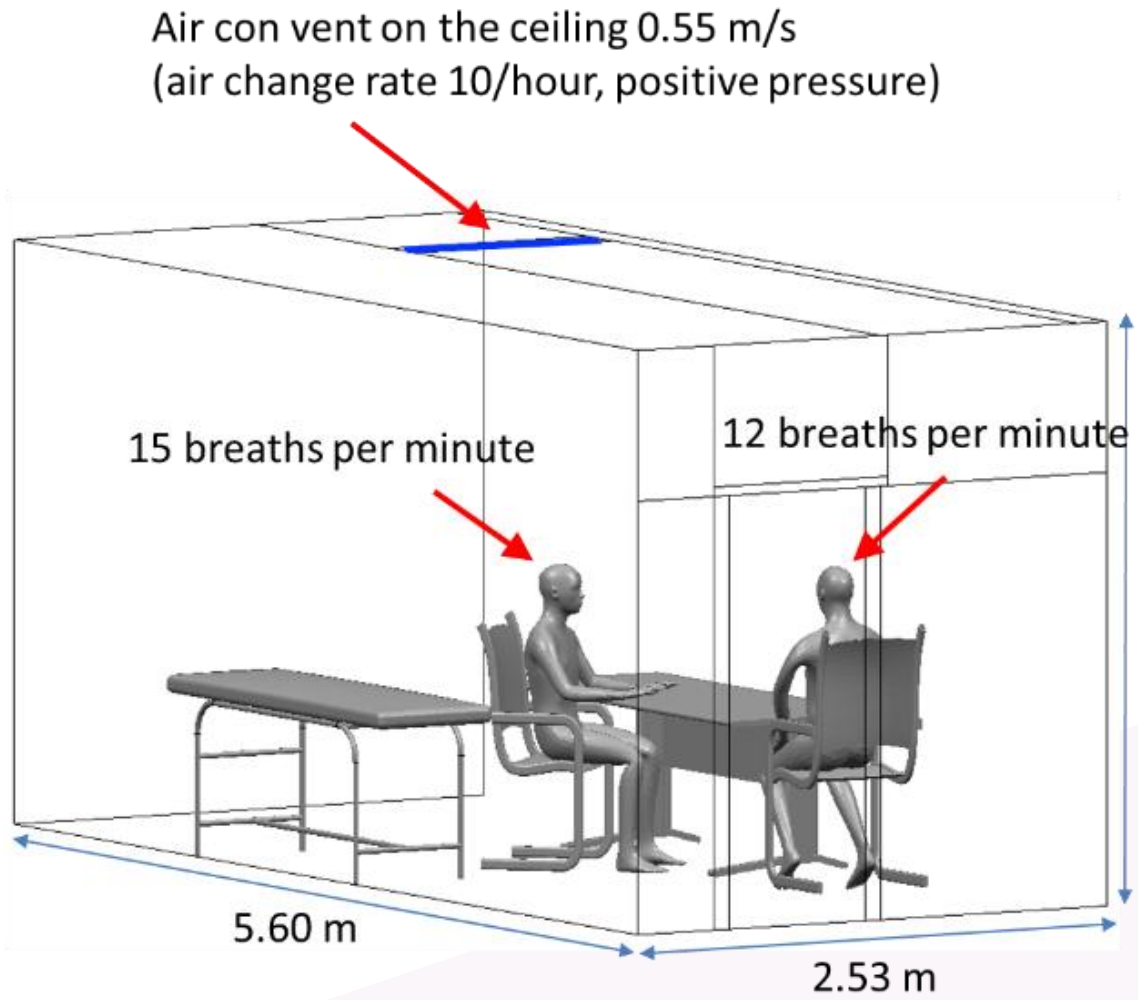
UCL

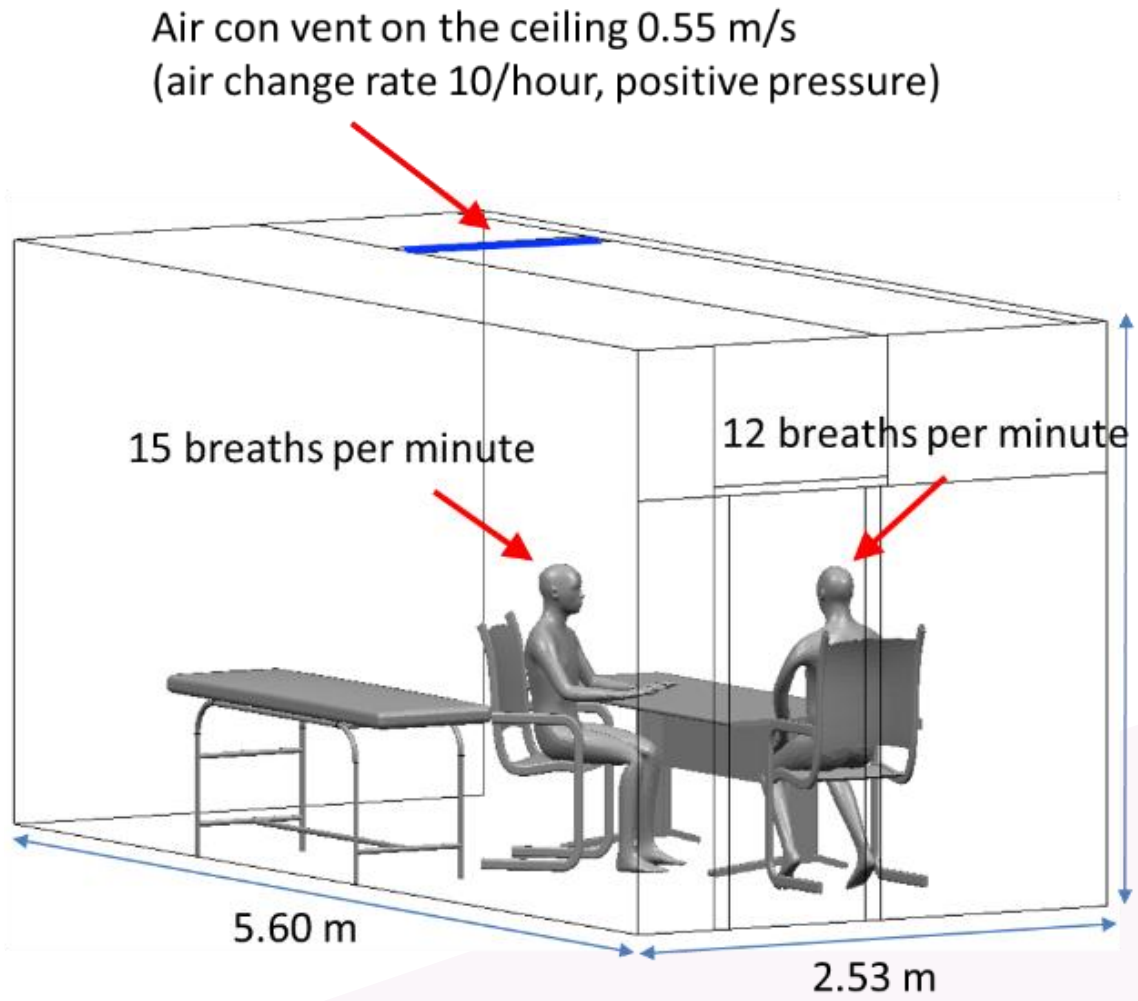

124 - 143 objects - Velocity magnitude (0-5 px/frame)
5
4.5
4
3.5
3
2.5
2
1.5
1
Velocity (pix/frame)
TracTrac v2.xx

Sonny the breathing robot

Virtual Human Exhalation Replicator (VALUATOR)




Air con vent on the ceiling 0.55 m/s
(air change rate 10/hour, positive pressure)
15 breaths per minute
12 breaths per minute
5.60 m
2.53 m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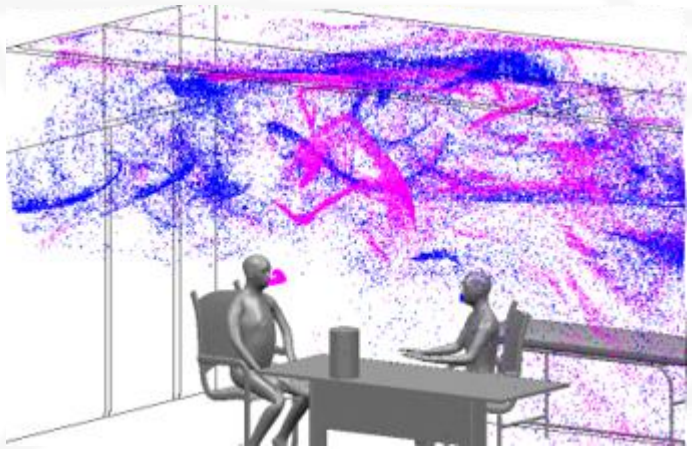
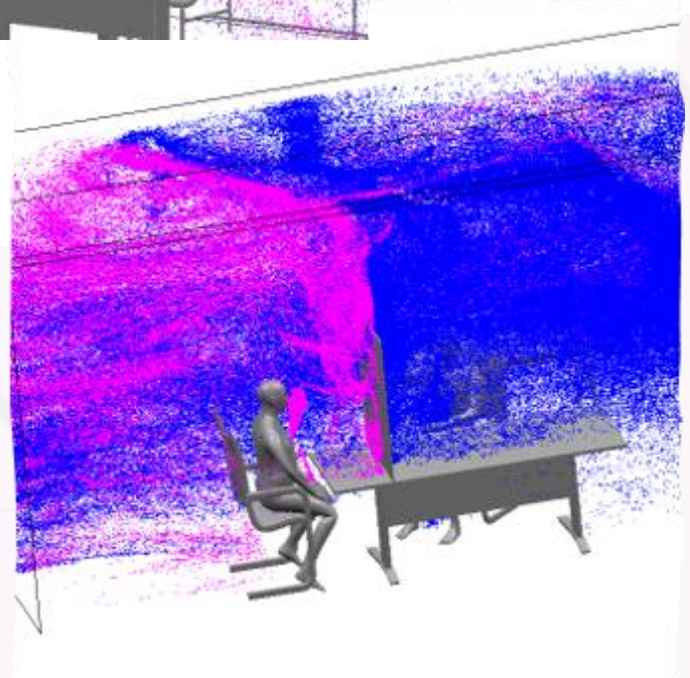




AISaT – Home

aisat.ucl.ac.uk

AISaT v2.0

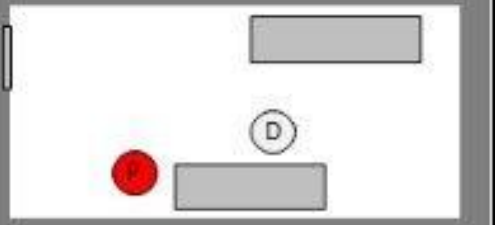
Input information

Room size

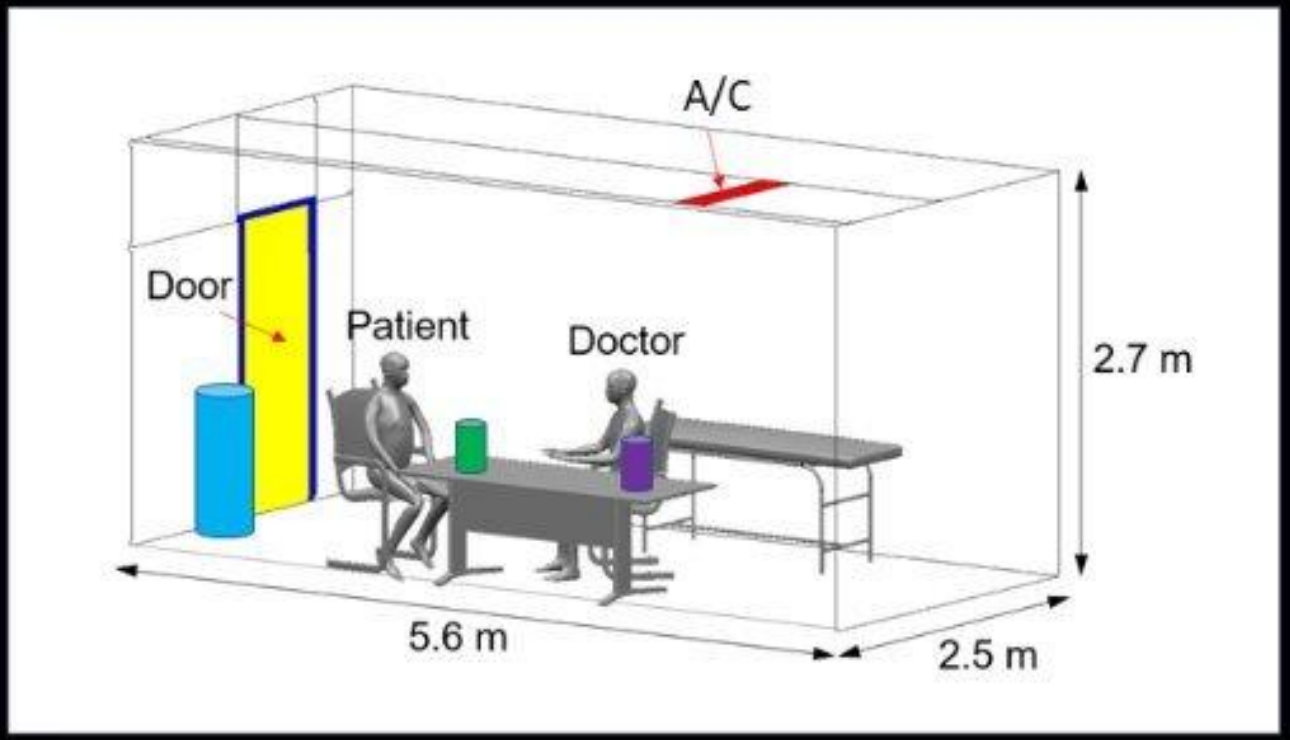
5.6 × 2.5 × 2.7

Clinician/Patient	1	1
Door	1	
Window	0	
Large furniture	2	
AC outlet/ACH	1	3

Drag items to position, double click to turn a human infectious (shown in red)

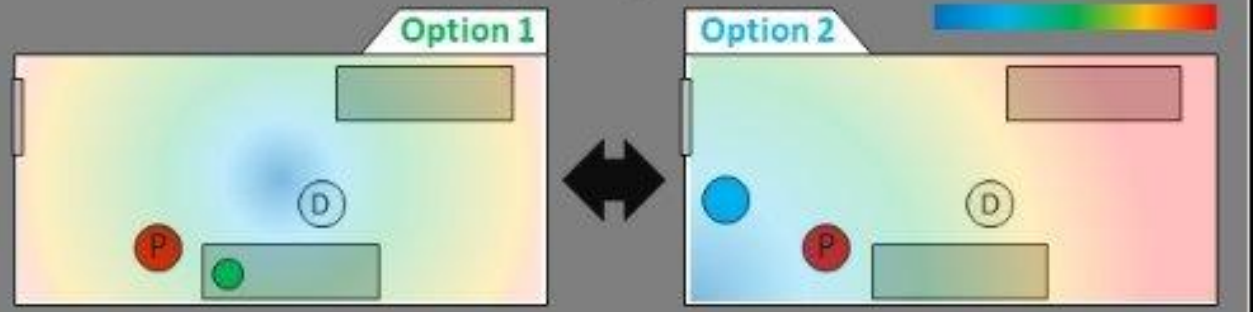


Run Analysis



Aerosol concentration map comparisons

Low High

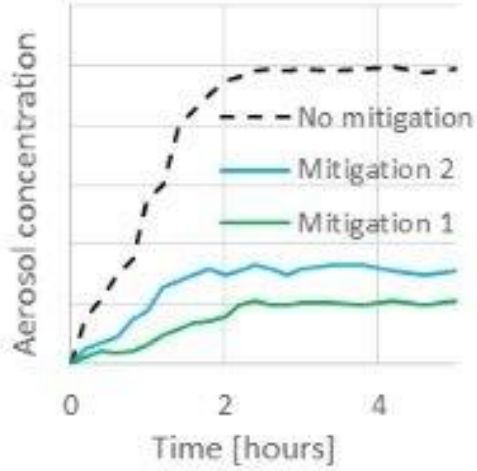


Output summary

Recommendations and reductions

1	Small unit between doctor and patient	80%
2	Large unit by entrance	75%
3	Small unit by doctor	60%
4	Open window	40%

Aerosol build-up predictions



The Team

NHS East and North Hertfordshire NHS Trust

NHS University College London Hospitals NHS Foundation Trust

Professor Laurence Lovat
Professor of Gastroenterology & Biophotonics,
Clinical Director WEISS Centre, UCL

Dr Ruth Epstein
Consultant Clinical Voice Specialist Head of Speech & Language Therapy, Royal National ENT & Eastman Dental Hospitals, UCL Hospitals NHS Foundation Trust

Dr Catherine Houlihan
Consultant Virologist UCLH & Clinical Lecturer, Hospital for Tropical Diseases, UCL

Dr Danielle Morris
Consultant Gastroenterologist
The Lister Hospital
East & North Hertfordshire NHS Trust
Stevenage

Clinical

Professor Manish Tiwari
Professor of Nanonengineering
WEISS Centre & Department of Mechanical Engineering, UCL

Eur Ing Jerry Slann
Authorising Engineer
Institute of Occupational Medicine

Dr Andrea Ducci
Associate Professor
Mixing and Experimental Fluid Mechanics
Dept Mechanical Engineering, UCL

Professor Ryo Torii
Application of Integrated Computational Biomechanics and in vivo imaging
Department of Mechanical Engineering, UCL

Engineering

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NIHR | National Institute for Health and Care Research

UCL

The Team

NHS
University College London Hospitals
NHS Foundation Trust

Health Economics

Professor Rachael Hunter
Professor of Health Economics at Head, Health Economics Analysis and Research methods Team (HEART), UCL

Microbiology

Dr Lena Ciric
Environmental microbiologist
Dept Civil, Environmental and Geomatic Engineering, UCL

Dr Hakim-Moulay Dehbi
Head of Statistics
Comprehensive Clinical Trials Unit UCL

Professor Fiona Stevenson
Professor of Medical Sociology, UCL

Implementation Science

NHS
East and North Hertfordshire
NHS Trust

Dr Zarnie Khadjesari
Associate Professor in Health Sciences
University of East Anglia

Professor Cecilia Vindrola-Padros
Medical Anthropologist
Director of the Rapid Research, Evaluation and Appraisal Lab (RREAL), UCL

Simon Watt
Public Engagement Manager
WEISS Centre, UCL

Mrs Elizabeth Lloyd-Dehler
Lay Member

PPIE

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THE TIMES

Thursday March 19 2020 | thetimes.co.uk | No 7301

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Reasons to be cheerful

Deborah Ross

Exams cancelled after virus forces schools to shut down

● First nationwide closure in history ● Emergency grades to replace tests ● Deaths across Britain exceed 100

Francis Elliott Political Editor
Rosemary Bennett Education Editor

Boris Johnson ordered the first nationwide shutdown of schools in British history yesterday to try to slow the spread of the coronavirus.

Exams were cancelled in schools and nurseries prepared to shut their gates indefinitely from tomorrow with only the children of key workers and vulnerable pupils able to attend basic facilities.

Pupils were left in limbo as Mr Johnson took the unprecedented step and indicated that grades would be awarded through an alternative system, but failed to set out details.

Gavin Williamson, the education secretary, said schools would close "until further notice" because keeping them open was no longer in the best interests of children and teachers. He acknowledged an "increasingly challenging" situation as staff shortages and falling attendance followed official advice to minimise contact with others.

Mr Johnson said that NHS and care staff, police and delivery drivers were among key workers whose children would be offered places at "skeleton schools". It was not clear last night who else would be included but a full list is due to be published today.

In other developments:

● Online supermarket services crashed or were withdrawn as panic-buying continued to grip Britain.

● 20,000 troops were put on standby to support hospitals and "tackle" roles in police forces, the prison service and the border force.

● The Duke of Cambridge backed fundraising for those in hardship.

● The government announced a three-month ban on evictions.

● The pound fell to its lowest level against the dollar since 1985 and stocks dropped again despite bailout pledges.

● Hospitals began testing their own staff for coronavirus to bring down absence rates after the government said an expansion to 25,000 daily checks would focus on patients.

● The chief scientific adviser hailed a test labelled a game-changer because it shows if patients have had the disease.

Mr Johnson had played down the option of shutting schools because Sir Patrick Vallance, the chief scientific adviser, said it offered little marginal benefit relative to disruption. Sir Patrick said last week that schools

Workers arrive to clean Parkside Community Primary in Bonhamwood, Hertfordshire. Schools will shut from tomorrow

outbreak as the number of fatalities in Britain leapt to 104, up 52 in a day. The number of cases was 2,626, up 606.

It was unclear last night who was defined as a key worker and could send their children to school. However, government sources stressed the definition

The full list will be contained in emergency laws to be introduced today.

Schools, pupils, parents and experts called for urgent clarity on how A-levels and GCSEs would be graded without exams. Mr Williamson said there would be a "means of redress" for pupils

further. He also said it was important that both children and adults still take exercise while in social isolation.

Even during the Blitz, schools in some areas carried on teaching. Alan Smithers, professor of education at the University of Buckingham, said: "Schools

London set for isolation as disease takes hold

Steven Swinford Deputy Political Editor
Eleni Courea Political Reporter

London could be put into lockdown by the weekend under government plans to curb Covid-19 infections.

Boris Johnson will chair a meeting of the Cobra emergency committee today to decide on the plans as concern grows that some Londoners are ignoring experts' advice.

The coronavirus is spreading faster in the capital than any other part of the country. According to Public Health England, 953 cases have been recorded in London, accounting for more than a third of cases in Britain.

The Cabinet Office has asked government departments to draw up plans that would force cafés, pubs and restaurants to close and reduce Underground, rail and bus services. Such measures would create "compliance" under a "shielding plan for London".

The prime minister said yesterday that people needed to be "ruthless" in following the government's advice, adding that he would "not hesitate to bring forward further and faster measures".

Last week travel by Tube had declined by only 10 per cent and bus travel by 30 per cent against the same period last year. The number of people using public transport has fallen significantly more than, however, and Tube travel is understood to have dropped by 50 per cent.

There have been anecdotal reports of pubs and cafés still full. Wetherspoon, Britain's biggest pub chain, has said that its pubs will stay open and impose social distancing measures.

The government has told people not to go to restaurants, pubs and cafés but has stopped short of ordering the businesses to close. That approach is likely to change, and ministers have also drawn up plans to reduce travel up-

The government has told people not to go to restaurants, pubs and cafés but has stopped short of ordering the businesses to close. That approach is likely to change, and ministers have also drawn up plans to reduce travel up-

The Guardian

Now it's the schools: PM scraps exams and shuts down classes

● Johnson forced to act after virus spreads faster than anticipated

● London could face lockdown as UK death toll increases to 104

Richard Adams
Heather Stewart

Schools across the UK are to close indefinitely from tomorrow, with A-levels and GCSE exams cancelled, as the government made another sudden escalation in its efforts to curb the increasing spread of coronavirus.

Boris Johnson said he had been forced to close classrooms for pupils in England – the first countrywide school shutdown in modern times – as the virus spread faster than anticipated, forcing teachers and pupils to self-isolate.

The decision came hours after Scotland and Wales announced their own blanket school closures and thousands of schools in England decided unilaterally to close as turn-away pupils and staff shortages and parents' concerns. Soon after the prime minister's announcement, Northern Ireland also announced the closure of all schools.

But schools will remain open for the supervision of potentially hundreds

▲ Trafalgar Square in London at 4.30pm yesterday as social distancing took effect

Inside

of thousands of children of NHS staff and other frontline workers, as well as vulnerable children, Johnson said. He also announced a national voucher scheme to ensure pupils eligible for free school meals get a meal each day and said this summer's exams would be replaced by teacher assessment.

On a day of rapid policy shifts as the UK death toll from the virus reached 104, it also emerged that London faces a potential lockdown similar to those in other European cities, with the prime minister warning the country to be prepared to take "further and faster measures". Stringent action to enforce social distancing is not expected within the next two days. The Ministry of Defence is to double the size of the military's

Sterling sinks to 35-year low against the dollar

Larry Elliott
Rob Davies
Richard Partington

The Treasury and the Bank of England have promised fresh measures to limit the impact of the Covid-19 outbreak on the economy after currency traders delivered a brutal verdict on the global response to the crisis so far.

Sterling tumbled to its weakest against the US dollar in more than three decades as a flight of speculative money into the safe haven of the dollar saw sterling crash through $1.10 against the US currency.

Andrew Bailey, the governor of the Bank of England, warned Britain faced an economic emergency caused by Covid-19 and further measures would be needed to prevent widespread disruption turning into destruction.

On another day of frenzy on the global financial markets, shares on Wall Street were down by 10% as news that Ford and General Motors were halting production until at least the end of the month. The pound ended trading in London at $1.1705, a level not seen since 1985, other than during the quickly reversed "flash crash" in 2016. Rishi Sunak, the chancellor, said he was alive to the urgency of finding new ways to support jobs and incomes amid criticism from MPs on the Treasury select committee that not nearly enough had been done today with the expected sharp rise in unemployment and squeeze on living standards.

Global equity markets suffered further hefty losses as:

● The International Labour Organisation said the initial impact of Covid-19 would be to add almost 25 million to global debt queues.

● Steve Mnuchin, the US treasury secretary, was forced to deny telling the Senate that American unemployment could rise from under 4% to over

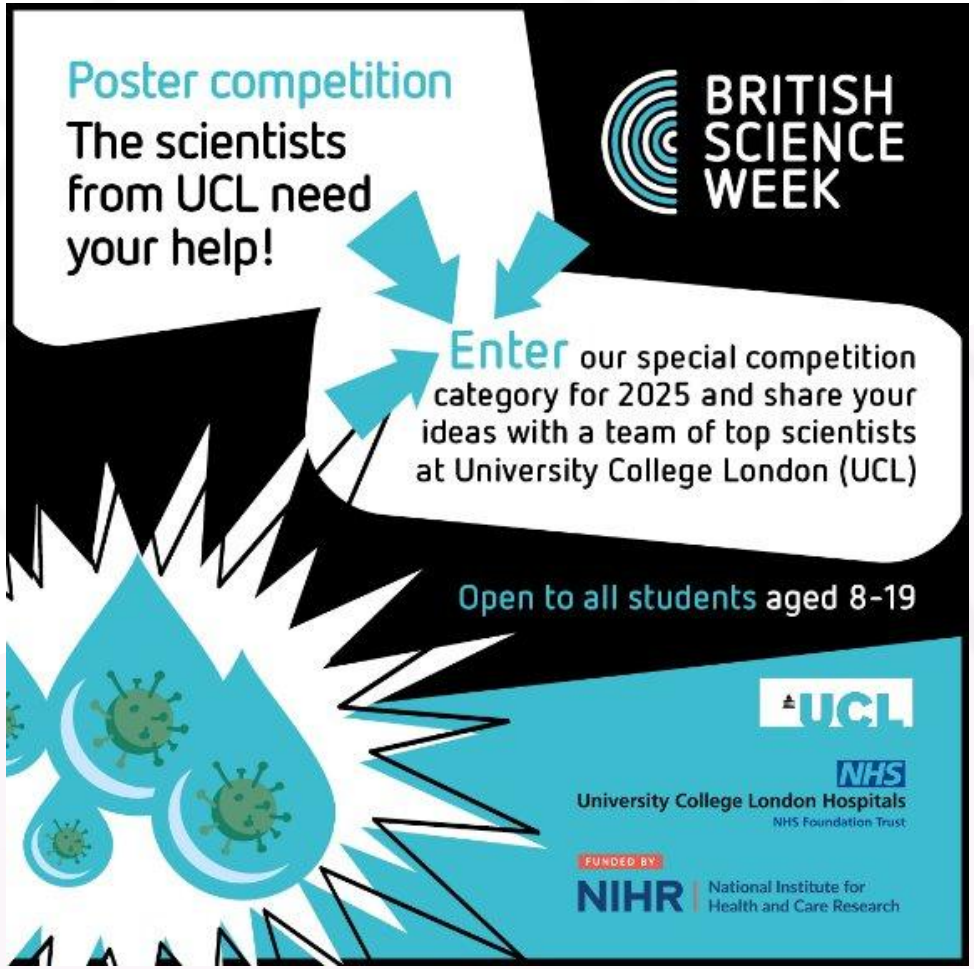
● Oil prices fell 8%, with the cost of Brent crude at its lowest since the aftermath of the Iraq invasion in 2003.

● The Dow Jones industrial average, a key gauge of share prices in the US – fell below its level on the day Donald Trump's inauguration in January 2017 and has now dropped 10,000 points in a month.

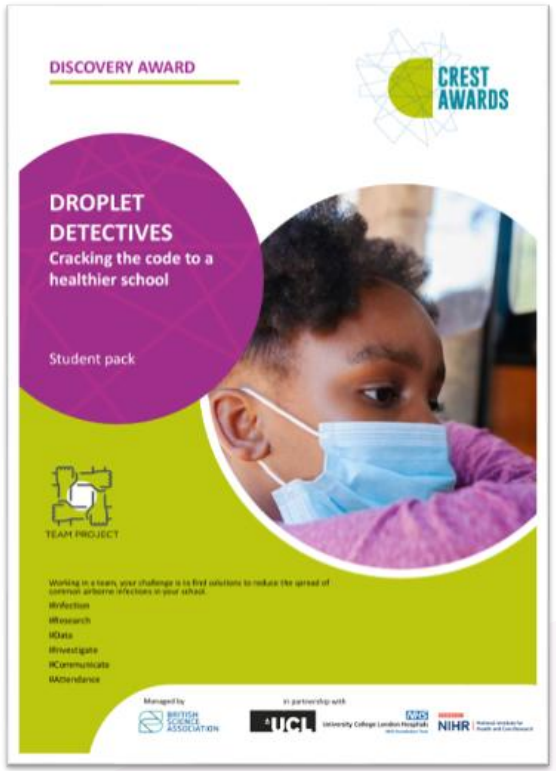
Schools engagement: British Science Week poster competition

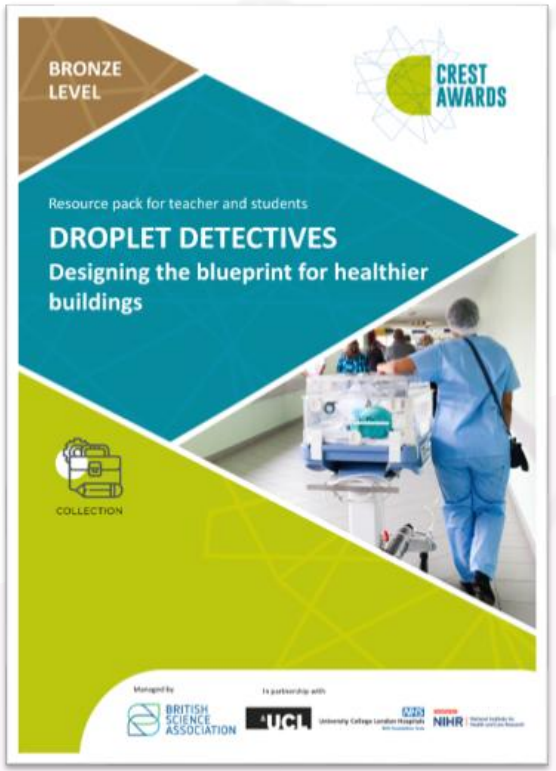
- 751 entries in total
- Junior (age 8-11) – 105
- Senior 1 (11-14) – 565
- Senior 2 (14-16) – 58*
- Senior 3 (16-19) – 23*
- 43 of the entries across all categories were from parent/home entries

https://www.britishscienceweek.org/



Schools engagement: CREST resources





Coming soon to the CREST Resource Library!

CREST AWARDS | DISCOVERY

Engage Teacher Network

Droplet Detectives: cracking the code to a healthier school

- Droplet Detectives introduces students to this exciting piece of live research
- Through a series of workshops, they have the opportunity to explore and apply the themes to their own school setting
- They are challenged to then think about how their learning could be used to improve school attendance , creating a presentation to convince their headteacher of their suggested approach!

Coming soon to the CREST Resource Library!

crestawards.org

CREST AWARDS | DISCOVERY

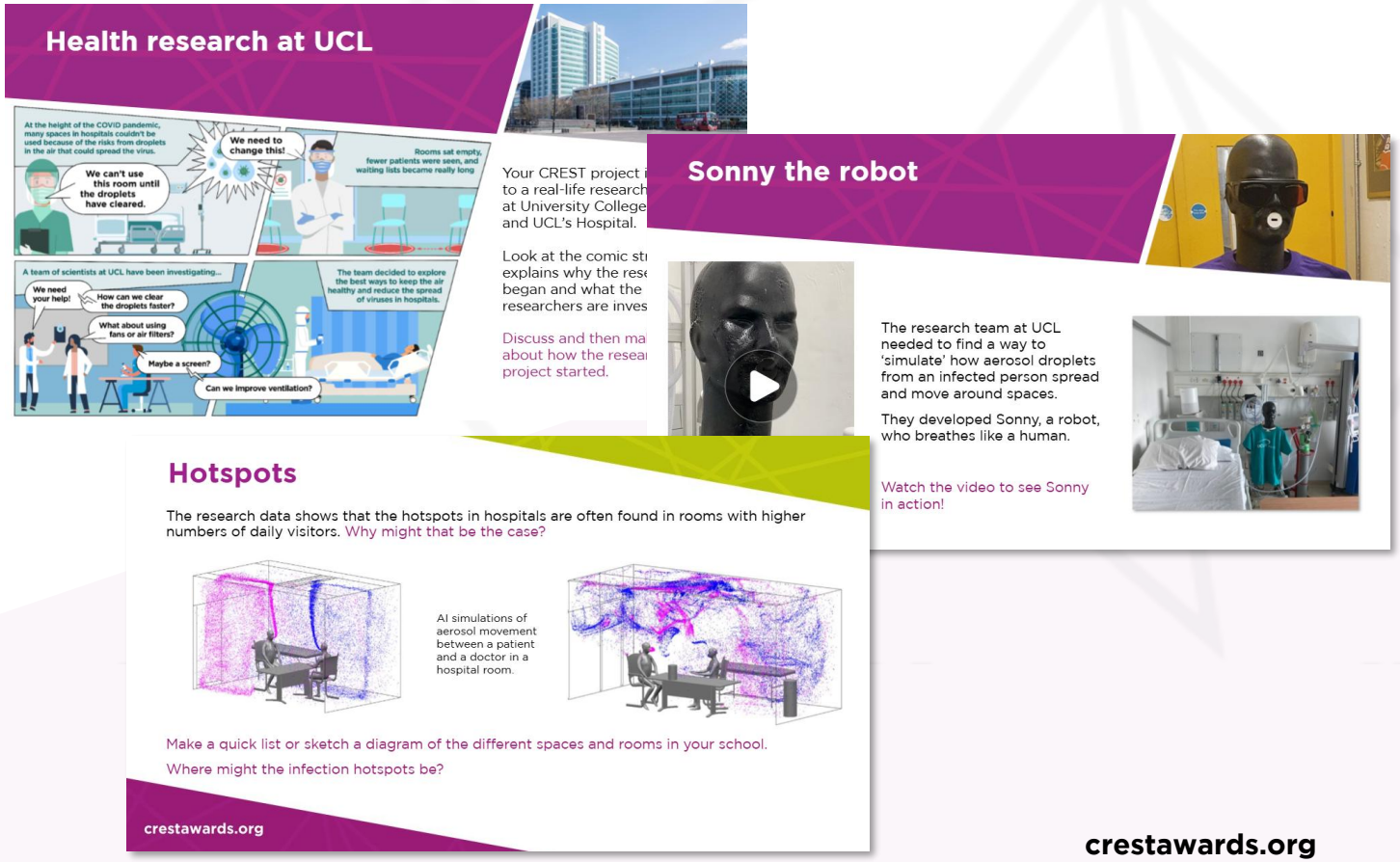
Engage Teacher Network

Droplet Detectives: cracking the code to a healthier school

Engaging supporting slides introduce students to the themes and science behind the research

Alongside this teams:

- consider school attendance trends
- carry out an investigation into filtration and the effectiveness of different filter materials
- explore the challenges of air filter implementation and health messaging



Coming soon to the CREST Resource Library!

CREST AWARDS | DISCOVERY

Engage Teacher Network

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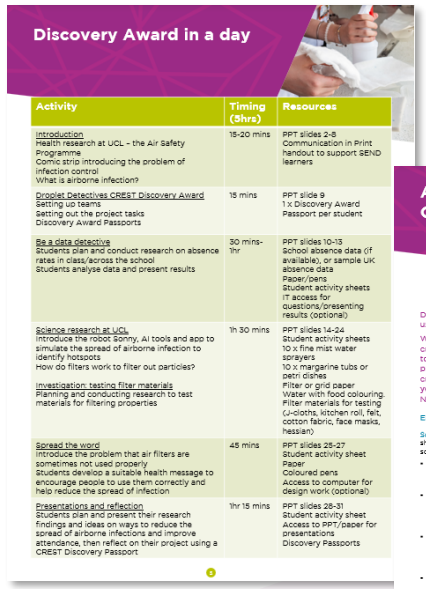
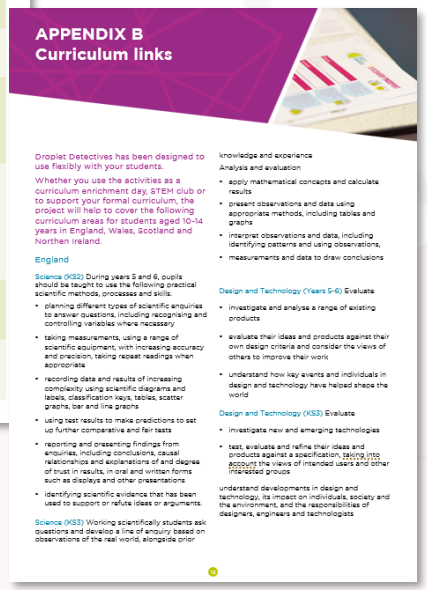
Teacher pack includes full planning for the project, including suggested timings and curriculum links

Student pack includes flexible supporting resources to guide teams through the workshops


Discovery Award in a day

Activity	Timing (3hrs)	Resources
Introduction Health research at UCL – the Air Safety Programme Comic strip introducing the problem of infection control What is airborne infection?	15-20 mins	PPT slides 2-8 Communication in Print handout to support SEND learners
Droplet Detectives CREST Discovery Award Setting up teams Setting out the project tasks Discovery Award Passports	15 mins	PPT slide 9 1 x Discovery Award Passport per student
Be a data detective Students plan and conduct research on absence rates in class/across the school Students analyse data and present results	30 mins-1hr	PPT slides 10-13 School absence data (if available), or sample UK absence data Paper/pens Student activity sheets IT access for questions/presenting results (optional)
Science research at UCL Introduce the robot Sonny, AI tools and app to simulate the spread of airborne infection to identify hotspots How do filters work to filter out particles? Investigation: testing filter materials Planning and conducting research to test materials for filtering properties	1h 30 mins	PPT slides 14-24 Student activity sheets 10 x fine mist water sprayers 10 x margarine tubs or petri dishes Filter or grid paper Water with food colouring Filter materials for testing (J-cloths, kitchen roll, felt, cotton fabric, face masks, hessian)
Spread the word Introduce the problem that air filters are sometimes not used properly Students develop a suitable health message to encourage people to use them correctly and help reduce the spread of infection	45 mins	PPT slides 25-27 Student activity sheet Paper Coloured pens Access to computer for design work (optional)
Presentations and reflection Students plan and present their research findings and ideas on ways to reduce the spread of airborne infections and improve attendance, then reflect on their project using a CREST Discovery Passport	1hr 15 mins	PPT slides 28-31 Student activity sheet Access to PPT/paper for presentations Discovery Passports


APPENDIX B
Curriculum links

Droplet Detectives has been designed to use flexibly with your students.

Whether you use the activities as a curriculum enrichment day, STEM club or to support your formal curriculum, the project will help to cover the following curriculum areas for students aged 10-14 years in England, Wales, Scotland and Northen Ireland.

England

Science (KS2) During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills.

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
- identifying scientific evidence that has been used to support or refute ideas or arguments.

Science (KS3) Working scientifically students ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience

Analysis and evaluation

- apply mathematical concepts and calculate results
- present observations and data using appropriate methods, including tables and graphs
- interpret observations and data, including identifying patterns and using observations,
- measurements and data to draw conclusions

Design and Technology (Years 5-6) Evaluate

- investigate and analyse a range of existing products
- evaluate their ideas and products against their own design criteria and consider the views of others to improve their work
- understand how key events and individuals in design and technology have helped shape the world

Design and Technology (KS3) Evaluate

- investigate new and emerging technologies
- test, evaluate and refine their ideas and products against a specification, taking into account the views of intended users and other interested groups

understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists


Be a data detective - school absence

Name(s)

Use these questions or develop your own to investigate absence levels caused by common airborne infections in your school. Record your answers below.

How many students are there at our school?

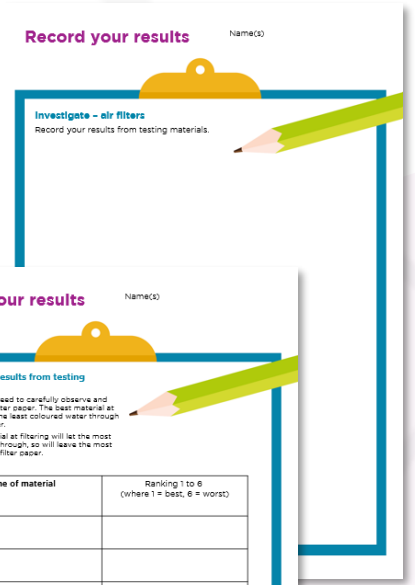
How many students were off school because of illness last week?

Which common infections cause children and young people to take time off?

Are absence rates higher in some classes than others?

Are absence rates higher at some times of the year than others?

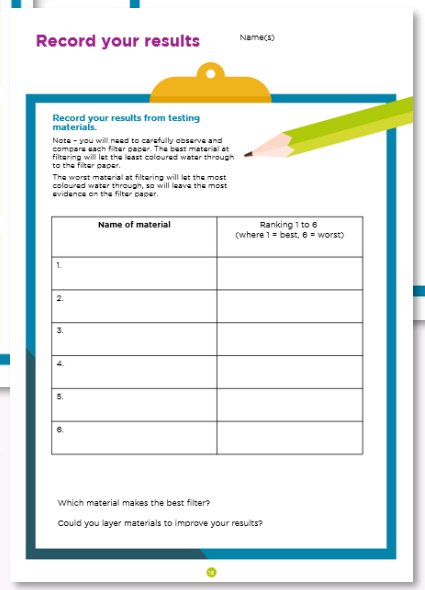
What happens in school already to control the spread of infections?


Record your results

Name(s)

Investigate – air filters

Record your results from testing materials.


Record your results

Name(s)

Record your results from testing materials.

Note – you will need to carefully observe and compare each filter paper. The best material at filtering will let the least coloured water through to the filter paper.

The worst material at filtering will let the most coloured water through, so will leave the most evidence on the filter paper.

Name of material	Ranking 1 to 6 (where 1 = best, 6 = worst)
1.	
2.	
3.	
4.	
5.	
6.	

Which material makes the best filter?

Could you layer materials to improve your results?

Coming soon to the CREST Resource Library!

crestawards.org

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- The new resources have been developed with input from educators in our Engage Teacher Network, and their students
- Look out for opportunities to be involved in future CREST resource development, from focus group participation, to in-school testing sessions!

https://www.crestawards.org/engage/

CREST AWARDS | DISCOVERY

Engage Teacher Network

Thank you for joining us!

Any questions?

Engage Teacher Conference

Thank you

Complete the **5-minute feedback form** for the chance to win one of ten **£10 Amazon vouchers**!
https://www.tfaforms.com/5181926

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crest@britishscienceassociation.org