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# Case study:
# Staffordshire University in association with Big Bang

## Client: Staffordshire University - 16-17 June 2020

## The Challenge

In March 2020, the country faced a national 'lockdown' due to the outbreak of COVID-19, resulting in the closure of workplaces, schools and the shutdown of large events and gatherings. As a result, it was no longer possible to go ahead with the Big Bang @ Staffordshire University (formerly the Big Bang Fair West Midlands) as planned on the 16th June 2020. With physical events no longer an option, the only way to engage students was digitally.

**Our challenge:** How can we transform the key features of a Big Bang event into a digital form whilst maintaining an engaging and local feel during a period of uncertainty?

## Our Solution

The 2-day 'Explore Staffordshire University in association with Big Bang' event was designed to meet the aims of the original event: exhibiting a wide range of STEM-based companies, industries and educational institutions, and providing exciting STEM-based activities online.

**Discover sessions:** These sessions replaced what would have been shows and workshops as part of the event. The majority of the discover sessions were hosted live to give students the opportunity to engage in discussions with the hosts. Many of the live sessions also built on pre-recorded content to tie the event together.

**STEM challenges:** These activities replaced what would normally be the exhibition. Each of the 4 sections of the event contained 5-6 'challenges' to reflect the choice students would normally have at a physical event of stands to visit and activities to take part in. The mixture of activities utilised materials and resources that students might have access to at home or in school. This was a particularly important part of the day as it enabled students to step away from their devices to do something hands-on.

**Meet the Future You challenge:** This activity was designed as a careers related learning activity that students could do at any point throughout the event, in the form of a STEM based careers quiz. It enabled the event to showcase the breadth of STEM career options – a key message within the Big Bang programme – as well as allow students to identify their own skills, attributes and values and consider how these might fit into the world of STEM.

**Explore at Home competition:** This replaced what would have been the regional Big Bang Competition final. Keeping the competition element central ensured that the event had longer-term impact, both during the build up to the event when students were working on their projects and after the event when they could consider where to take their project next.

Our digital solution also took into account the reality of home-schooling and how each child's experience and access may be different. To ensure there was a way all students could engage, it was important to us that:

- The event was split across two days
- The duration was two two-hour time slots on each day, so student did not need access to a computer or device all day
- It contained a mixture of pre-recorded and live sessions
- There was access to downloadable handouts of activities
- The event could be accessed on mobile devices

## The Event Day

The event saw 1481 students from over 27 schools join the live event page across the two days. Parent and teacher guides were sent out ahead of the event, but on arrival attendees were also guided to the different event areas through an infographic menu. Throughout the event, this was updated to reflect changes, e.g. 'vote on the competition' changed to 'view the announcement' once voting had closed.


Students could choose to engage in the variety of different activities and content, provided by:

- Staffordshire University
- The Operational Research Society
- Air Aware Staffordshire
- PSDA
- Keele University
- The Royal Air Force
- SAS-ARG (Shropshire and Staffordshire Amphibian and Reptile Group)
- Tomorrow's Engineers
- Learn by Design

## Timetable

# 16 JUNE - KS2 MORNING SESSION

Staffordshire University in association with Big Bang

The Big Bang Near Me | LEARN by design

### STEM Challenges

**10.00 The STEM Challenges begin**

**Garden Volcano**
Be ready for exploding fun with this quick chemistry challenge. Have your materials ready and be prepared to make a bit of mess! Will you be able to work out what's happening?

**What you need**
Washing up liquid - Cold water
White vinegar - Bicarbonate of Soda
Empty 2 litre bottle - Measuring jug
Food colouring

**Lego Furniture Factory**
Are you up for a challenge? You are in charge of your own furniture factory: you can make small tables and chairs out of Lego. Work out the maximum pieces of furniture you can make for the minimum amount of money, and learn how to optimise the process using maths, science and operational research (OR). Will you be able to make the best use of your materials to maximise your profit?

**What you need**
6 rectangular Lego bricks (we use ones with 2x4 dots on)
8 square Lego bricks (we'll be using ones with 2x2 dots)
A pen or pencil
Paper and Handout

**Chromatography butterflies and bow ties**
See the colours of your pens transformed into butterflies or bow ties that you can use to decorate your home.

**What you need**
Pipe cleaner - Coffee filter paper
Non-permanent felt tip pens
Water - Small pot

**Home for Monty**
Monty has lost his home! Put your creativity to the test by making him a new home from recycled materials. Watch the video to hear what Monty needs to survive.

**What you need**
Recycled plastic and cardboard from around the house

**Shadow Theatre**
Use materials from around the home to engineer your very own shadow puppet theatre.

**What you need**
Cardboard - Tissue Paper - Lollipop sticks or straws - Masking tape - Lamp or torch

**11.15 STEM Challenge Explanation Videos**

**Discover why things reacted the way they did in your STEM Challenges.**

### Discover Sessions

**10.15 - 10.45 - LIVE session**
**Forensics Live**
Can you use Forensic Science to Solve a Crime? In this activity you will be guided through a crime, you will need to collect and analyse evidence to try and solve this case.

**10.30 - 11.00**
**Guess Who: Health Science**
Are you ready to use your investigative skills? Can you guess the careers of our STEM superstars from a few clues? Tune in at 10.30 to have a go, and then join the Discover Who session live to find out their career identities.

**What you need**
Worksheet

**11.00 - 11.30 - LIVE session**
**Discover Who: Health Science**
Tune in to find out the answers to Guess Who challenge. Join Sarah Cosgriff as she reveals the STEM superstars' job titles and answers any burning questions you might have. Will you get them all right?

Discover who our STEM superstars are with Sarah Cosgriff

**11.30 - 12.00 - LIVE session**
**Curiosity Live**
Had a go at a STEM challenge? This is your chance to ask your burning questions to the brilliant Jon Chase has he shows off his favourite pictures from today's challenges along side his favourite science raps!

Get curious about STEM with Jon Chase

# 16 JUNE - KS3 AFTERNOON SESSION

Staffordshire University in association with Big Bang

The Big Bang Near Me | LEARN by design

### STEM Challenges

**1.00 The STEM Challenges begin**

**Lego Furniture Factory**
Are you up for a challenge? You are in charge of your own furniture factory: you can make small tables and chairs out of Lego. Work out the maximum pieces of furniture you can make for the minimum amount of money, and learn how to optimise the process using maths, science and operational research (OR). Will you be able to make the best use of your materials to maximise your profit?

**What you need**
6 rectangular Lego bricks (we use ones with 2x4 dots on)
8 square Lego bricks (we'll be using ones with 2x2 dots)
A pen or pencil
Paper and Handout

**Bridge Builder**
Put your creativity and engineering skills to the test with this building challenge.

**What you need**
10 Sheets of paper - 2 chairs - Rice - Sandwich bags - Sticky tape

**Tower of Hanoi**
Take on the mathematical game of the Tower of Hanoi!

**What you need**
Polystyrene or cardboard
Pencils - Blue Tack - Compass

**Bicycle Materials Challenge**
Find out more about bikes and the materials they are made from.

**What you need**
A bicycle (optional)

**Can we build an airplane out of seaweed?**
Put your engineering brains to the test, as you think about the best materials use when building a plane and is it possible to build a plain from seaweed?

**What you need**
Worksheet

**2.15 STEM Challenge Explanation Videos**

**Discover why things reacted the way they did in your STEM Challenges.**

### Discover Sessions

**1.15 - 2.15 - LIVE session**
**Explore the technology of Esports events**
The small interactive workshops with explore the tech behind Esports events.
**Numbers are limited for this session. Please book here or on the event page on the day.**

**1.30 - 2.00 - Guess Who: Technical Science**
Are you ready to use your investigative skills? Can you guess the careers of our STEM superstars from a few clues? Tune in at 1.30 to have a go, and then join the Discover Who session live to find our their career identities.

**What you need**: Worksheet

**1.45 - 2.00**
**Meet a Boat Captain fighting plastic pollution in the worlds oceans**
Do you love the Ocean? Have you ever dreamed of being an Explorer? Are you interested in a career linked to the Environment? Join Rachael Miller Captain of the American Promise, the worlds most environmentally friendly research vessel, which was also used for a record solo circumnavigation of the planet, talking to Professor Claire Gwinnett about their research into plastic pollution in the Ocean.

**2.00 - 2.30 - LIVE session - Discover Who: Technical Science**
Tune in to find out the answers to Guess Who challenge. Join Sarah Cosgriff as she reveals the STEM superstars' job titles and answers any burning questions you might have. Will you get them all right?

Discover who our STEM superstars are with Sarah Cosgriff

**2.15 - 2.45 - LIVE session**
**Forensics Live**
Can you use Forensic Science to Solve a Crime? In this activity you will be guided through a crime, you will need to collect and analyse evidence to try and solve this case.

**2.30 - 3.00 - LIVE session**
**Curiosity Live**
Had a go at a STEM challenge? This is your chance to ask your burning questions to the brilliant Jon Chase has he shows off his favourite pictures from today's challenges along side his favourite science raps!

Get curious about STEM with Jon Chase

# Timetable

## 17 JUNE - KS2 MORNING SESSION

Staffordshire University in association with Big Bang

### STEM Challenges

**10.00 The STEM Challenges begin**

**Make your own playdough**
Ever wondered how to make the wonderful stuff that is playdough. Watch for step by step instruction then share a picture of your creations.
**What you need**
Water - Flour
Cream of tartar - Salt
Vegetable or sunflower oil
Food colouring

**Lava Lamps**
The colourful chemistry experiment is a great way to discover more about density and chemical reactions.
**What you need**
Cup or bottle - Vegetable oil and Water
Food colouring of any colour
Fizzy tablets (such as heartburn tablets) but parental supervision is required

**Could you bandage an injured animal?**
Not only is this a fun activity, but it can actually help in an emergency! Our pets can get cut easily – especially on their paws – and it's surprising how much they bleed. Bandaging the wound correctly will make it easier for you and their pet get to the vets quickly and safely.
**What you need**
Guidance sheet
Toy animal
Bandages or toilet paper

**Pollutants: Can you work out the biggest?**
Air pollution is all around us, but do you know what's causing it? Try out this speedy challenge to test your knowledge.
**What you need**
Paper and pen

**Pollution Catcher! Conduct your own experiment.**
Ever wondered how clean the air you are breathing in is? This challenge will task you to set up your own experiment measuring air quality on your street.
**What you need**
Paper plate
Vaseline
String

**Glitter germs**
How much do you know about germs? The good and the bad? Have a go at this quick challenge to see how easy it is to pass on nasty germs and the importance of washing our hands.
**What you need**
Glitter
Water

**11.15 STEM Challenge Explanation Videos**
**Discover why things reacted the way they did in your STEM Challenges.**

### Discover Sessions

**10.30 - 11.00**
**Guess Who:**
**Engineering, Design and Technology**
Are you ready to use your investigative skills? Can you guess the careers of our STEM superstars from a few clues? Tune in at 10.30 to have a go, and then join the Discover Who session live to find our their career identities.
**What you need** - Worksheet

**10.45 - 11.00**
**Amphibians and Reptiles of the Midlands: survey, identify, protect!**
Join Phil to discover more about amphibians and reptiles near you whilst he shows you how they undertake local surveys and protect the wildlife.

**11.00 - 11.30 - LIVE session**
**Discover Who: Engineering, Design and Technology**
Tune in to find out the answers to Guess Who challenge. Join Sarah Cosgriff as she reveals the STEM superstars' job titles and answers any burning questions you might have.
Will you get them all right?


Discover who our STEM superstars are with
Sarah Cosgriff

**11.30 - 12.00 - LIVE session**
**Curiosity Live**
Had a go at a STEM challenge? This is your chance to ask your burning questions to the brilliant Jon Chase has he shows off his favourite pictures from today's challenges along side his favourite science raps!


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Jon Chase

## 17 JUNE - KS3 AFTERNOON SESSION

Staffordshire University in association with Big Bang

### STEM Challenges

**1.00 The STEM Challenges begin**

**Garden Volcano**
Be ready for exploding fun with this quick chemistry challenge. Have your materials ready and be prepared to make a bit of mess! Will you be able to work out what's happening?
**What you need** - Washing up liquid - Cold water - White vinegar - Bicarbonate of Soda - Empty 2 litre bottle - Measuring jug - Food colouring

**Design a Pet First Aid Kit**
Can you design a portable First Aid Kit that can be taken with you when you are walking your dog? We will introduce you to all the essential tools a pet First Aid Kit should have. Your challenge is to create an inventive design that is easy to carry: one that could be made into a real product!
**What you need** - Paper - pencil

**Paper City**
Can you build a 3D mini version of your home? Learn how to design and make a net of your home.
**What you need** - Paper - Pencil - Ruler

**Transfusion!!**
An interactive blood transfusion simulation to explore how biomedical scientists use their knowledge of antibodies to save lives
**What you need** - Milk - Vinegar - Red food dye (gel type if possible) - 5 small liquid containers (for example glasses or small plastic drinks bottles) - Dropper (or teaspoon or a straw with your finger over one end) - Stirrer (ie cocktail stick) - A waterproof pen or crayon - A waterproof test plate (a white plate or a piece of flat plastic)

**The science of personality**
This activity will introduce you to the science of personality, exploring how and why psychologists measure it. You'll be challenged to take and review a personality test to find out how you score as well as complete a task exploring how personality is linked with social media.

**Identify the organism**
Test out your skills of identification with this organism quiz.
**What you need** - Paper - Pencil

**2.15 STEM Challenge Explanation Videos**
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### Discover Sessions

**1.15 - 2.15 - LIVE session**
**Explore the technology of Esports events**
The small interactive workshops will explore the tech behind Esports events.
**Numbers are limited for this session. Please book here or on the event page on the day.**

**1.30 - 2.00**
**Guess Who: Research Science**
Are you ready to use your investigative skills? Can you guess the careers of our STEM superstars from a few clues? Tune in at 1.30 to have a go, and then join the Discover Who session live to find our their career identities.
**What you need:** Worksheet

**2.00 - 2.30 - LIVE session - Discover Who: Research Science**
Tune in to find out the answers to Guess Who challenge. Join Sarah Cosgriff as she reveals the STEM superstars' job titles and answers any burning questions you might have. Will you get them all right?


Discover who our STEM superstars are with
Sarah Cosgriff

**2.15 - 2.45 - LIVE session - Are you ready to be a Cyber Defender**
Join this live session to discover more about cyber security and watch a live cyber attach demo. Leave ready to secure your accounts against hacks!

**2.30 - 3.00 - LIVE session - Curiosity Live**
Had a go at a STEM challenge? This is your chance to ask your burning questions to the brilliant Jon Chase has he shows off his favourite pictures from today's challenges along side his favourite science raps!


Get curious about STEM with
Jon Chase

### For everyone to join

**3.00 - 3.15 - LIVE - Competition Winners Revealed**
Entered the 'Explore at Home' competition, or voted on your favourite? We will reveal the winner, runner up and people's vote at 3pm, so make sure you're ready!

## Feedback

Upon entering the site students were asked to indicate their current feelings towards STEM subjects and STEM careers. Feedback was then collected from students post-event via a survey link on the event website and in emails sent out to registrants.

- 67% of respondents were somewhat or extremely happy with the digital platforms used
- 80% of respondents were extremely happy (20 % somewhat) with the presenters and hosts
- 60% respondents were extremely happy with the interactive activities and the length of the event.

## Comments

> Thank you so much for putting this on. We were all gutted when the real-life Big Bang events couldn't take place. This has given the children a great experience in STEM which they wouldn't have had otherwise
>
> *Teacher*

> I joined this virtual 2-day online event not knowing what to expect. It was amazing! The programme contained something for everyone interested in STEM issues. There were activities, interactive sessions, worksheets to try things at home and inspirational speakers. Highly recommend this to others. Hope we get an opportunity to see more of this innovative approach - it worked really well.
>
> *Dr Deirdre Hughes, Director at DMH Associates*

> I think the mixture of live and pre-recorded sessions worked really well. There were lots of different ways for me to get involved which was fab as I could pick and choose, and I think this variety would have also made it really fun and interesting for students.
>
> *Eve Hardy, provided content on behalf of The OR society*

> Flo and I just had a good look around the Big Bang day and it looks brilliant. Well done everyone! From a parent perspective it was good as there was nothing weird to try to find - it was all stuff you would have at home and that they could do independently. Flo said she really liked all the different workshops as there was nothing too similar and she would like to visit next year if it's on campus.
>
> *Lecture at Staffordshire University who attended with their 10-year-old daughter*

## Client Testimonial

It was a huge undertaking to convert an on-campus activity to an online event and I am so pleased with the results and the engagement. I know that behind the registration figures there is also the family/parent learning experience which is so hard to effectively achieve.

The engagement both in views but also in participation in the live events was great to see and the competition entries were also excellent with an innovative approach from the winner.

The hosts were excellent and very well prepared, and I like how they adapted and added further engagement, for example featuring the Guess Who participants live and Jon Chase's improvised Raps to suggested STEM words.

*Sara Buckley, Academic Outreach Manager at Staffordshire University*

## How did this event hit the Gatsby Benchmarks?

The event adhered to the following Gatsby Benchmarks for good careers guidance:

2. Learning from career and labour market information

   Through engagement with local employers and organisations through the competition days and STEM Ambassador mentoring, students picked up information on the types of STEM careers available within their local area as well as nationally.

4. Linking curriculum learning with careers

   The Robotics Challenge links topics in the National Curriculum, particularly in physics, IT, maths and D&T, to careers in engineering and robotics.

5. Encounters with employers and employees

   Students taking part in the Robotics Challenge had the opportunity to interact with employers through visiting venues and having a 'tour' of the site, as well as meet employee representatives and STEM Ambassadors.

7. Encounters with further and higher education

   Many of the competition venues were FE and HE providers, for example Farnborough College and the National College for High-Speed Rail in Doncaster. Students picked up information on the range of courses and qualifications available with these providers.

8. Personal guidance

   Through the 'Meet the Future You Challenge' activity, student were given personal guidance on the types of careers which may interest them and encouraged to find out more though the associated videos.