

# Power of Light – collaborative co-creation of innovative resources for primary science education.

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## Session outline:

- ✓ Power of Light project
- ✓ Team and team expertise
- ✓ Project aims and impact
- ✓ Co-creation of resources
- ✓ Research and preliminary findings
- ✓ Reflections and next steps
- ✓ Questions



# Power of Light

- ✓ STFC funded under 'Wonder initiative'
- ✓ Aimed at 40% most deprived areas of deprivation with low science capital
- ✓ Bringing cutting edge research to classrooms
- ✓ Providing hands-on science
- ✓ Familiarising children with STFC funded facilities
- ✓ Multidisciplinary

LASAR  
colleagues

Diamond  
Lightsource  
(engagement  
team, research  
scientists)

Science  
teachers and  
science leaders  
at Primary  
schools

STEM  
Ambassadors



## Co-creating multidisciplinary teaching resources (Primary) framed around science and real-world problems

ASPIRES Research, 2022, ASPIRES 3 report - “Make it more relevant and practical’

- ✓ Almost 60% of young people indicated that there was a need for a greater focus on **practical, experimental and problem-based learning**.
- ✓ Over 70% of young people in England say that **linking the science curriculum more to their everyday life** would improve their learning and engagement in the subject

### We combined

- ✓ **EPISTEMIC INSIGHT** – a pedagogy exploring Big Questions using interdisciplinary approach
- ✓ Bringing **cutting edge science** to Primary classroom
- ✓ **Primary science curriculum** and teacher experience

**Initial phase:** Relationship building and visit to Diamond

**Phase 1** Working with research scientists and teachers

**Phase 2** Co-creation of outputs

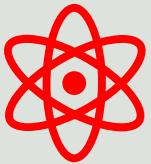
**Phase 3 Piloting** of outputs – over **573** pupils engaged across **19** schools and **community groups**



## Main aims –impact on children:



To spark love of science in children and inspire them to take STEM careers - catch them early!



To teach children what it means ‘work scientifically’ through examples of real research and real scientists



To show how science works in multidisciplinary arenas (real-world problems and Big Questions)

# Impact on teachers and research scientists (through co-creation)

## Primary teachers

- Equip with resources and skills
- STEM influencers, inspire and boost confidence

## Research scientists

- Develop public engagement skills
- Learn to translate research to new audiences
- Access to innovative, interdisciplinary tools (Epistemic Insight)

## Diamond Lightsource Facility

- Innovative resources and pedagogies
- Access to hard to reach audiences (Primary)



# Research questions

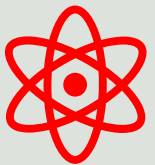
- Can introduction of research and science in real world context at Primary level **instigate pupils curiosity and interest in science and inspire them to pursue STEM careers?**
- Will collaboration with research scientists **empower teachers to deliver innovative and inspiring STEM sessions?**
- What strategies help teachers and researchers to **co-create and test pedagogies and tools** that develop pupils' **love for science?**



# Zines' – an innovative approach to engage 'wonder' audience into STEM



- Represent diversity of gender, ethnicity and religion within the scientific community.



- Dispel misconceptions about what science looks like in practice.



- Inspire students to understand how science is making exciting discoveries that improve our lives.

# Resources



**What are X-Rays, and why are they used?**

Using light to describe things that cannot be seen using magnifying glasses or most microscopes

12. When we look around us and see colours, we are seeing energy that is in the visible to our eyes. We cannot see or feel the energy in x-rays. Using x-rays, however, we can learn more about the structures within objects.

**VISIBLE SPECTRUM**

13. To see very small things (much thinner than a strand of hair), scientists at Diamond Light Source use an x-ray beam... this is beam brighter than our sun!

This is what human hair looks like through a microscope.

When we are doing research using the equipment at Diamond Light Source, we are working with particles so small it would take 80 pieces to be as thick as this one strand of hair.

**14. The Mary Rose had a crew of 400 men.**

Buried with the sunken ship were objects that can help us learn more about what was important to people who lived long ago.

**Artefacts found on Mary Rose include:**

- two brick ovens,
- wooden bowls, a wooden drinking cup and spoons,
- A bone object carved with angels on it (that might have been used during prayer),
- and the ship's bell.

**15. Diamond Light Source's synchrotron has been used to investigate and understand changes in the structures of objects that take place over weeks, months and years.**

This knowledge can help us understand why changes might take place inside the cells of plants and the human body.

**Observe, Compare, Record**

Scientists like Fred understand that some changes (reactions) may take time to become observable.

Try this in your classroom (with an adult's help to keep you safe).

**You will need:**

- some metal objects
- Some salt water and some plastic or glass containers

**Method:**

- Place a metal item and salt water into each container
- Observe each day, over seven days, and record if any changes occur to the metal objects

**For reflection:**

If you were to build a structure using metal, what might you need to think about in your planning?

Find out more about how Diamond Light Source has worked with researchers to preserve the Mary Rose and its artefacts by watching this family webinar <https://www.diamond.ac.uk/Public/Digital-Learning-Resources/events-Webinars/Mary-Rose-Webinar.html>

**Scientist Profile: Fred**

If someone had asked me as a child if I planned to be a scientist, I would probably have said "no!"

Using x-rays helps me to understand how atoms behave. I am amazed at how the world around us is so complex!

In school I was good at maths – this helped me when I studied science at university.

My research on the Mary Rose has helped my investigations into other areas and puzzles I am working on.

**'Thinking like a scholar' Activity**

This is a 'Discipline Wheel' – it includes some examples of 'ways of knowing'. Using these 'ways of knowing' can help us understand more about being human and the world around us.

Investigate the Big Question in the middle through some of these different 'ways of knowing' (disciplines)?

a. Scientists' research helps to find ways to slow down changes that may damage structures (like the ancient artefacts found in the Mary Rose).

b. Scientists might investigate by observing patterns in nature. This can help them understand what happens to particles when materials change.

c. What kinds of questions might scientists ask when investigating?

d. Why might scientists work with historians, archaeologists and others to find out more about ancient artefacts?

e. What kinds of questions might historians want to ask and investigate?

f. People can use disciplines to gain a fuller 'picture' of the world around us. Looking through these lenses helps us on a journey of discovery.

g. When exploring the world around us, scientists and other scholars often find their discoveries lead to more questions about the world around us.

h. What Big Questions do you like to think about?

**Why do things change?**

Science, Geography, History, Theology, Religious Studies, Modern Foreign Languages, English, The Arts, Philosophy, Engineering and Computer Science, Mathematics.

**Big Questions**

- Does everyone use the same 'code of ethics'?
- How do we know we are safe?
- Why do things change?
- In the future will we live and travel in space?
- How do we take care of planet Earth?

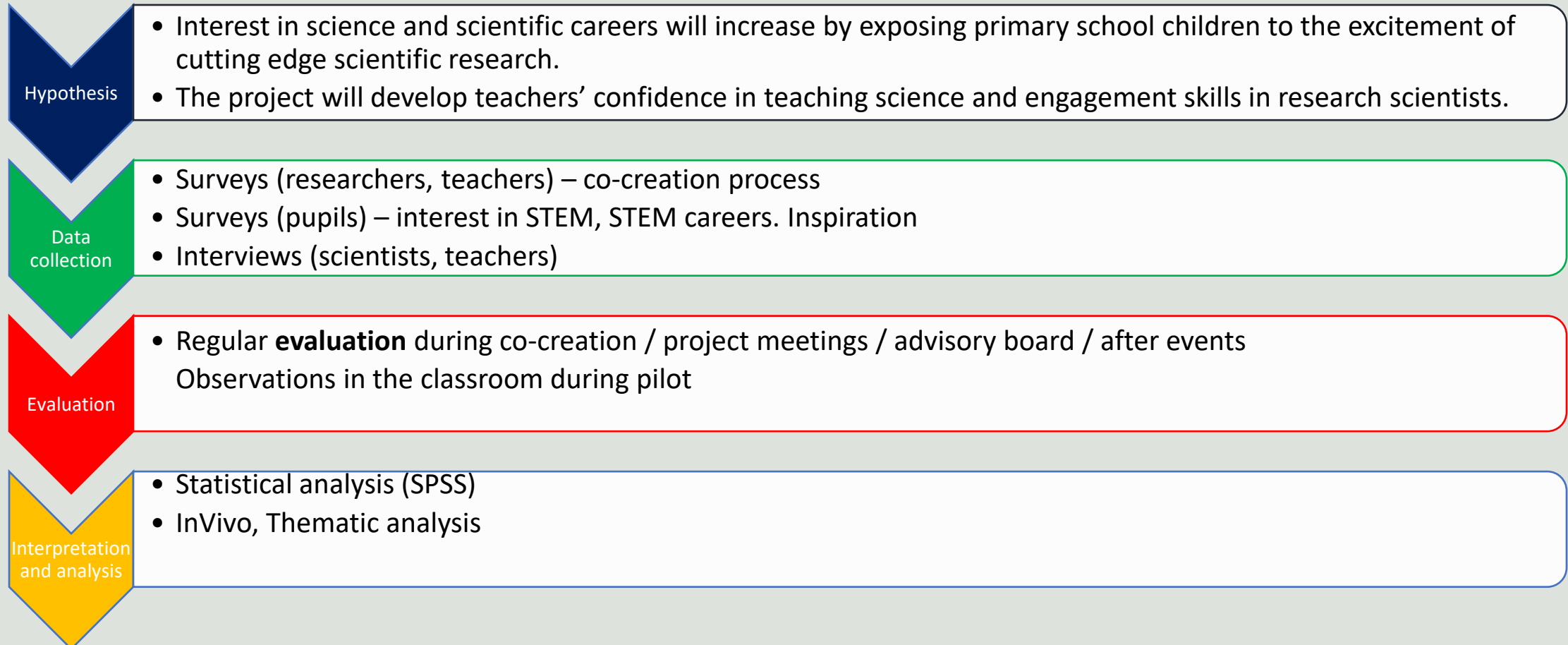
**The Power of Light**

A UKRI funded project co-creating resources with schools, scientists and CCCU

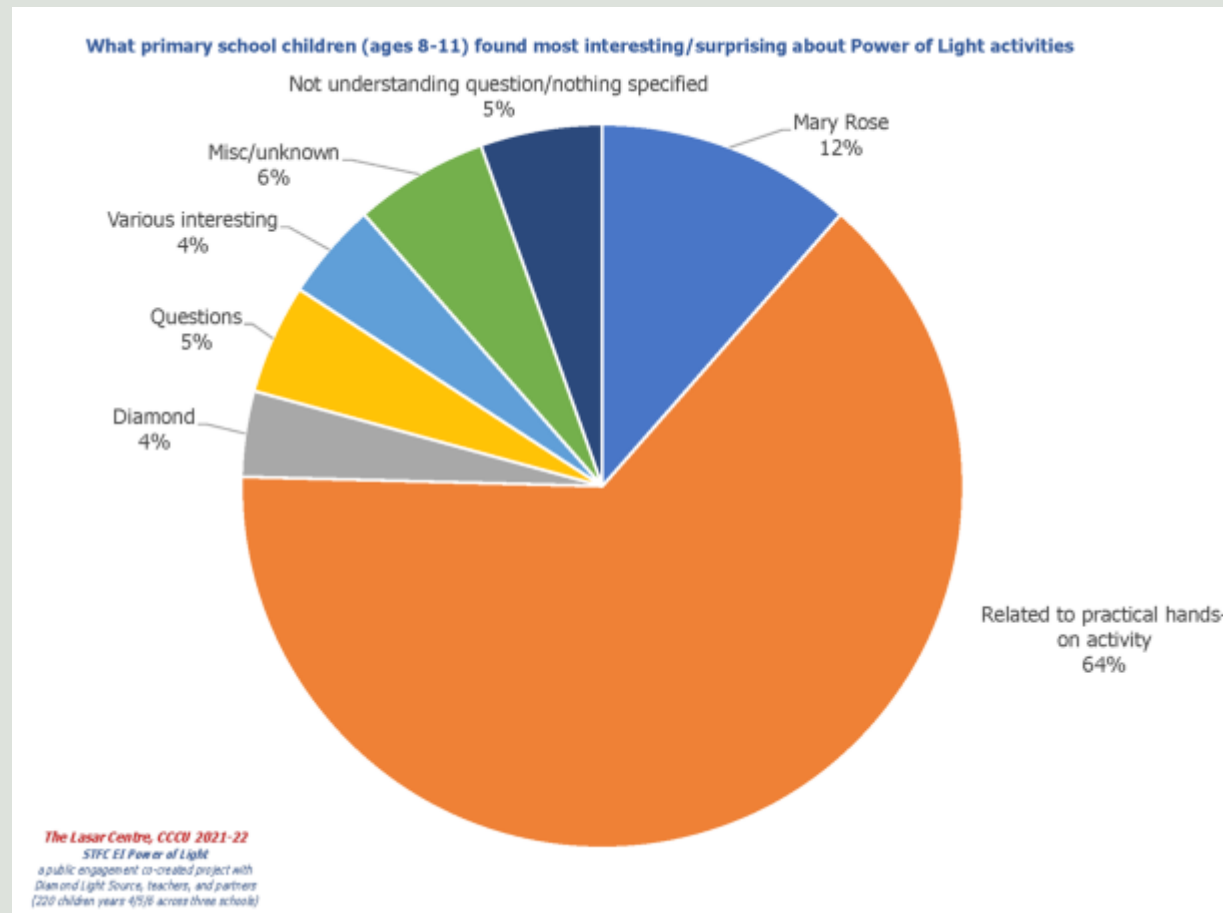
Epistemic Insight | diamond

This zine has been co-created with the help of STFC, Diamond Light Source, primary school teachers, the Epistemic Insight team at the Lasar Centre, and Canterbury Christ Church University (2022)

# Research design



# What did you find most interesting in the session ?



## Teacher comments:

- ✓ 'I now feel more confident giving real-world examples of 'working scientifically'
- ✓ 'I now have ideas about how to teach science more effectively'
- ✓ 'I now have a greater appreciation for why its important for students to know about the similarities and differences between disciplines'

## Impact on the team :

- ✓ Diamond Light Source - most valuable to reach new audience – Primary – usually A-level
- ✓ The focus on ‘Big Questions’, together with the exploration of how knowledge is built through different disciplines, was of particular interest
- ✓ Non-scientific colleagues gained better understanding on **how scientific research works in practice** and how it is linked to real-world problems

## Reflections and future steps

- ✓ Co-created, hands-on resources brought cutting edge research to the classroom making it more relevant, practical and enjoyable
- ✓ Children enjoyed exploring and experimenting (post-Covid)
- ✓ Teachers enjoyed opportunity to work with teachers of other specialisms – real interdisciplinary lesson and linking knowledge across
- ✓ Teachers reported increased confidence in delivering science lessons and linking to real-world context
- ✓ Further research is needed - Interviews with teachers and research scientists planned to further explore impact



# Animation

<https://bit.ly/3VSvHwF>



# Thank you for your attention

## Thanks to:

LASAR team



Epistemic Insight

School teachers

Diamond Light Source



STFC

