Department of Physics

UNIVERSITY OF BATH

Look into my eyes

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University of Bath

THE ROYAL SOCIETY

THORLABS

Science & Technology Facilities Council

Organization of the activities

Schools we visited

COMBE DOWN CEVC Primary School

OLDFIELD PARK JUNIOR SCHOOL

Widcombe CofE Junior School
Be the best you can

St Philips

PAULTON JUNIOR SCHOOL

St. John's Catholic Primary School
Ora et Labora

Timeframe: **Morning:** arrival 9h15; start 9h30; break 10h30; resume 10h50 to 12h10. **Afternoon:** Workshop runs 13h15 to 15h15. Departure 15h20.

Robot Lecture: Involves the whole class. The activity should take 20 min

Hands on activities: There will be 5 activities (15 min each) for up to 6 children. All are risk assessed.

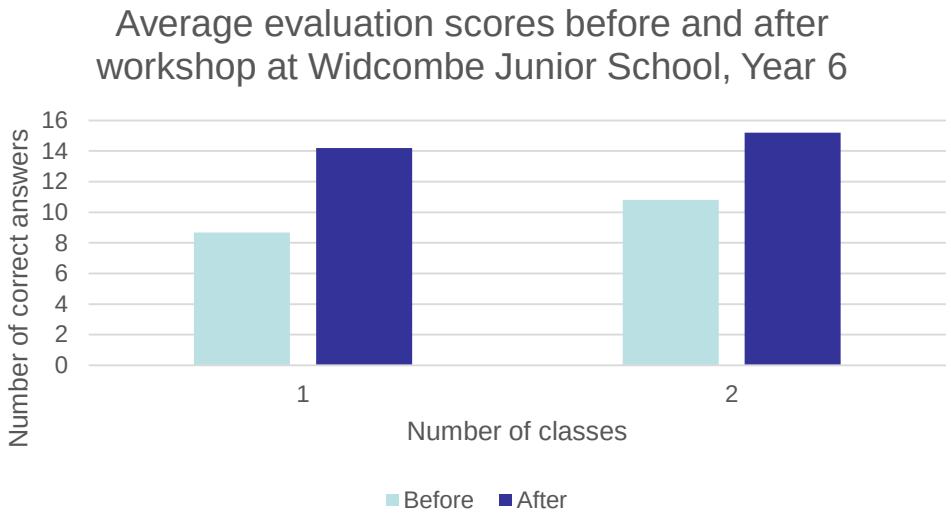
Activity evaluation: Questionnaire to be filled in before and after workshop.

Supervision: Dr Valev and 4 PhD students plus Teacher and anyone from the staff who wishes to take part.

Room Preparation: 5 work areas composed of 3 school tables each.

Evaluation Questionnaire

The questionnaire consists of 20 multiple choice questions. It is to be filled in **before** and **after** the workshop. Upon comparing the results we can evaluate the success of our activities.



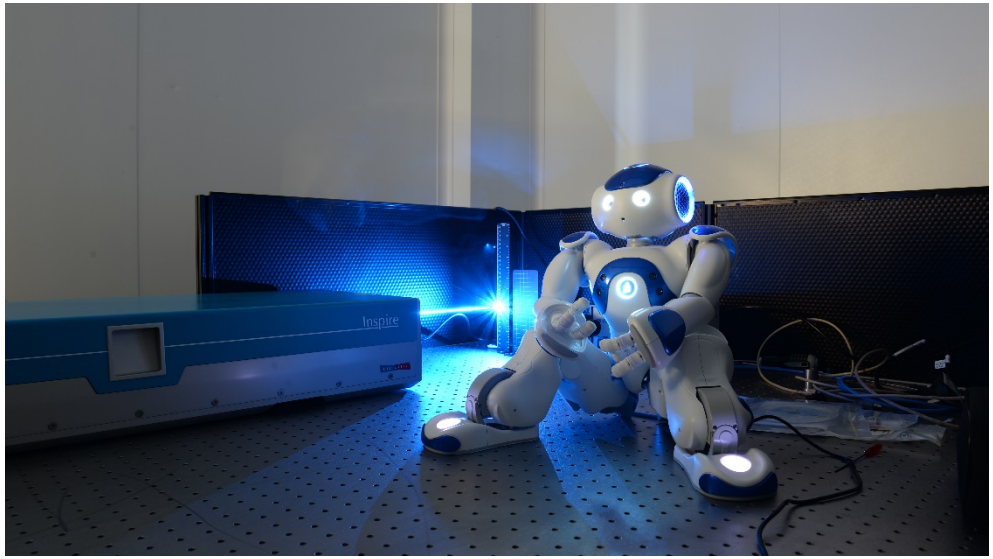
We aim to measure improvement in knowledge/understanding and attitude.

The last question is: "*Could you be a scientist?*"

In Widcombe Junior School, 15 children chose the answer "*I could never be a scientist*" before our workshop. The number was down to 10 after the workshop.

One child had initially selected "*I could never be a scientist*" and also written "*because I do not know much*". Afterwards, she selected "I could, if I wanted to".

Hello, my name is Photon!



Photon is a *Nao* robot from *Aldebaran Robotics*.

Children might have seen such robots play football or dance and sing, on the internet. This one is different though; he is a scientist.

The robot will speak for about 5 min about colours and light.

At the same time, he will use gestures and indicators to illustrate what he is talking about.

At the end of the presentation, the children have to say what the robot can do and what he said.

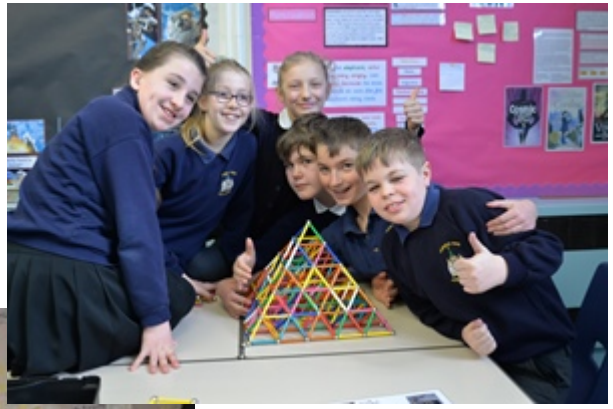
Traditional, lecture style, learning activity, with a robot lecturer.

Crystal clear!

What are atoms, molecules and crystals?
The children learn about periodic arrangements of atoms in cubes, pyramids and others. They learn of the limited number of crystal structures available in Nature and understand the need to create new (meta)materials.

Using *Geomag* magnetic rods and balls, the children have to grow together the biggest cubic or hexagonal crystal they can.

This is a visual learning activity that focusses on 3D vision.



Laser rig

How do scientists build an experiment in a real lab? Child's play!

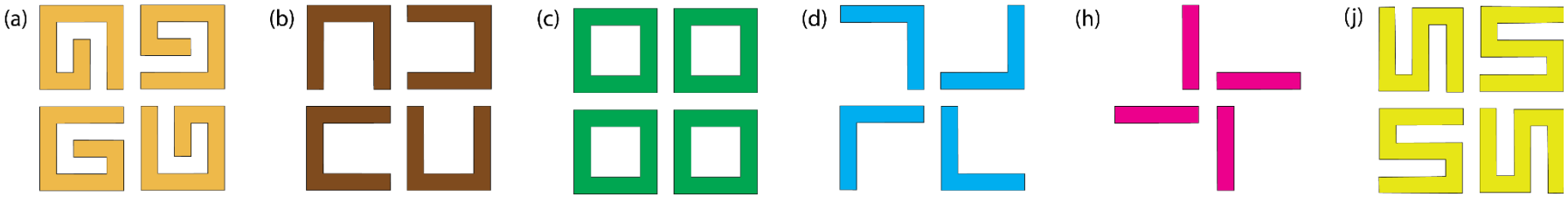
Together, the children build an experiment, where green laser (500 μW) light is guided through an iris (just like in the eye), a "beam splitter" (like a window) and two lenses (like in glasses). Big & small spots can be seen on the screens.

This is a kinaesthetic learning activity.

Sponsored by *Thorlabs* with 50% discount on all components.

Image in the mirror

Some objects and patterns look different when seen in a mirror. Such objects are called “chiral”. Our research consists in making *meta-atoms* (fake atoms) to trick light into thinking that they are natural atoms. Because meta-atoms are man-made we can tailor their properties.



Children will be taught about chirality and metamaterials.
Using mirrors, they will draw the mirror image of patterns to find out which ones are chiral. They can also come up with their own designs.

Light is a vibration, just like sound

Colours of light have a particular order, just like musical notes. The children will learn that order and that light is a vibration, with the different tones corresponding to different colours.



Using 5V batteries and small colored light bulbs, the children tape the bulbs to the batteries and build a light piano. Then they play a well known tune on it and others have to guess the tune.

This is a music-based learning activity.

Light under the microscope

The image on a screen is made of pixels. Pixels have only three colours – red, green and blue – yet their combination produces all the colours we can see. Red, green and blue are the primary colours of light.

We have designed a cross-platform app that changes the colour of the screen on a smart phone. Looking through a professional grade microscope, the children will observe how combinations of pixels produce different colours. They also learn the difference between the white colour of the Sun and of the screen.

This is a questions and answers style learning activity with demonstrations on the microscope.

Would I lie to you?

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INTERNATIONAL YEAR OF LIGHT 2015

"Humans can see the colours of light such as they really are."

"The colours in the rainbow are in the order in which they blend best one into the next."

Science is about being critical. Children will be challenged with statements about light that are sometimes true and sometimes false. They need to discuss and give a collective answer whether the statement is a lie.

Summary

The workshop consists of one short lecture about light delivered by a robot and 5 hands-on learning activities. The children will rotate so all can enjoy the activities.

- Light piano – playing music with light
- Laser Rig – setting up an experiment
- Crystal Clear – building a BIG crystal
- Image in the mirror – discover chirality
- Light under the microscope – colour mixing
- Would I lie to you? – true or false science

Contact Details

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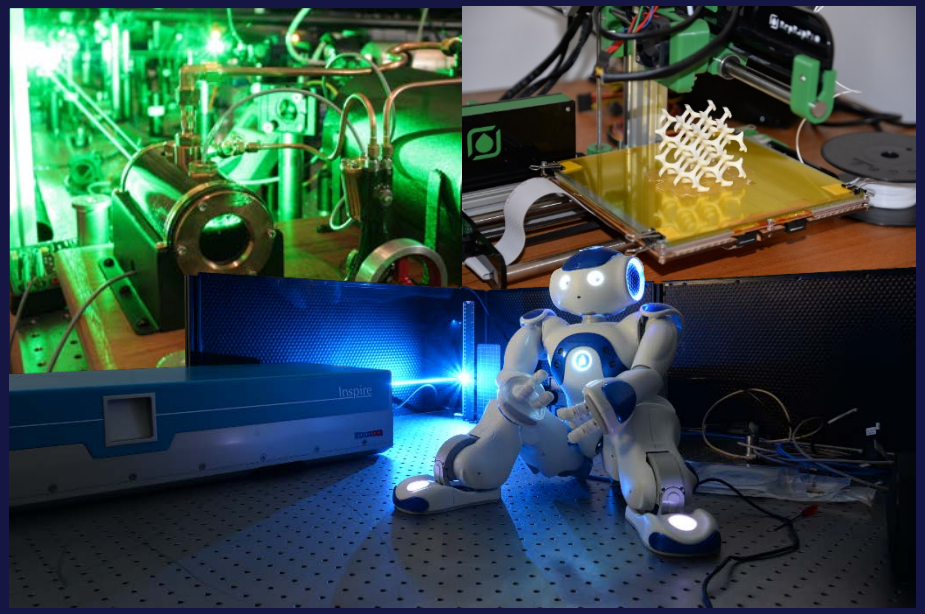

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