

Sustainable stories and solutions for our planet

Nicky Waller describes how primary children can learn how to help to look after our planet and explores how industry is playing its part in the bigger picture of sustainability



Figure 1 John Mackenzie (Regulatory Affairs Manager) and Simon Grant (Technical Director) from Thomas Swan and Co. Ltd. exploring practical activities for primary children at CIEC's sustainability workshop

If you are familiar with CIEC's website, or have read Jane Winter's article on page 30, you will know that we provide a whole host of information regarding how we work with both industry and schools. Our school resources consist of downloadable materials for teachers and interactive areas for children to access with teacher guidance. For teachers of the 4-11 age range, these resources promote hands-on practical enquiry, problem-solving, teamwork and discussions, and are set in real industrial contexts.

The themes of these publications are regularly evaluated to ensure that they are meeting the needs of the school curriculum and the changing demands on our industry partners. In 2018, CIEC worked closely with Thomas Swan and Co. Ltd. in County Durham to see the creation, development and delivery of a new tailor-made resource, highlighting the issues and impacts of sustainability for primary-aged children.

'The future holds many challenges for young people and our current model of development is placing an increasing

burden on the planet. In order to secure the future of children all over the world, we need to make a decisive move towards sustainable development' (Department for Children, Schools and Families, 2008, p.2).

A definition of sustainability

Given that young children will become the next generation of adults, it is important that they are educated about sustainability issues so that they can take positive action to help preserve their future in a changing world. There are many definitions of sustainability and it is important to reach a shared agreement of what sustainability actually means, so that it can be conveyed and understood by children.

One of the most frequently used definitions is taken from *Our Common Future*, also known as *The Brundtland Report* (1987): *'Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs'* (Brundtland, 1987, p.37).

In simpler terms, sustainable development means meeting the needs of all people now, without having a negative impact on the needs of people living in the future.

Sustainable Stories

In order to develop a sequence of activities for classroom use that link purposefully to real-life scenarios from the world of STEM and industry, a one-day workshop was held with representatives from companies and organisations with a strong reputation for sustainability: Thomas Swan, Croda, Quorn, Johnson Matthey, University of York's Green Chemistry Centre of Excellence, York Environmental Sustainability Institute, Ineos and the British Plastics Federation (see Figure 1).

From this workshop, case studies were developed into industry-related practical and discussion activities pertaining to four main themes:

- The motives behind sustainability: how we see the planet for future generations versus how much we value material possessions of our own;

Key words: ■ Sustainability ■ Problem-solving ■ Industrial storylines

- The product life cycle: looking at manufacturing different products and the various aspects and impacts of sustainability;
- Understanding the impact of our own behaviour in actively bringing about change and developing sustainability; and
- Exploring a range of careers associated with sustainability and their place in STEM industry.

The pilot phase

Activities generated during the workshop were written into a pilot resource, which was shared with case study companies for comment and collaboration. In addition to this, 32 primary schools from Teesside, Lincolnshire and Hertfordshire attended a twilight CPD session and were invited to trial the activities and provide feedback as part of the pilot study.

The objectives covered in the publication are most relevant to the Year 5 science Programme of Study (National Curriculum for England), with all the activities covering statutory enquiry skills taught in the Upper Key Stage 2 (age 9-11) programme of study whereby children are required to work scientifically. All respondents said that the resource provided enough information for teachers with a limited scientific background to use the material and also that they would recommend the publication to other primary teachers.

The final publication

After all feedback had been taken into consideration and final amendments made, *Sustainable Stories and Solutions for Our Planet* was published and uploaded to CIEC's suite of teacher resources, with special thanks to Thomas Swan for their time, energy and funding.

This final version contains two generic introductory activities to develop children's awareness and understanding of sustainability, and five case studies developed into classroom activities with accompanying PowerPoint presentations related to their industrial and scientific focus.

The publication is aimed at children aged 9-11 years, although all the



Figure 2 CIEC's sustainability publication

activities can be adapted to suit a range of ages.

The two introductory activities encourage children to consider their own motives behind sustainability, as well as to develop an awareness of vocabulary linked to current environmental issues. A glossary provides a comprehensive list of all key vocabulary introduced and children can reflect upon the learning that is taking place.

The five main activities introduce children to challenges within the context of sustainability. These include the sustainability of common materials such as metal, plastic and fabrics and

also the sustainability of food and energy sources.

The investigative approach provides opportunities for children to explore the varied roles of scientists and engineers in practical ways, allowing the development of key skills including discussion and problem solving.

A presentation accompanies each main activity, and contains opportunities for higher order thinking, further discussion and research. Each presentation extends the sustainability message to focus on a wider environmental issue, including:

Activity 1	Introduction to sustainability
Activity 2	Vehicle emissions and air pollution
Activity 3	Single-use plastics and the importance of recycling
Activity 4	The environmental impact of washing and replacing items of clothing
Activity 5	Alternative diets and an awareness of our carbon footprint
Activity 6	Our use of fossil fuels and the development of renewable sources of energy

The presentations have been created to help children to develop a deeper understanding of our impact on the planet and to encourage them to weigh up different opinions and evidence for themselves: *'Empowering young people to take responsibility for their own future is not only desirable:*

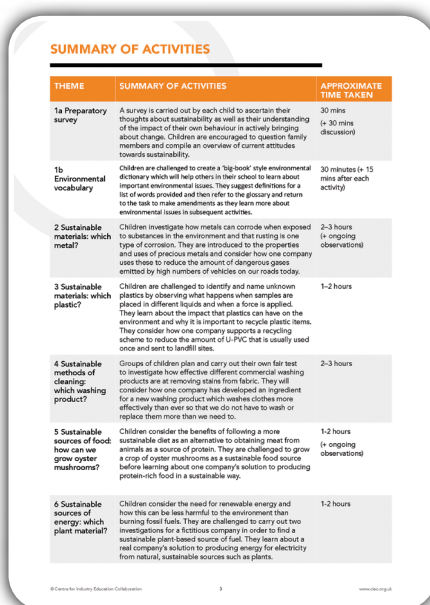


Figure 3 Summary of activities

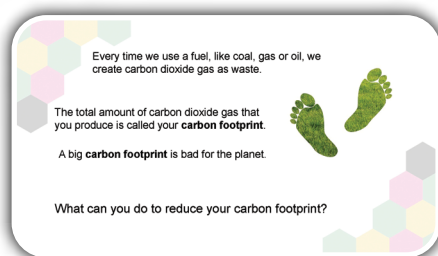


Figure 4 An example slide from accompanying presentation: *Which washing product?*, which encourages children to explore sustainable methods of cleaning

it is a crucial feature of their education' (Porritt et al, 2009, p.6).

Real examples from the classroom: Introductory activities

Anna Ronsano, class teacher at Whinney Banks Primary School in Middlesbrough, completed the introductory activities with children in her Year 5 class (age 9-10). First of all, they carried out the survey (Activity 1a) to reveal their thoughts about sustainability as well as their understanding of the impact of their own behaviour in actively bringing about change. She encouraged all children to question family members too and they compiled a class database of current attitudes towards sustainability.

In the second introductory activity (1b), the children created a 'big-book' style environmental dictionary with the intention of helping others in their school learn about important environmental issues. The children discussed their ideas for definitions of the words provided and then referred to the glossary to make any improvements to their suggestions.

Ms. Ronsano's feedback about these activities was extremely positive: *The environmental vocabulary activity was a great way to learn about sustainability as it promoted good conversations and questioning with the children.* She also commented on how much the children

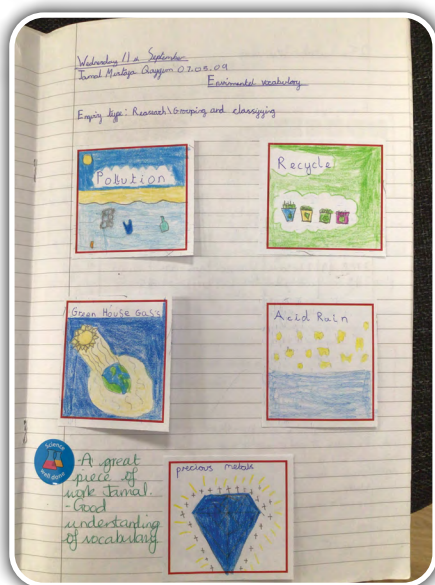


Figure 5 Example of children's work for the environmental dictionary

had particularly liked the creative way of recording the vocabulary. An example of one child's work can be seen in Figure 5.

Real examples from the classroom: Which metal?

Jeanette Harrison, Year 6 (age 10-11) teacher from Breckon Hill Primary School in Middlesbrough, carried out Activity 2: *Which metal?* with her enthusiastic class. The children investigated how metals can corrode when exposed to substances in the environment and then developed their own questions about rusting. They also looked at environmental vocabulary from the introductory activities and linked this to the learning.

Working in small groups, the children used steel wool pads to compare a control pad with one dampened with water, one with saltwater and one with a mixture of water and mild white vinegar (acid). Children examined the pads at regular intervals over the period of a week and took photographs and measurements of changes over time, including observations of how the colour of the liquids changed in each container.

The sustainable story from industry extended the children's learning to precious metals and how they are unique in many ways – they are relatively non-reactive, so they will not rust or explode when exposed to different substances or high



Figure 6 Rusting investigation results



Figure 7 Odd One Out activity

temperatures. The children were keen to hear about how scientists at Johnson Matthey use precious metals to help our environment, by reducing the amount of dangerous gases emitted by high numbers of vehicles on our roads today.

Mrs Harrison reported that *The children found this really exciting, they were amazed to see how quickly changes appeared in the metals. They then used their knowledge of this to carry out the "odd one out" activity using evidence from their investigation.*

She also told us that *I love the resources, and the children gained a lot from the activities. I think most of this was due to it being such a current topic and something that they could relate to – hence we have used them again this year, and as part of British Science Week, with resounding success!*

Examples from the classroom: Which plastic?

Children attending the school science club at Bader Primary, Thornaby, carried out this activity with the science subject leader, Charlotte Ferens. They were challenged to identify and name unknown plastics by observing what happens when samples are placed in different liquids and when a force is applied.

The sustainable story for this activity enabled the children to learn about the



Figure 8 Identifying plastics activity

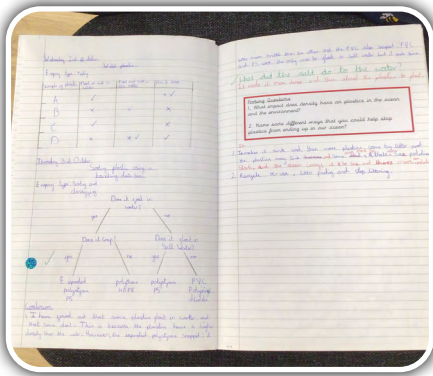


Figure 9 Example of children's work using a key

impact that plastics can have on the environment and why it is important to recycle plastic items. They then found out about the scientists at Ineos and how the company supports an innovative recycling scheme to reduce the amount of U-PVC that is usually used once and sent to landfill sites.

Ms. Ferens reported that *'The children loved this activity! They were so surprised with the results and have since used their knowledge of density and the ocean to look at plastics in the ocean more closely. An expert group of children in our science club also carried out their own research about the effect of salt in the sea on plastic.'*

Examples from the classroom: Sustainable sources of food

Ms. Ferens also used the mushroom-growing kit that she received at CIEC's regional teacher CPD session with children attending science club. They considered the benefits of following a more sustainable diet as an alternative to obtaining meat from animals as



Figure 10 Children growing mushrooms as a sustainable source of food

a source of protein, before attempting to grow a crop of oyster mushrooms as a sustainable food source.

The sustainable story from Quorn introduced the children to one company's solution to producing protein-rich food in a sustainable way. Due to the success of these activities, the Year 5 and 6 curriculum at Bader Primary School now embeds sustainability as a theme for summer term science activities, using the *Sustainable Stories and Solutions to Our Planet* resource from CIEC.

The importance of learning about sustainability

In more recent years, many primary schools have recognised the growing importance of educating young children about sustainability and the world around them. As part of the local to global element of a curious curriculum, primary schools are signing up to help deliver on the United Nations 17 Sustainable Development Goals. This involves planning for opportunities to link enquiry themes with bigger global issues in order to allow learners to explore the ideas, concepts, issues and reality regarding sustainable development.

The 'global goals' apply to everyone in the world and cover issues such as equality, hunger, energy, clean water and sanitation, biodiversity, climate change, economic growth, sustainable

cities and responsible consumption, as well as strategies such as education and justice.

Every school now has the opportunity to cover a range of the goals through its teaching and wider activities. By linking learning in the classroom to real-life problems and scenarios, children can hear positive stories of scientists working towards solutions to global issues and this can help allay developing anxieties



Figure 11 United Nations Sustainable Development Goals

that some children may have about the world that they are inheriting.

Using *Sustainable Stories and Solutions for Our Planet* as a teaching resource provides a wealth of ideas for how to do this in the primary classroom and supports teachers in bringing young children and external agencies, such as local industry, together.

Returning again to feedback provided by teachers in CIEC's pilot sustainability study, when asked: 'Do you think the children gained a better understanding of sustainability having the industry story for a context?', there was a resounding 'yes' from all respondents, with many positive comments including:

'The children enjoyed the activities and it gave them a greater insight into industry'

'The learning had a true purpose and put their actions into context'

'The sustainability resource is filled with enjoyable, real-life learning.'

Sustainable Stories and Solutions for our Planet can be freely downloaded from the CIEC website at www.ciec.org.uk

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Nicky Waller has been working as an advisory teacher for CIEC since 2004 and is passionate about building teachers' and children's confidence in all things primary science.

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