

Practical Action links to the science curriculum in Scotland



Background

The **new science curriculum** in Scotland offers a real opportunity for teachers to enhance pupils' learning by the integration of global issues in their teaching. Teaching in a global context, using methodologies that encourage discussion and debate, coupled with an **enquiry** based approach, not only engages and motivates pupils but deepens their scientific knowledge and understanding.

The emphasis on teaching in context and understanding the uses and implications of science is made clear in the aims.

Aims

The Broad General Education (BGE) and national courses for science aim to ensure that all pupils:

- ▶ develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- ▶ develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to **answer scientific questions about the world around them**
- ▶ are equipped with the scientific knowledge required to **understand the uses and implications of science**, today and for the future.

In the programme of study the importance of teaching through a global lens is highlighted within the scientific knowledge and conceptual understanding and the nature, processes and methods of science.

Scientific knowledge and understanding:

...teachers will wish to use *different contexts* to maximise their pupils' engagement and motivation to study science.

The nature, processes and methods of science:

...Working scientifically might be embedded within the content... so that pupils learn to use a variety of approaches to answer relevant scientific questions. These types of scientific enquiry should include...*researching using secondary resources*.

This emphasis on **research and communication** is a new requirement of the curriculum. Secondary sources to support research could include case studies of how science is having both a positive and negative impact on the developing world, technical briefs written by Practical Action for engineers in developing countries, information available on the main website and videos.

Level 1 (Primary P2, P3, P4)

Topic & SCN outcomes

Global Context

Practical Action resources

Topical Science

SCN 1-20a

I have contributed to discussions of current scientific news items to help develop my awareness of science.

Discussions around global issues such as food security and health

- ▶ [Concept Cartoons](#)
- ▶ [Cool Pots](#)
- ▶ [Sandy Seeds](#)
- ▶ [Smoky Homes](#)
- ▶ [Pumpkins against Poverty](#)

Level 2 (Primary P5, P6, P7)

Topic & SCN outcomes

Global Context

Practical Action resources

Topical Science

2-20a

Through research and discussion I have an appreciation of the contribution that individuals are making to scientific discovery and invention and the impact this has made on society.

Discussion and debate around how science and technology can lift people out of poverty

- ▶ [Concept Cartoons](#)
- ▶ [All primary resources](#)

Body Cells and Systems

2-12a

By investigating some body systems and potential problems which may develop, I can make informed decisions to help me maintain my health and wellbeing.

The effect of smoke from inefficient stoves and lack of hand washing on health

- ▶ [Smoky Homes](#)
- ▶ [Smoke cookers and hoods](#)
- ▶ [Stop the Spread](#)

Energy Sources and Sustainability

2-02b

I can investigate the use and development of renewable and sustainable energy to gain an awareness of their growing importance in Scotland and beyond.

Use of renewable energy in the developing world

- ▶ [Moja Island](#)
- ▶ [Wind Power Challenge](#)
- ▶ [Renewable energy activities](#)
- ▶ [Marvellous microbes - video](#)
- ▶ [Energy - videos](#)
- ▶ [Free Energy - Concept Cartoon](#)
- ▶ [Energy and the Global Goals](#)
- ▶ [Power for the World](#)
- ▶ [Renewable energy poster](#)
- ▶ [Energy - technical briefs](#)

Biodiversity and Interdependence

2-01a

I can use my knowledge of interactions and energy flow between plants and animals in an ecosystem, food chains and webs. I have contributed to the design or conservation of a wildlife area.

Designing systems to grow plants

- ▶ [Floating Garden Challenge](#)
- ▶ [Pumpkins against Poverty](#)
- ▶ [Images - plants](#)
- ▶ [Growing Food - concept cartoon](#)

2-01b

Through carrying out practical activities and investigations, I can show how plants have benefited society.

The importance of global food security in poverty alleviation

- ▶ *Pumpkins against Poverty*
- ▶ *Floating Garden Challenge*
- ▶ *Sandy seeds*
- ▶ *Seed fairs in Kenya and potatoes in Peru*

Properties and uses of Substances

2-16a

I have participated in practical activities to separate simple mixtures of substances and can relate my findings to my everyday experience.

Filtering water to make it fit to drink

- ▶ *Ditch the dirt*
- ▶ *Water! Water!*
- ▶ *Global Project ideas*

Chemical Changes

2-18a

I have investigated different water samples from the environment and explored methods that can be used to clean and conserve water and I am aware of the properties and uses of water.

Simple water filters used to clean water

- ▶ *Stop the Spread*
- ▶ *Ditch the dirt*
- ▶ *Global Project ideas*
- ▶ *Water Harvesting Challenge*
- ▶ *Water Conservation – concept cartoon*

Level 3 (Secondary S1, S2, S3)

Topic & SCN outcomes

Global Context

Practical Action resources

Topical Science

3-03a

Through investigations and based on experimental evidence, I can explain the use of different types of chemicals in agriculture and their alternatives and can evaluate their potential impact on the world's food production.

Global food security

- ▶ *Pumpkins against Poverty*
- ▶ *Design for a Better World*
- ▶ *Global Project ideas*
- ▶ *Plants - images*
- ▶ *Food & Agriculture - videos*
- ▶ *Global food and Farming*
- ▶ *Growing Food - concept cartoon*

3-20a

I have collaborated with others to find and present information on how scientists from Scotland and beyond have contributed to innovative research and development.

Research and development of technology to improve the lives of people in poverty

- ▶ *STEM Challenges*
- ▶ *Global Project ideas*
- ▶ *Technical Briefs*
- ▶ *Concept Cartoons*

3-20b

Through research and discussion, I have contributed to evaluations of media items with regard to scientific content and ethical implications.

Ethical implications of science and technology

- ▶ *STEM Challenges*
- ▶ *Technology Justice*
- ▶ *#Techjustice in Action - videos*
- ▶ *Wild Weather*
- ▶ *Concept Cartoons*

Body Cells and Systems

3-12a

I have explored the role of technology in monitoring health and improving the quality of life.

The effects of poor diet and substandard living conditions on the health of children in the developing world

- ▶ [Stop the Spread](#)
- ▶ [Smoky Homes](#)
- ▶ [Pump it - video](#)

3-13b

I have contributed to investigations into the different types of microorganisms and can explain how their growth can be controlled.

Spread of disease and production of bio gas by micro-organisms

- ▶ [Stop the Spread](#)
- ▶ [Marvellous Microbes - video](#)

3-13c

I have explored how the body defends itself against disease and can describe how vaccines can provide protection.

The use of vaccines in prevention of infectious diseases

- ▶ [Stop the Spread](#)
- ▶ [Incredible Inoculations](#)

Biodiversity and Interdependence

3-03a

Through investigations and based on experimental evidence, I can explain the use of different types of chemicals in agriculture and their alternatives and can evaluate their potential impact on the world's food production.

Global food security

- ▶ [Pumpkins against Poverty](#)
- ▶ [Plant - images](#)
- ▶ [Food & Agriculture - videos](#)
- ▶ [Global Food and Farming](#)
- ▶ [Global Project ideas](#)
- ▶ [Sandy Seeds](#)

Properties and Uses of Substances

3-05a

By contributing to experiments and investigations, I can develop my understanding of models of matter and can apply this to changes of state and the energy involved as they occur in nature.

Energy transfer in technology preserving food

- ▶ [Cool Pots](#)
- ▶ [Zeer pot – video](#)
- ▶ [Zeer pot – technical brief](#)

3-05b

I can explain some of the processes which contribute to climate change and discuss the possible impact of atmospheric change on the survival of living things.

Looking at climate change and its impact on society

- ▶ [Design for a Better World](#)
- ▶ [Climate Change – concept cartoon](#)
- ▶ [Wild Weather](#)

Level 4 (Secondary S1,S2,S3)

Topic & SCN outcomes

Global context

Practical Action resources

Topical Science

4-20a

I have researched new developments in science and can explain how their current or future applications might impact on modern life.

Scientific applications that improve day to day life of people in the developing world

- ▶ [STEM Challenges](#)
- ▶ [Global Goals](#)
- ▶ [Design for a Better World](#)
- ▶ [Small is Challenge](#)

4-20b

Having selected scientific themes of topical interest, I can critically analyse the issues, and use relevant information to develop an informed argument.

Discussion and debate around global issues where science could be used to improve people's lives

- ▶ [Concept Cartoons](#)
- ▶ [Wild Weather](#)
- ▶ [Design for a Better World](#)

Energy Sources and Sustainability

4-04a

By contributing to an investigation on different ways of meeting society's energy needs, I can express an informed view on the risks and benefits of different energy sources, including those produced from plants.

Use of and access to renewable energy in the developing world

- ▶ *Free Energy – concept cartoons*
- ▶ *Moja Island*
- ▶ *Wind Power Challenge*
- ▶ *Renewable energy activities and games*
- ▶ *Marvellous Microbes - video*
- ▶ *Energy - videos*
- ▶ *Energy and the Global Goals*
- ▶ *Power for the World*
- ▶ *Renewable energy poster*
- ▶ *Energy – technical briefs*

Biodiversity and Interdependence

4-02a

I have propagated and grown plants using a variety of different methods. I can compare these methods and develop my understanding of their commercial use.

Factors effecting the growth of crops in the developing world

- ▶ *Pumpkins against Poverty*
- ▶ *Sandy Seeds*
- ▶ *Global Project ideas*
- ▶ *Design for a Better World*

Properties and Uses of Substances

4-16a

I have carried out research into novel materials and can begin to explain the scientific basis of their properties and discuss the possible impacts they may have on society.

The importance of properties in materials in construction and products used in the developing world.

- ▶ *Plastics Challenge*
- ▶ *Small is Challenge*
- ▶ *Beat the Flood*
- ▶ *Beat the Flood - video*

4-17a

I have explored how different materials can be derived from crude oil and their uses. I can explain the importance of carbon compounds in our lives.

Reuse and recycling of plastics in the developing world

- ▶ *Plastics Challenge*
- ▶ *Reuse or Recycle - upd8*

Inheritance

4-14b

Through evaluation of a range of data, I can compare sexual and asexual reproduction and explain their importance to the survival of the species

Global food security

- ▶ *Technical briefs - food*
- ▶ *Global Project ideas*
- ▶ *Design for a Better World*
- ▶ *Agriculture - videos*

National 4/5 Chemistry unit 2

Topic & SCN outcomes

Global Context

Practical Action resources

Topical Science

National 4/5 Chemistry unit 2

The impact of climate change on life of people in the developing world

- ▶ *Plastics Challenge*
- ▶ *Floating Garden Challenge*
- ▶ *Beat the Food*
- ▶ *Technical Briefs*
- ▶ *Climate Change - videos*
- ▶ *Wild Weather*

A number of Practical Action resources in particular STEM challenges can be used for Topical Science Units, class challenges, and Physics National courses.