# Maximising primary cross-curricular opportunities whilst investigating real-world sustainable dilemmas

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# MAXIMISING PRIMARY CROSS-CURRICULAR OPPORTUNITES WHILST INVESTIGATING REAL-WORLD SUSTAINABLE DILEMMAS

This article presents a vignette of an aspect of Initial Teacher Training that examined current sustainable dilemmas and subsequently planned projects aligned to the National Curriculum that could be adapted and delivered in primary classrooms. The aim was to develop pupils' skills in working scientifically alongside aspects of Human and Physical Geography.

## The training context

The Core Content Framework (CCF, 2019) ensures that student teachers share their training experience with expert colleagues, using the best available evidence to understand what makes a particular learning and teaching approach successful or unsuccessful. Developing reflective practitioner dialogue with mentors enables students to critique how a range of approaches might be integrated into their own school practice. This analytical and deconstructive framing when working with expert colleagues enables student teachers to develop career-long skills based on observation, modelling and sustained practice, to become confident and competent teachers in a primary classroom (Dockerty, 2019).

The National Curriculum in England (DfE, 2013) presents a particular challenge in fitting the breadth of content into any one academic year. To overcome this, the practice shared herein operationalised cross-curricular planning through sustainable projects that tackled sustainable dilemmas impacting on the school community. School stakeholders were invested in learning and developing skills together to achieve a common goal. This provided a structured learning and teaching process for consolidating the student teachers' practice whilst simultaneously developing pupils scientific and geographic skills.

## The curriculum foci

Jessie designed a cross-curricular sustainable project to deliver in a primary key stage two classroom. She chose to focus on UNESCO principles of Education for Sustainable Development and a shared ethos focused on "Education for Sustainable Development (ESD) that empowers

learners of all ages with the knowledge, skills, values and attitudes to address the interconnected global challenges we are facing, including climate change, environmental degradation, loss of biodiversity, poverty and inequality" (UNESCO, 2021). This project focused on water harvesting from educational buildings for replenishing green outdoor spaces, and was connected to the curriculum as follows,

National Curriculum Exerts

KS2 Human and Physical Geography

Human geography, including: types of settlement and land use, economic activity including trade links, and the distribution of natural resources including energy, food, minerals and water.

Geographic skills and fieldwork

Use fieldwork to observe, measure, record and present the human and physical features in the local area using a range of methods, including sketch maps, plans and graphs, and digital technologies.

KS2 Working Scientifically

Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.

Y4 Living things

Recognise that environments can change and that this can sometimes pose dangers to living things.

DfE. (2013) Programmes of Study Key stages 1 and 2

A problem-based scenario provided by the Royal Society of Chemistry (2015) contextualised a real-world dilemma pitched at a level for university students. The aim was to model how this way of teaching could be adapted for use in primary schools.

The sustainable dilemma

The Midsummer university hosts 12,000 students, 3,000 of those are living within university accommodation. A large number of people, understandably using many resources within the university. Water usage at the university was high and consumption was increasing. Specifically, the chemistry department water usage contributed ⅓ of the universities annual water bill. The 3,000 students residing on site, using facilities requiring water in the onsite accommodation block further contributed to water consumptions and significant bills.

Jessie's initial ideas
Initially, focusing on the water wastage within the university because I am passionate about reducing wastage and innovatively I want to use a green system.

By collecting rainwater, it is possible to utilise the Earth's natural resources in a responsible way to reuse water efficiently.

Royal Society of Chemistry (2015) Future cities project

## Jessie's story: supporting the pupils to solve the problem?

### Pupil as researcher

Developing transferrable skills for life was a key aspect of this cross-curricular project. Knowledge of global Sustainability Development Goals (SDGs, UNESCO.org, 2021) and preparing the next generation to fulfil roles in the renewable energy sector to support a "clean energy system and green jobs boom to build back greener with an ambition to be net zero by 2050" (GOV.UK, 2021). Teachers are driven to progressively enable pupils to develop increasingly complex skills to solve real-life problems for jobs that are currently embryonic in development or may not even exist yet.

According to the Green Energy Foundation (GEF, 2021) simple systems could be a starting point for pupils' research. A water collection system from building guttering to channel water to a collection vessel is a good use of space. This source of water is portable and can be distributed via smaller vessels like watering cans to other developed or regenerated green spaces. A lack of green

space in schools provides opportunities to use planters on ledges or mounted on perimeter walls and fences to create colour, food for pollinators or raised beds for growing produce for a local community. Image Credit GEF, 2021.

This was a starting point for my pupils to understand what a rainwater harvesting system might look like and acted as a spring board for researching about more innovative systems like green walls.

Small to big ideas

Once the pupils had mastered knowledge on simple systems, they progressed to look at innovative systems such as green walls. The University of Hull for example used green panels to form part of the perimeter wall of a new single storey car park as an innovative way to produce oxygen via photosynthesis by absorbing $CO_2$, a polluting by-product from car exhaust emissions in the air around the car park. Image credit: Hull University Union, 2019.

Then from this local example in the UK we progressed to examine international green innovation. *The Regenerators*, launched for children ahead of the COP26 summit (BBC Bitesize, 2021), provides case studies to support children to realise the difference they can make. These examples act as comparative vignettes of good practice elsewhere in the World to broaden the pupils understanding of potential solutions to water challenges in urbanised areas. Moreover, as a partial solution to combat impacts of climate change as living walls can absorb about 2.3kg of $CO_2$ per $m^2$ per year.

The scientific team (inspired by the RSC PBL scenario)

The pupils researched and undertook the following roles, almost in a mantle of the expert style (table x).

A meteorologist, providing weather expertise and supporting information for green systems and rainwater collection;

An insect and ecology expert to provide knowledge on ecosystems the green systems could provide;

A bio-civil engineer, to co-plan design solutions for the use of natural products and or designs mimicking nature (biomimicry) within the sustainability project;

Environmental logistical support sharing knowledge around the reduction of transport miles by sourcing construction materials local;

An environmental activist to provide expertise on raising awareness amongst the educational community (through persuasive and informative writing) as to why such change (despite short-term noise from construction) will be economically worthwhile and support a more sustainable campus.

<u>Celebrating and presenting solutions to an audience – the so what, for teaching!</u>

Image and product credit: (Jessie Gleisinger, 2021)

Pupils worked together on these real-life problems, fostered peer support, and developed higher-level problem-solving skills. They collaborated closely to work towards a common goal driven by the feeling that they could make a difference. This project increased pupils' awareness of sustainable issues and they felt empowered to make changes and design solutions that made educational buildings sustainable places to learn and from my perspective to teach. I believe school pupils are central to education for sustainable development, who will grow up to pioneer sustainable ideas of the future all over the World. This increased awareness, was an unanticipated result of the project. Pupils were keen to go home and tell their grown-ups about Midsummer and its problems and how they solved them. That enthusiasm to learn doesn't cost anything and the aim to be more sustainable was achieved, pupils were proud to present their ideas. In my future career, I will use my own passion for sustainability to create projects using PBL strategies and synthesising real-world evidence, to build a classroom ethos that inspires pupils to work through complex problems and manage challenge to build skills for life across the National Curriculum subjects. The future is going to be a challenge but education that is both sustainable and increases our sustainability can make a positive difference to the World.

Kelly Dockerty is a Senior Lecturer at the University of Hull and a Registered Scientist with the Association for Science Education. She has a passion to support regional primary schools with sustainable projects that potentially make a difference to their communities. Jessie Gleisinger is a final year BA Primary Teaching student who has planned cross-curricular sustainable projects to deliver in primary schools and is keen to share her insights of practice with readers of Primary Geography.

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