

SCIENCE IN CYCLES

Dysgu yn yr
Awyr Agored
Cymru

Outdoor
Learning
Wales



Coetiroedd
Dyfi
Woodlands

FSC
BRINGING
ENVIRONMENTAL
UNDERSTANDING TO ALL
THE WAY TO SUSTAINABLE
AGRICULTURE
1996

Real
World
Learning

Country: UK

Name of the programme?

Science in Cycles – a collaborative programme between the Outdoor Learning Wales Dyfi Group led by Dyfi Woodlands and the Real World Learning Network through the Field Studies Council.

Age of the children involved?

From 2 to 15 years old.



Short introduction

Science in Cycles was an exciting and leading edge project that offered an opportunity to bring science learning into the open air through outdoor learning sessions in a woodland setting. The planning and delivery of the six day-long sessions was designed specifically to support positive thinking and action for sustainability.

This project involved collaboration on a local, national and international scale through Dyfi Outdoor Learning Wales (OLW - www.outdoorlearningwales.org) partners led by Coetiroedd Dyfi Woodlands (CDW - www.dyfiwoodlands.org.uk) working together in the planning and delivery supported by the Field Studies Council (FSC - www.field-studies-council.org) in its role as the lead partner in the Real World Learning Network (RWL - www.rwlnetwork.org), a European network project.

The project used the key science concept of cycles to explore the interconnections between the learners, the natural world, the non-natural world, their communities and the global society - all core to developing the systemic thinking, intrinsic values and green competences that underpin sustainability.

The programme was run with the 'Outside Education' group, a well-established group of home educators from across Gwynedd, Powys and Ceredigion in Mid and North Wales. Each session was differentiated for three groups each facilitated by an outdoor learning practitioner. These groups fell nominally into Foundation Phase/Key Stage 1 (1-6 years), Key Stage 2 (7-11 years) and Key Stage 3 (12-14 years). Each of the sessions concentrated on one of the following six themes: water, rocks, nutrients, seasons, life and interconnection. Through these themes, and the activities designed to explore them, the sessions aimed to bring forward and embody the six elements of the RWL model.



What is the frame?

The frame used for the programme was *"All taking requires giving back"*

This way of framing the sessions was chosen as it is designed, if used transparently and affectively, to bring through bigger thinking around the concept of cycles and the strong values of responsibility and sharing. This frame was used as a clear guide by the facilitators to channel their thinking during the planning process and used explicitly at points through the delivery.



All six sessions used this frame which had been agreed at a project planning meeting between the facilitators.

What are the goals of the programme?

To provide the learners with an inspiring learning experience that raises curiosity, develops understanding of scientific concepts of life and connects them to the natural world of which they are a part. Through the process of planning, delivering and evaluating the programme there was a parallel goal of trialling the Real World Learning hand model and providing feedback (see full report for more details).

What values are promoted in the programme?

Respect for nature and care for the state of the planet, equal opportunities for all people to shape their lives and respect for future generations.

Through the modelling of the facilitators, the settings used, the design of the activities and the guidance of the frames these values provided the core basis and ethos for this programme. *Respect for nature and care for the state of the planet* came through very strongly in the way interactions with the natural environment were modelled and set up through the activities. Transferring this respect into the interactions between all involved in the programme, and to the planetary scale through exploring connectivity at all scales helped promote these values. Through working with a very mixed age group, and alongside parents, offered the opportunity to bring forward *equal opportunities for all people to shape their lives*. This was embodied in the careful differentiation of the activities that allowed all to participate and to lead their own learning, and also came through in activities designed to explore global connections relating to equal opportunities and social justice. *Respect for futures generations* was promoted through consideration of future users of the woodland, both human and non-human. Activities to ensure the environment was sustained for those generations were included in the programme.



How were learners empowered to shape a sustainable future?

- **enable learners to cooperate, participate, take responsibility and learn in a self-directed way**

During each day long session a part of the day was dedicated to offering an opportunity for learners to lead their own learning, working alone or with others to further explore the learning from earlier in the session. This, along with many other aspects built into the programme, offered significant opportunity for learners to cooperate with one another and to play an active and responsible role in their learning and the learning of others.

- **enable learners to deal with their own feelings and the feelings of others**

Due to the nature of the group being home educated learners for this programme the social context offered a rich opportunity for dealing with feelings. Working as part of a larger group offered an emotional challenge to many of the learners, requiring them to deal with their feelings and those of others in a more benevolent manner. Through dealing with some larger global (particularly with the older group) feelings were often challenged. Through a process of working with some of the younger learners these older learners found the opportunity to work through these feelings to come away with renewed hope for the future.

- **allow learners to take ownership of their learning and reflect on what and how they have learned**

This element was brought forward most strongly through a 'Sharing community' activity at the close of each session. Learners, parents and facilitators from all three age groups would come together to share what they had been doing through the day. This offered a very focused opportunity for the learners to reflect on their learning in order to share it affectively with the others. Through this sharing process the ownership of the learning was cemented with the learners themselves.

- **empower learners to be creative, flexible and able to take positive action to deal with change**

Through exploring seasonal cycles and variability in climate learners took on the challenge of finding solutions to these problems when faced with the need to continue food production in a changing world. With minimal support the learners worked together to find solutions to this real world issue, developing positive solutions through taking a creative and flexible approach.

- **enable learners to become conscious of interconnectedness - you, me and the world around**

This came through strongly in many elements of the programme. Transferring the learnings across all elements of the Hand Model brought interconnectedness to the conscious level, in terms of understanding, experience, values and empowerment. This was an area of the programme that the facilitators found very powerful, and one on which to work in developing their practice.





Which of the specific scientific concepts does the programme relate to?

The focus of the project was on cycles that take place within the woodland and that can be seen to work on a range of scales from the micro to the global. Within the exploration of these cycles, including the cycling of water, rocks, nutrients, seasons and life, other key scientific concepts of life were also explored.

Cycles: e.g. Learners explored different rock types and how they relate to different small and large scale processes that erode, transport and deposit material across the face of the planet in a long term cycle.

Energy flow: e.g. Learners acted out food webs within the woodland as part of their exploration of life cycles. Through this activity the flow of energy from the sun through the different organisms in the web was explored.

Change: e.g. during explorations of the water cycle learners had the opportunity to observe and play with the changing states of water between a solid, liquid and gas.

Stability: e.g. Climatic fluctuations in relation to seasonal variations were explored through looking at tree rings and climate data. This led into a discussion around climate change and stability of the climate system in relation to carbon dioxide levels which has also been explored as part of a geological timeline when looking at the rock cycle.

Transferability: Which areas of learning are included and how?

The Science in Cycles sessions were designed with an initial collective activity that aimed to link the learning planned for that session to the learners' life as an initial hook. This sometimes involved the learners bringing items from home that were then used to connect them to the cycles being explored. For example bringing a small household item to the final session that was then used to find interconnections between all the cycles previously explored.

As participants arrived at each session they were greeted by a tray bearing waiter (one of the older learners dressed in black tie) who offered them something, sometimes with a thought provoking choice that connected them to the cycle being explored. This included for example a drink of water and seasonal fruit from hedgerows and abroad (who's seasonal?)

Once all participants had arrived and taken part in the 'Raising curiosity' activities everyone was welcomed and introduced briefly to the session content. As part of this process all participants were congratulated on their amazing achievement of having continued to successfully be a part of the water, nutrient and life cycles of the planet. This was built up as each cycle had been explored, and was also reinforced at the end of each session to keep highlighting our inextricable connectivity as a part of nature.



During each session the facilitators planned, where appropriate, opportunities to transfer the learning to other areas of life beyond the natural setting in which the learning was taking place. This took a number of forms including through specifically designed activities, questioning and discussion.

At the end of each session parents were given a handout that offered some insight into the structuring of the sessions, and also gave additional ideas of where to take the learning between sessions. This offered the opportunity for further transfer of the learning into the learners communities and into the non-natural environment.

What educational strategies are used in your programme?

This project was designed, planned, facilitated and evaluated using the Real World Learning hand model.



This model itself also draws on a wide base of education strategies, research and pedagogies. For further details see the Real World Learning website www.rwl-network.org.



How is the programme evaluated?

A range of evaluative techniques were employed and trialled as part of this project. The main form of evaluation with relation to the RWL model took place as a structured discussion between facilitators directly after each session, in the form of a feedback questionnaire at the half way point of the project and a project evaluation diner at the end of the project. In addition to these methods feedback was sought from the home educating parents and a Volunteer Employed Photography evaluation was trialled with members of the KS3 group. The evaluation of the learner experience and longitudinal thinking and action change around sustainability are recognised as areas for development.

Describe the programme

In order to help develop a programme that embodied the RWL model's thinking the sessions were planned with a structure that brought through certain elements of the model more strongly during different parts of the session. This was not to treat the model as a tick list, rather to offer structure for thinking and delivery of a holistic learning experience. This looked as follows:

Session Structure	Outline	Focal elements of the model
Opening activity - <i>Raising Curiosity</i>	This part of the session involved a range of activities for all ages to stimulate curiosity. It aimed to provide a hook for all learners to take into the main activity, while also connecting the learning to their lives. This included finding and piecing together large jigsaws created by a local artist visually depicting the cycle and its interconnections.	Experience, transfer.
Main activity - <i>Us, the woodland and the planet</i>	This element developed the thinking around the cycles concept, taking the learners on a journey that connected their lives with that of the woodland and the planet.	Frame, understanding, experience, empowerment, values.
Lunch	Lunch times offered a chance for free play as well as the occasional thought stimulator related to the cycle for that session (e.g. Where are your nutrients from in the world?).	Transfer
Self-direction - <i>Exploring self-direction</i>	This session offered the chance for the learners to further explore their learning from the morning in a self-directed way. The level of guidance varied from week to week and group to group.	Empowerment
Closing activity - <i>A sharing community</i>	The last part of the session brought everybody back together to share what they had explored that day. This allowed an open sharing process between all ages, a very values rich activity, and the chance to consolidate the learning experiences from the day and the connections with other areas of life and sessions.	Empowerment, values, frame.