



Awe and Wonder!

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According to the ([Cambridge online Dictionary 2022](#)), the word '**environment**' simply put means the conditions that you live, work and play in and the affects that these conditions present to influence your outcomes. [Cambridge Online Dictionary](#)

This portfolio will examine my chosen outdoor environment in detail and it's links to promoting scientific and mathematical development in the early years.

There are so many inspiring environments on our doorsteps, waiting for young minds to explore. (**EYFS 2021**) highlight in the written standards document for child development and learning, that early years settings **must** provide access to outside environments and planned activities.

In choosing the outdoor environment for my portfolio I came across many inspiring outdoors images that made me observe in awe..... Rock pools, parks, built up urban areas, wide open spaces and woody forests.



1 -

- **Rock pool's**
- <https://www.uksouthwest.net/p566/worms-head-pool.jpg>
- (Uksouthwest.co.uk, No date) (Image)



2 -

- **Parks**
- https://images.saymedia-content.com/.image/t_share/MTc0NTk0MjgxNzU4Nzk1NzIx/natural-playgrounds-for-kids-advantages-and-problems.jpg
- (Saymedia 2022) (Image)



3 -

- *Urban*
- *(Own Image, 2022)*



4 -

- *Urban 2*
- *(Own Image, 2022)*



5 -

- *Wide open spaces*

- <https://images.unsplash.com/photo-1612056026402-ac9e86c277e0?ixlib=rb-1.2.1&ixid=MnwzMjA3fDB8MHxzZWFiY2h8Mnx8bmF0dXlJTlwcGFya3xlbmwxfHwwfHw%3D&w=1000&q=80>

- (Unsplash.com, No date) (Image)



6 -

- *Woody forests*

- [https://www.treehugger.com/thmb/QoIJfOYFmxwIH6Sxv5SBqY8Kg-M=/1885x1414/smart/filters:no_upscale\(\)/GettyImages-1273584292-cbcd5f85f4c646d58f7a7fa158dcaab.jpg](https://www.treehugger.com/thmb/QoIJfOYFmxwIH6Sxv5SBqY8Kg-M=/1885x1414/smart/filters:no_upscale()/GettyImages-1273584292-cbcd5f85f4c646d58f7a7fa158dcaab.jpg)

- (Treehugger.com, No date) (Image)

I then turned my focus towards a topic I am very passionate about, **sustainability**. I looked at images of pre school gardens and allotments and read literature on their links to science and maths.



7 - Flowers and Vegetables

(Bing Image - Sway 2022)



8 - Allotments

<https://elsteadvillage.co.uk/wp-content/uploads/2019/06/Elstead-Allotment-1-1024x610.jpg>

(elsteadvillage.co.uk, 2022) (Image)



9 - Pre-school Agriculture

(Bing Image - Sway, 2022)

My chosen image is of a sustainable working school garden area.



10 - Sustainable school garden area

<https://www.educationworld.com/sites/default/files/gardenspace2.jpg>

(Educationworld.com 2022)

This environment is an interesting setting where learning through play, experimentation, and participation can have a lasting impact on the individual child's life long learning. (Cremin et al 2015) state in their article that continuous participation in activities taking place in an outdoor environment and building connections with living things; produce the emergence of curiosity and questioning with strong links to the world around us.

According to (Tovey, H. 2017) Froebel passionately recognised that the garden was the perfect environment for early years children. Through gardening and play, a child could develop skills in exploration and with that inquiring mind they would pave the way for a deeper understanding of the world in which they live. Discovering beauty in nature and learning to take responsibility at a young age would develop an appreciation that would grow with the child. During the 'seed to harvest' process Tovey describes the child's ability to "*Experience the rhythm of nature*" learning to understand significant circumstances such as life and death cycles, how and why things grow or don't grow and the importance of seasons each in turn having relevance to their environment. Through participation the children can become part of creating something magical and meaningful.

Section 2 - How can the sustainable school garden environment - encourage, develop and support the progression of scientific and mathematical learning?



The surrounding environment, whether natural or man-made, impact a child's ability to learn about the world. One small area of grass may provide opportunity to discover a mass of new information or develop creative, imaginative insight into learning through curiosity.

This garden image, rich in new life and new experiences, enhances the users' opportunities, encouraging **awareness, wellbeing, responsibility, positive self-discovery and physical exercise**, while engaging in areas such as **mathematical and scientific learning**.

Through exploration both guided and independent, new skills such as **confidence, teamwork, and communication** can enrich the individual learning experience. Added to this, literacy and numeracy

skills, scientific and mathematical skills, and art and creativity skills tick all the boxes in adhering to the New Curriculum in Wales and appears to be a perfect setting for the developing early years child. It's links to **nature, healthy living, physical and emotional wellbeing and understanding the world in which we live**, create a holistic and effective space to allow children to play, experiment, explore and learn.

While all the above core subjects are equally important in the early years, I am focussing on the links to **mathematics and science**.

Growing maths skills in the garden



If a setting is lucky enough to be involved in the process of '**seed to harvest**' projects, the range of **mathematical** opportunities are abundant. From measuring to sales, mathematical skills are used to develop the child's understanding of growth cycles, living creatures, agriculture, and business.

Using early years mathematics techniques, the process of growing a pumpkin can encourage a child to measure distance between planting areas, estimate, sort, count, add and take away seeds to plant. Experiment with basic ratios of compost, earth, seeds, feed and water and engage with the concept of time and distance. The use of larger seeds such as pumpkin seeds, cucumber seeds or bulbs can be helpful in the early years with little fingers and early dexterity. Maths plays a part in studying the stages of growth during the plant cycle as well as the numeric value of its produce.

Moving on from the act of planting and growing, the natural process of germination will promote skills in ordering and problem solving. Take for example the sunflower, as it grows it will need to be supported by an upright structure or the stem will bend and break. This would need to be monitored/measured and added to. Another issue that may involve numeracy and problem-solving techniques are monitoring those hungry bugs, keeping a close eye on how many visitors the plants, vegetables and flowers are attracting and if they are helping or causing damage.

When the vegetables are ready for harvest, maths skills are back in play. The sorting, measuring, and weighing of the final product. The curiosity now developed into a creation. The experiment into a physical outcome the child can see, feel and in most cases taste. A reward for their patience and responsibility. Maths can take a new direction from this point, the children can price and sell their items in a school farm shop or go on to see how many items can be made into their favourite foods, these experiences can follow the children home as they present their family with their very own carrot or cucumber and see how many slices it can be cut into to make a tasty casserole or salad.

The science patch...



Within the 'Statements of what matter' regarding Science in the **Curriculum for Wales (Hwb, 2022)** it encourages interaction, and a developing understanding of the environment, nature and evolution. The curriculum places significant value on educating children in the 'living world', highlighting different living organisms and their interactions and functions within their environments.

The curriculum also asks practitioners to recognise how science impacts sustainability and the environment, which links closely to the nature of this project.

In an early years setting, a sustainable garden area such as the one in the photo can provide a wide range of scientific learning opportunities.

(WRWA 2022) Shares some fantastic insight into the **chemical and biological processes** of creating compost. Children can be given the tools to create an informed decision to collect their waste and recycle it into plant food. Waste such as fruit and vegetables, egg shells, tea bags, grass cuttings and cardboard can be recycled to begin the scientific **wonder** that occurs, together with some earth and

the addition of some lovely worms from the garden, not forgetting a little help from the weather. This can be a fantastically messy ongoing experiment and if there is a chance it can be done in a container that has a small window, the fascinating chemical combination of waste, micro-organisms, bacteria, atmosphere and minibeasts can be a spectacle to observe and investigate.

"Did you know, there are more micro-organisms in a teaspoonful of soil than there are humans alive on the planet."

(BBC - Gardening, 2014)

Biology can also be a fantastic science strand to study in the garden. How plants are structured, what are plants made of, how are they made and what are their jobs? Can you describe or identify the plant? What does a plant need to live? What is the **life cycle** of a plant? How does water move within a plant? **Pollination**.... so many areas just surrounding the plant! That's without studying the science behind insects, other forms of wildlife, habitat, weather, and not forgetting **human interaction** and it's positive and negative affects.

Physics in the sustainable garden setting can be investigated when climate changes **density** of soil or fluids, when **gravity** makes the tomato plant lean over without assistance or the fruit fall from the tree and the **construction** of supporting structures and frames, testing **weight and durability**.

A lovely example of a using science in the garden to support development of learning in the early years would be to create fact files documenting pests in the garden, brainstorming how we can keep the vegetation safe. How we can identify pests, making pictures, creating awareness, researching the insects and what they need. Maybe creating an area where they can't cause any harm? Creating new habitats to solve problems!



11 - Bing Images (Sway, 2022)

Learning in this natural environment can be incredibly nurturing and fruitful for young children, as they learn to associate with their surrounding environments outdoors, they are forced to question processes such as the seasons, where their food comes from and how it is made.

These outcomes are encouraged and supported by the Welsh Curriculum's 4 purposes. With a structured approach, learners can become equipped and confident, creative and ready to

contribute through exploration of the sustainable gardening, learning about their world and the serious implications of global warming. Taking steps to understand the values in producing final products and the life long health, well-being and socio-economical benefits for themselves and their wider communities. (Hwb, 2022)

Risk Assessment Sustainable school garden 2022 - ECEY5005



Location / Activity:	Sustainability garden / Gardening Activities	Date:	20/09/2022
Assessor:	Hayley O'Malley	Review date:	20/11/2022
Name of activity:	'Seed to Harvest'	'Composterium'	
Description of activity	Initially preparing soil to plant seeds to grow fruit, vegetables, and flowers.	Food waste collected by children from their snacks, school meals, and kitchens. This waste is added to the compost bin with a layer of garden waste, (grass/dried leaves/shredded paper). Worms and insects are added, and the decaying process continues over the next few months. Following this the children empty the completed nutritious soil, to add new compost to the vegetable garden.	
Appropriate for which ages and abilities	Age 2+ years upwards	Age 2+ years and upwards	
Equipment or resources needed	Gardening tools – for example: Trowel, bucket, watering can, seeds and access to means of water.	Compost bin/bin with lid, compost bags.	
Any special adaptations for different needs	Accessible equipment	N/A	
Benefits e.g. Soft/Hard outcomes, Early learning outcomes, Key stage outcomes	- Engagement in active outdoor exercise - Improve memory and focus skills - Increased dexterity - Awareness of environment - Sensory exploration - Motor skills development - Responsibility - Patience - Introduction to mathematics, science and literacy - Encourages healthy eating - Reduces stress and poor mental health - Develops social skills • Develops senses - Aids communications - Links with community	- Opportunity for hands on learning - Raises awareness of environment - Creates lifelong good habits - Introduces children to conservation of nature - Children will observe organic processes - Stimulation to support growth, independence, responsibility, and confidence - Promotes sustainability - Reduces carbon footprint by reducing food waste - Academic teaching opportunities through lessons, e.g., The carbon cycle - Stimulate senses.	

Activity for assessment of risk	Hazard (potentially dangerous activity, occurrence or physical item)	Risk (incident / accident that MAY happen)	Likelihood + Severity	Benefit	Action to remove or reduce risk (The whole group can learn to take their own precautions guided by the forest school leader)	Who?	When?	Risk Level (when actions observed)
Gardening Planting seeds – tending to plants. Compost creation	Digging and planting in soil	Possible contamination or risk of infection	1	Sensory exploration. Increased dexterity. Outdoor exercise. Develop motor skills.	Check land via Local Authority and environmental health. Up to date vaccinations, reinforce hand hygiene/ wear gloves to garden.	Pupils and Staff	During school term time Sept 2022-July 2023	1
	Types of plants / Types of waste / Types of soil	Possible allergic reaction	1	Awareness of environment. Discovery.	Wear gloves to garden. First aid trained staff. Ensure allergy action plans on hand.	Pupils and Staff	During school term time Sept 2022-July 2023	1
	Wildlife/insects	Stings, bites, potential reactions.	5	Awareness and exploration of nature and life. Science.	Wear gardening gloves always. Clear instructions. First aid kit available with antihistamine products.	Pupils and Staff	During school term time Sept 2022/July 2023	1

	Chemicals	Skin irritation, breathing difficulties.	1	Experiments and learning	Wear gardening gloves always. Frequent hand washing. First aid member of staff present. Adults to administer chemicals when children are not using facilities.	Pupils and Staff	During school term time Sept 2022-July 2023	1
	Tools	Cuts, splinters, and scrapes. Dropping heavy tools on feet.	5	Develops motor skills, outdoor exercise, improves concentration and dexterity.	Clear simple instructions for use of all tools. Appropriate size and weight. Well maintained.	Pupils and Staff	During school term time Sept 2022/July 2023	1
	Wet/uneven ground – weather conditions	Slips, trips and falls	5	Outdoor activity in all weather can build resilience and engagement during seasons creates valuable learning outcomes.	Obvious risks removed. Risk assess throughout the session. Be vigilant of any changes. Practices and promote safe respectful movement through the area.	Pupils and Staff	During school term time Sept 2022/July 2023	1

likelihood	x	severity	risk level and acceptability		
			Low - L	medium - m	high - H
1-5	x	1-5	1-5 acceptable risk level	5-12 acceptable with precautions	12+ unacceptable risk level - find ways to reduce risk.

Adults supporting Science and Mathematics outdoors



Following on from the description of the outdoor sustainable garden chosen for this assignment, **(RHS, 2022)** demonstrate a huge range of ways to encourage children's interest and engagement in gardening. From the very first idea of imagining and creating how their garden will look, smell, sound, taste and feel, through to the habitats and wildlife they wish to discover and the ways in which their own efforts can support the wider community. Research into what can grow and when, can be done in advance and laid out for the children to choose what they wish to plant, nurture and grow. Interactive resources can be a fun and engaging layer of learning, including digital technology in line with the curriculum. Also, the provision of stations for tools and water must be provided if there are no natural sources of provision.

(White, 2020) like **(Tovey, 2017)** refers to 'rhythms' when she writes about seasons and life cycles in the garden. While the seasons change so does the environment, providing opportunities for experimentation and new immeasurable experiences all year round. In line with the Royal Horticultural Society, **(White, 2020)** refers to developing a fruit and vegetable garden as **powerful** in terms of the learning outcomes for early years, especially for those children who do not have access to a garden environment or an adults' input at home or in the community.

This directs an emphasis towards a very important factor that can affect and alter these environmental outcomes greatly, **The enabling adult.**

Research into reports such as **Marmot's Review**, indicate the need for urgent progression in educating children from an early age, to avoid the worlds growing social and economic inequality crisis **(Marmot Review report – 2010)**

The **New Curriculum for Wales** acknowledges that understanding how learners progress is invaluable to the curriculum's own progression. It addresses the supporting stages of learning and

how these can no longer be associated with the physical age of learners. (Challenging the cognitive theoretical works of Piaget) The New Curriculum endorses a pedagogical, conceptual strategy where educators and decision makers reflect upon observation, planning and child led analysis to enhance their suitable internal curriculums. **(Developing a vision for curriculum design - Hwb, 2022)**

While the chosen sustainable garden area must, to a certain degree, be structured in its design and approach, it is the responsibility of the adult to recognise the varying paths children will take to influence outcomes and experiences.

(Wilson, 2013) uses words such as fascination and awe to describe a child's feelings when engaging with the natural environment, filled with opportunities to discover and to create. Wilson uses the analogy of children communicating in their own unique way, in a serve and return sequence with nature, going on to suggest the key to successful adult enablement is to observe and recognise each individual's relationship with the outdoors, and all its possibilities for that child.

(Keith, 2018) States that observation skills are crucial in witnessing sustained shared thinking, this produces effective learning characteristics that support a child's individual learning journey. **(Brodie, 2014)** Acknowledging the varied stages and natural abilities in early years children, especially when encouraging sensitive exposure to mathematical and scientific engagement, can mean the difference between a child achieving a goal or giving up in an explosion of overwhelming frustration. **(Keith, 2018)**

(Keith, 2018) encourages layered, schematic learning to build confidence and interest in core subject themed scenarios. For example, 'Positioning' schemas, using loose parts, lining up plant pots or seeds and bulbs, organising into groups and rows. This can facilitate early maths and numeracy problem solving skills, pattern making, exploring shape, size and weight and categorising. **(Pound, 2006)** Alongside this **(Nutbrown, 2011)** explains how 'Transforming' schemas can encourage early scientific curiosity, changing soil by adding water, growing, and developing, time and nurture.

(Athey, 2007) writes that if an environment is rich in loose parts and freedom to engage in independent play and learning, then schematic behaviours will be observed in abundance.

(Keith, 2018) advises that it is critical and, in the child's best interests, to discover concepts through their own means, instead of trying to break down and understand the outcomes that an adult is expecting them to find. She also believes that interpreting maths and science through avenues such as song and movement can allow information to become innate to the child more so than the written or spoken word.



(Peaker, 2021) Applied her **Froebelian teachings** to a community garden project in 2021 in Newcastle-upon-Tyne. This project received an innovation award in 2019 to create a garden for families to engage in 7 days a week in all weathers. The enabling adults within the team maintained

a provision that explored interconnectivity using natural resources and led a day-to-day representation of open-ended activities linked to Froebel's designs in an enabling environment.

(water/mud/soil/sand) The staff thrived on conversational moments with the young children, deeply engaged in activities of their choice, and felt they learnt as much if not more than them in the process.

(Tunnicliffe, 2015) highlights how children can sometimes offer involuntary questions disguised as a statement when engaged in play and learning. If caught or observed these questions can aid developing understanding for the assessor. Tunnicliffe also suggests scientific thinking stems from exploration of circumstances and the environment, which she believes can be greatly benefitted by a facilitating adult. Using a recipe approach the adult can create an environment where the child will learn scientifically by experiencing what happens themselves.

(White, 2020) offers encouragement to practitioners and care givers, to not shy away from the gardening environment based on their lack of skill or experience, but to experiment and learn hand in hand with the child or children. Providing unique, genuine, natural outcomes full of intrigue and excitement for all participants. This procedure White aptly names **"Companionable learning"** and believes it can contribute to a more meaningful, interesting way of learning. Another effective suggestion (White, 2020) shares, is to construct a **'visual path of routine'**. This can be led initially by the adult using a plan of preservation, but once the basic expectations are identified, this process can be handed over to the children to maintain independently. This could potentially allow the enabling adult to witness authentic learning by means of assessment, observation, recording and analysing **metacognitive talk**, capturing photos, videos, schemas, and drawings etc to later reflect upon.



*An example of this would be to explain to the children about **weeds**. The children can continuously investigate the garden for anything that they believe may be a weed, leading to learning more about plants and investigating wildlife habitats during their discovery process. This could also bring about the socially difficult situation of not belonging somewhere which can allow the children to think both cognitively and emotionally.*

Did you know that the weeds you find in the garden can be used as indicators to show us how fertile or dense the soil is? Nettles and dandelions can indicate good, fertile soil while daisies are found growing in low fertile conditions.

With the curriculum's new purposes set to roll out over Welsh schools and learning environments, the vision of improving education and lifelong learning is being eagerly promoted. **(GOV.WALES, 2022)**

While the new Welsh Framework aims to aid individual schools in designing its own personalised, suitable curriculum, there are some concerns regarding the impacts on the poorer parts of Wales. Although the guidance refers to ensuring a consistent approach for all learners throughout the country, and expectations, in the form of assessment criteria is in its early developmental stages, the likelihood that we will find limitations in some areas is sadly becoming more obvious.

A blog written by **(Power, Taylor and Newton, 2020)** published on the **BERA** website, shows concerning research into the early stages of the New Curriculum in Wales. The writers note how teachers and educators are expected to leave behind traditional teaching methods and approach lessons in a more creative way. This the authors suggest is being done in the hope that the achievement gap can be reduced. However, although they acknowledge the sound intentions of all those engaged in making these curricular changes, they express their anxiety, believing it will have the opposite effect on learners' outcomes in Wales.

In their research they refer to **Bernstein (1975)** whose writings, half a century before, highlighted the expense of a curriculum centred around the child. The opportunities the curriculum is now aiming for, for example, to be enriched in terms of visits outside of the learning environment, is according to (Power, Taylor and Newton 2020) already uneven and disjointed, unearthing a depth of differences between learners from poor families and their better facilitated peers. The writers call the new curriculum **radical** and believe areas of inequality will be amplified dangerously without a substantial investment, and a guarantee that students in areas of disadvantage are equipped and supported to receive the very same experiences, as students in more affluent circumstances.

To Conclude



Looking back to the photo of the sustainable garden and its links to the mathematical and scientific curriculum, there are substantial benefits both in theory and practice to the growing child that link with the New Curriculum and an ongoing body of research, that evidences the opportunities this learning experience can offer for both children and practitioners.

However, it would be irresponsible to believe that all settings will have the means to take this concept and create this wonderful, engaging space. Whatever the activity be it a large planting allotment or a small herb garden grown with love in a window box, **Awe and Wonder** can be discovered all around us and nature can provide the questions and the answers for the curious child.

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Image 10 - https://images.saymedia-content.com/.image/t_share/MTcONTk0MjgxNzU4Nzk1NzIx/natural-playgrounds-for-kids-advantages-and-problems.jpg

Image 11 – Rocks river - <https://images.fineartamerica.com/images/artworkimages/mediumlarge/2/shallow-river-svetlana-sewell.jpg>

Image 12 – School garden - <https://www.educationworld.com/sites/default/files/gardenspace2.jpg>

Image 13 – school shop - <https://i.pinimg.com/originals/51/26/6b/51266b93f710ab675da2ec0b7064bb5a.png>

Image 14 - <https://thumbs.dreamstime.com/z/vegetables-weight-scale-20207527.jpg>

Image 15 - https://i.etsystatic.com/18019705/r/il/2d1c57/2265688654/il_fullxfull.2265688654_f47o.jpg

Image 16 - <https://i.pinimg.com/originals/87/d6/5c/87d65c674f28b9c9455cea56cfad60e1.jpg>

Image 2-Allotment - <https://cornishstuff.com/wp-content/uploads/2019/07/Allotments-1.jpg>

Image 3 – Allotment - <https://elsteadvillage.co.uk/wp-content/uploads/2019/06/Elstead-Allotment-1-1024x610.jpg>

Image 4 – Allotment –

Image 5 – Allotment - <https://i.pinimg.com/originals/88/f3/a4/88f3a47ae720b071eaf4b4a4ca936466.jpg>

Image 6 – Allotment - [http://3.bp.blogspot.com/-nFXe2J5ocVM/UEYUIyKj98I/AAAAAAAAAT4/I-Fmi4nYAOQ/s320/Allotment+\(81\).jpg](http://3.bp.blogspot.com/-nFXe2J5ocVM/UEYUIyKj98I/AAAAAAAAAT4/I-Fmi4nYAOQ/s320/Allotment+(81).jpg)

Image 7 – Rock pool - <https://www.uksouthwest.net/p566/worms-head-pool.jpg>

Image 8 – Nature park - <https://images.unsplash.com/photo-1612056026402-ac9e86c277e0?ixlib=rb-1.2.1&ixid=MnwxMjA3fDB8MHxzZWFFyY2h8Mnx8bmF0dXJlJTlwGFya3xlbmwfHwwfHw%3D&w=1000&q=80>

Image 9 – Forest - [https://www.treehugger.com/thmb/QoJfOYFmxwIH6Sxv5SBqY8Kq-M=/1885x1414/smart/filters:no_upscale\(\)/GettyImages-1273584292-cbcd5f85f4c646d58f7a7fa158dcaeb.jpg](https://www.treehugger.com/thmb/QoJfOYFmxwIH6Sxv5SBqY8Kq-M=/1885x1414/smart/filters:no_upscale()/GettyImages-1273584292-cbcd5f85f4c646d58f7a7fa158dcaeb.jpg)

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