

How outdoor environments can promote scientific and mathematical learning in the early years.

Part 1.



Figure 1 – Sunflower field in Rhossili, Gower, Swansea.

Part 2.

Figure 1 is an enabling environment for the development of children's Learning. Lots of areas of learning can be expanded within this outdoor area, Focussing specifically on mathematical and scientific learning, expanding the holistic learning of children.

Figure 1 shows a field of bright sunflowers of different heights and colours. This environment is full of opportunities to engage in mathematical and scientific learning and to expand on the children's knowledge and current skills.

This environment can be used to develop mathematical and scientific learning in many different ways. For example, mathematically, the use of colours, shapes, sizes, ad

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heights can be developed in ways of simply talking about and exploring the area. A conversation or task discussing the different colours of the sunflowers, whether they are light yellow or dark yellow and questioning the few red sunflowers in the field. The children can be asked to discuss the height of the sunflowers, are they taller or shorter than the children doing the activity, why some roots are thick and others are narrow, or to count the leaves on the stems. The patterns and shapes of the sunflowers can also spark interest in the children's learning. Practitioners can ask many different questions to encourage the expansion of the children's knowledge.

For this activity, scientific concepts will be put into practice. Firstly by explaining plant growth, life cycles and living things to the children. Through the environment shown in Figure 1. There are many opportunities for activities to be made.

The activities I would plan as a practitioner, would be to firstly explain the concept of plant growth and photosynthesis in a simple and enjoyable manner to the children.

Explanation of plant growth and photosynthesis

To explain plant growth, and its life cycle I would tell them that plants start as seeds, making connections to other familiar life cycles such as how chicks hatch from eggs. For this seed to start growing, it needs to be planted in the ground with lots of soil, and watered often. As the seed grows, the plant will begin breaking the seed, growing its roots into the ground and pushing its stem above the soil to make an appearance, as the stem grows bigger and taller, leaves will start to grow. These leaves make food for the plant. Some plants grow into flowers, these will have seeds inside them, these seeds fall from the flowers into the soil and a new flower is planted.

To help and encourage the children to follow along I will use diagrams to show them.

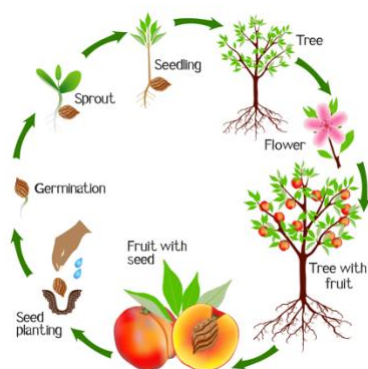


Figure 2. PrimaryLeap (2022)

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Next, to explain photosynthesis In simple terms, I would explain that plants such as these sunflowers Need food and water to survive, just as we all do, this process is called photosynthesis. This happens inside the green part of the plant such as the stems and leaves on the sunflowers. For plants to make their food, they need:

- a chemical called carbon dioxide from the air which enters the plant through its leaves.
- water from the soil they are planted in which the plant absorbs through its roots.
- the light from the sun which gives the plant its energy.

Photosynthesis is very important to the plants as it gives them their food and water to survive. Plants are also very important for all other living things, such as us.. as they create most of the oxygen we breath. Again using a diagram so the children can follow along.

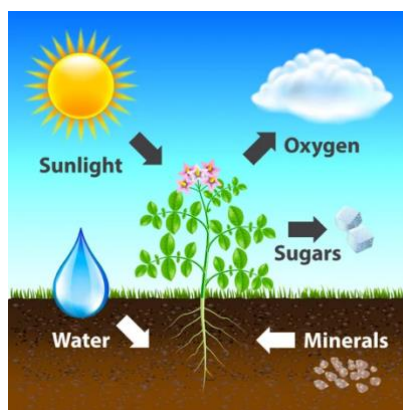


Figure 3. Learning Resources (2019)

Songs about plant growth and photosynthesis are also available as an entertaining way for the children to remember how they both work.

Following the explanation of plant growth and photosynthesis the next planned activity is for the children to plant their own sunflower seeds. This can be done in small pots so the children are able to keep them and watch them grow as they water them.

As we count how many sunflower seeds each child needs, they can also discuss the shapes and colour of them to interlink and Delos their maths skills along with the scientific benefits to this activity. The children will have the opportunity to dig up soil

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and place it into their plant pot using a shovel, then planting their seed into the soil. Once this has been planted, they can then use a watering can to water their sunflower. Before finishing, I will recap and ask them questions on plant growth and participation, and remind them that they are in charge of watering their new plant. As they take these plants back with them, they they can watch how their plant grows and understand the full concept of plant growth and photosynthesis.

The children can further this learning experience by taking sunflower stems back home or to school. Lots can be done with these sunflower stems that can also teach new scientific concepts.

An activity to do later on is to dry out the sunflowers. The stems should be aced in a dark, dry area where the children are able to visit to watch them dry out over time, this will also develop the their knowledge on why the plants need sunlight ad water to be able to grow. Once they are dried, the sunflower seeds, petals and leaves can be used to make art or as loose parts. They can recreate the sunflower field by gluing the dried sunflower pieces on paper, as they remember and talk about the colours of the sunflowers and the way they grow. The sunflower seeds can also be tasted as a way to expand the children's sensory development. With these dried parts from the sunflower stems, the children can experiment with making perfumes, by adding petals and other parts of the flower to water, this will change the state of the sunflowers and they are able to identify different smells from them.

Tovey, H. (2017), explains the views and practice of Froebel. Froebel believed that an understanding of the natural world was essential for children's development and it was built through gardening, outdoor play and exploration. Many theorists express their beliefs on the benefits of outdoor play and learning for young children, along with Kramer and Rabe-Kleberg (2011) who that Authentic, hands on experiences, develop their scientific learning as children begin making connections within their surroundings.

Enabling adults should create emotionally safe environments to encourage and support children in positively communicating and managing their feelings. children's natural curiosities should be encouraged and developed. This will create a child led

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environment where practitioners are able to progress to these experiences and make them possible, while encouraging an area of learning. (Education Wales, 2022)

Part 3.

RISK BENEFIT ASSESSMENT

Location / Activity:	Sunflower field, Rhosili, Gower, Swansea. Exploring and planting sunflower seeds.	Date:	26.09.22
Assessor:	Laura Palmer	Review date:	26.10.22

The boxes in the table below will expand as you type into them; pre-entered text is simply for illustration. You should delete irrelevant items and replace with text relevant to your circumstances.

Your overall risk rating – Low, medium or high – is based on your judgement about whether the BENEFITS of the activity or opportunity outweigh the RISKS.

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Experience exploring outdoor space in photograph	How will young people BENEFIT from this activity?	Hazards and risks	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
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Exploring the new environment	• Exploring the outdoors is beneficial to children well-being and development. • Builds confidence as they are given opportunities to risk assess themselves, and experience new things. • Teaches responsibility- they are given the chance to understand and take care of the outdoor environments.	• Children may get lost in an environment they are not familiar in. • May be uneven ground- a risk of falling and causing bumps/ bruises abrasions	Children and adults	• To reduce the risk of any children getting lost in an unfamiliar environment, all of the children should wear high vis vests, and uniform and/or something stating where they came from, name of school/ setting and contact numbers. The children should all be told to stay together and hold hands with apart. Before leaving, rules should be made to it venture far out of sight and nowhere without an adult present. They should be aware that there may be other people	H
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Experience exploring outdoor space in photograph	How will young people BENEFIT from this activity?	Hazards and risks	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
				at the sunflower field, and to not talk or go with anybody they do not know. • To reduce the risk of children falling because of uneven ground, a practitioner should walk in front of the group and if they notice any hazards they are to warn everybody else.	

Planting sunflower seeds	• Learning and experiencing first hand about the life cycle of plants. • Experiencing new textures, through soil, seeds and water-developing sensory skills. • Children may come into contact with insects whilst digging the soil, creating a learning opportunity on looking after insects and wild life. • An opportunity to discuss the benefits of sunflower seeds and talk about their	• Seeds may have sharp edges to them and could cause cuts. • Children may ingest soil • There may be a lot of wasps/bees around the area, that could sting the children. • Children may have allergies to sunflower seeds,	Children	• Warn the children that sunflower seeds may have sharp edges so they take precautions when handling them. • Educate the children firstly of reasons soil should not be ingested. • Explain to the children that there may be wasps/bees in the area and if they come near to stay still and not scare them or to call an	M
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	nutritious values.			adult to help. • Before leaving, practitioners should be aware of any allergies. Allergic reactions may still occur so practitioners should have first aid kits at all times out of settings, and contact numbers for children's parents in case they need to take any medication.	
Collecting sunflowers	• Mathematic and scientific concepts can be brought into	Equipment such as scissors/spades may be used when cutting or	Children and adults	• Adults should risk assess the situation at current time, if the sunflower is	M

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Experience exploring outdoor space in photograph	How will young people BENEFIT from this activity?	Hazards and risks	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
	this activity by talking about heights, colours, numbers of leaves/ petals. Children can choose which sunflowers they would like to collect, and try digging it up by the root, this way they are able to see the roots and understand how they grow.	digging up the sunflower.		too thick/ deep to cut/dig safely, an adult may take over, to reduce any risk of harm.	

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Experience exploring outdoor space in photograph	How will young people BENEFIT from this activity?	Hazards and risks	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
Weather	Children will learn that sunflowers grow between spring and summer, and gain an understanding of the different seasons and how the weather affects plants and wildlife.	As this activity will have to take place in spring or summer, some children may suffer from hay fever. There is also a high risk of sunburn in this weather as there is no shelter.	Children and adults.	Practitioners should be aware if children suffer badly from hay fever, in case they have to take any medication when out. Children and adults should also be wearing sun cream and have more in their bag to top up throughout the day. They should also have plenty of water with them to stay hydrated throughout the day. Practitioners should keep an eye of the weather forecast throughout the week, as if it is too hot, the trip will have to be rescheduled so there are no high risks involved.	H

Part 4

Outdoor learning provides a diverse and rich opportunity for young children which should be advocated and supported by adults. (Blanchet-Cohen, N. and Elliot, E., 2011). Practitioners in the early years can develop their own skills and knowledge to be these advocates for the children in their care.

Practitioners may observe and support children's curiosity in the surrounded area, then plan how to develop their skills and learning.

Learning through Landscapes (no date) states that outdoor experiences are core values for children and it is essential for children to have these experiences available for them. A simultaneous indoor-outdoor environment should be created to offer children meaningful experiences and freedom.

Ernst, J. and Tornabene, L. (2012) explain at through environmental education, children are able to expand on the advancement of their values, behaviours, views and skills. These all benefit viable developments.

The progress of students and children in the care of practitioners is reliant on the presence of enabling adults, who's duty it is to project expectations and supply safe environments for the children to learn in. (Education Wales, 2021))

Through being outdoors, children are able to make connections with experiences, play and education. This will help children develop skills they are able to use I the future for their own learning and life skills. The outdoors provide many learning opportunities for children, they whites different patterns, textures, quantities, all contributing to the

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child's development. Enabling adults such as practitioners in early years settings are responsible for creating learning provisions for the children in their care, mathematical provision can be made using natural outdoor objects. Whilst practitioners can provide these opportunities for children, they can also be child-led. Through children initiating their play and learning, meaningful and purposeful experiences are made. The enabling adults should be responsive to the child-led approaches, by developing them to create a rich learning activity. Outdoor environments are ideal for mathematical education, as the outdoors provides numerous natural resources, where children can develop many mathematical concepts. Risk assessment should be completed by practitioners before the outdoor learning activity arises to consider all benefits and risks in the environment. Maths should be fun and attainable, and children should not feel any negative connotations towards the task. By maths being included with outdoor play, it creates an enjoyable experience for the children, who before being able to realise the mathematical side, are able to enjoy themselves. (Robertson, J. 2017)

Sargent, M. (2015) explains the importance of outdoor learning, stating that children are presented with more physical challenges, in a space where they are able to weigh up their own risks, decide upon their own capabilities and being able to push their boundaries to an extent. It is explained that numbers should be used in everyday contexts. Mathematical and scientific concepts can be developed through play such as counting steps, making mind pies and making daisy chains, though these activities, counting, measuring, weighing and threading are involved.

Outdoor learning provides a new way of nurturing children's well-being and development. Through being outdoors, real experiences occur, which mean children are able to grow and experiment with nature such as different elements of water which can create many different learning environments. (Richardson, G. R. 2010)

There are many theorists who explain their views on children's play and development. Both Piaget and Vygotsky describe children's play as creative, explorative, experimental, and allows children to adapt and develop communication and socialisation. (Chakravarthi, S., 2009) As a way to promote and encourage outdoor play and learning, the use of natural and synthetic loose parts. Loose parts are objects that can be manipulated and open ended. They should be used in a variety of different ways, in a play that's not dictated by adults. Loose parts offer unique experiences, and

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expand the curiosity of children. This curiosity encourages and inspires children to engage in more outdoor play.

(Flannigan, C. And Dietze, B. 2017)

Gull, C. Et al., (2019) describe the benefits of loose part play where children are able to be creative, experiment and develop upon cognitive, social and emotional skills. Opportunities like loose part play should be made available to children in as many environments as possible.

Nicholson (1971) explained that children enjoy interacting with different variables such as materials and shapes. Through experiencing things of different forms, they are able to experiment with gravity, senses such as smells and counting. Loose parts can provide these opportunities for children. (Smith-Gilman, S., 2018)

Beeley, K. (2013) explains the benefits of learning maths outdoors. The outdoors offers lots of opportunities for sorting, matching, counting, patterning, and measuring. It is also acknowledged that some mathematical activities can also develop other skills, for example counting activities can encourage talking and confidence skills, and sorting activities may develop fine-motor skills.

The curriculum for wales (2020) emphasises that mathematics is a vital part of the advancement in society, it develops a wide range of skills and learning experiences such as art, music, money and engendering.

The education of maths should be as accessible enjoyable and engaging, as it offers skills that are to be used in every day life. Through early years, children can develop their problem solving skills, explore ideas, make connections and participate with others through play. Play, in turn, seizes the development of maths and numeracy. The foundations of skills built in the early years of life, create opportunities for the future. The curriculum states, that mathematics and numeracy require a development of intellectual understanding, the understanding of symbols, fluency, rational reasoning and strategic capability. With no hierarchy to each of these skills, they all aid. The development of Mathematica learning. Through the se of mathematical education, learners gain a feeling of Emilie education, achievement and enjoyment by being faced with challenges, and either independently or collaboratively overcoming them. It teaches learners to not let unfamiliar or difficult problems overcome them in the future, and to use their resilience to break down the problems to defeat the obstacle they may be faced with. Mathematics teaches metacognitive skills, allowing learners

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to evaluate and recognise areas of improvement, this skill can be used through life, creating ambition out of capable learners.

The curriculum for Wales (2020) also states the importance of science, explaining that it will be increasingly impactful to the future of people's lives. Science involves the use of technology which is becoming more relevant in today's society and will only increase. The curriculum hopes to create an environment in Wales and the UK, where young people can become ethical, and knowledgeable citizens who are healthy, confident people, able to make impactful decisions and lead attainable lives in society.

Hewett, V. M. (2001) explains the impact of the Reggio Emilia approach to schools and education today. It is explained that when creating the first school in Reggio Emilia, it was built by the parents. The involvement of parents in their children's education has been carried through schools today, emphasising on the role of the enabling adult. It is said that the teacher should be a guide and facilitator, they should observe the child and provide adequate resources so that the child is able to achieve their personal goals.

Similarly, Vygotsky, L. S., and Cole, M (1987) believe that adults/ educators should assist children in their learning by providing the right structure to aid their development through education.

However, Geary, D., C. (2020) disagrees with child led learning and believes that after a certain age, the learning process becomes more difficult, and emphasises that it is then the teacher's responsibility to provide the structure that the brain does not provide by itself.

Froebel's theory of the benefits of outdoor play and being surrounded by nature, inspired the development of forest schools, emerging in Scandinavia and following closely to the Danish early years program, forest schools have now been inspired throughout many countries and have impacted the education in Britain over the past decade. The main aim is the children understanding and respect of the natural environment which is being carried across many schools and settings in various ways. The invention of forest schools grew to an increasing worry of a decline in children playing outdoors. This is thought to be because of modern society causing parents to worry about strangers, traffic or violence, making them reluctant to allowing their children outdoors alone. This in turn creates an increase to the use of technology such as computers and video games being used at home, creating a negative affect on

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children's costal and emotional development. Since this worry, educators have been encouraged to provide both indoor and outdoor learning opportunities. It is identified that through children being outdoors they are able to experiment and discover more about themselves, as they are able to do more than they would in the classroom. The ability for children to make sound, mess and experiment with materials and natural resources, from being in a bigger scale outdoor environment can lead towards the development of many skills. Children are able to discover the natural world, in their own tie and favoured way. Children also have the opportunity to discover their bodies ability outdoors, having the opportunity to run and jump, building their coordination, stamina and strength. (Maynard, T., 2007)

O'Brien, L. (2009) Explains that through forest school, learning can take place in many different ways, for example, they have opportunities to develop art skills by creating war with different tools, listen and read lots of stories to develop communication, listening and language skills, learning. About animals and habitats can develop teamwork skills, scientific skills can be developed through the experience of different weathers and elements, and mathematical skills can be developed trough many different counting activities or discussions regarding colours/ sizes of natural objects.

In Summary, outdoor play can create nervous earning opportunities, aiding the development of mathematical and scientific learning. The role of the enabling adult is almost seen as essential to create a learning environment for children and a place for them to develop upon their play. A child led approach is thought by many to be an adequate way of children's learning, as adults observe and expand on what the children's current interests are. Trough hands-on, EtherTalk experiences, children gain a sense and understanding of the world around them, teaching them many skills that can be transferred throughout their lives.

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Reference list

Blanchet-Cohen, N. and Elliot, E., (2011). Young children and educators engagement and learning outdoors: A basis for rights-based programming. *Early education & development*, 22(5), pp.757-777.

Beeley, K., (2013). *50 Fantastic Ideas for Maths Outdoors* (Vol. 50). Bloomsbury Publishing.

Curriculum for Wales (2020) Area of Learning and Experience. Science and Technology. *Education Wales*.

Curriculum for wales (2020) Area of Learning and Experience. Mathematics and Numeracy. *Education Wales*.

Education Wales (2021) Enabling pathways. *Welsh Government Consultation Document*.

Education Wales (2022) *A curriculum for funded non-maintained nursery settings*. Welsh Government.

Flannigan, C. And Dietze, B. (2017) Children, outdoor play and loose parts. *Journal of childhood studies*.

Gull, C., Bogunovich, J., Goldstein, S.L. And Rosengarten, T., (2019) Definitions of loose parts in early Childhood Outdoor Classrooms: A Scoping Review. *International Journal of Early Childhood Environmental Education*.

Geary, D., C. (2020) Why learning should not be led by a child. Child-led learning simply does not work, argues professor David C Geary. *Tes magazine*.

Hewett, V.M., (2001). Examining the Reggio Emilia approach to early childhood education. *Early childhood education journal*, 29(2), pp.95-100.

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Kramer, F., and U. Rabe-Kleberg. (2011). *Wissenschaftliche Untersuchungen zur Arbeit der Stiftung. Haus der kleinen Forscher*. Accessed November 4, 2011. Accessed March 13, 2015. http://www.haus-der-kleinen-forscher.de/fileadmin/Redaktion/4_Ueber_Uns/Evaluation/Wiss.Schriftenreihe_2011_Band2.pdf.

Learning resources (2019) *Plant Science for Kids*. available at: <https://www.learningresources.co.uk/blog/plant-science-for-kids> Accessed: 26 September 2022

Learning through Landscapes (no date) *Early Years Outdoors Vision and Values for outdoor play*.

Miller, N. Kumar, S. Pearce, K. L. Baldock, K. L. (2022) The perceived benefits of and barriers to nature-based play and learning in South Australian public primary schools: A cross-sectional study. *Journal of Adventure Education & Outdoor Learning* 0:0, pages 1-13.

Maynard, T., (2007). Forest Schools in Great Britain: an initial exploration. *Contemporary issues in early childhood*, 8(4), pp.320-331.

Nicholson, S. (1971) How not to cheat children: The theory of loose parts. *Landscape Architecture*.

O'Brien, L., (2009). Learning outdoors: the Forest School approach. *Education* 3-13, 37(1), pp.45-60.

PrimaryLeap (2022). Available at: <https://primaryleap.co.uk/activity/how-plants-grow/level-1> Accessed: 26 September 2022.

Student number- 2107710.

Module Code- ECEY5005/C

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preschool teachers' beliefs and practices f outdoor play and outdoor environments

(Doctoral dissertation) Available at:

<https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.453.1839&rep=rep1&type=pdf>. Accessed: 01 October 2022.

Robertson, J. (2017) *Messy Maths: a playful, outdoor approach for early years*. Crown House publishing.

Richardson, G. R. (2010) *Creating a space to grow. Developing your outdoor learning environment*.

Sargent, M. (2015) *Developing Early Maths skills outdoors*. Mark Allen Group.

Smith-Gilman, S., (2018) The arts, Loose parts and conversations. *Journal of the Canadian Association for curriculum studies*.

Tovey, H., 2017. *Outdoor Play and Exploration*. Froebel Trust.

Vygotsky, L.S. and Cole, M., (1978). *Mind in society: Development of higher psychological processes*. Harvard university press.