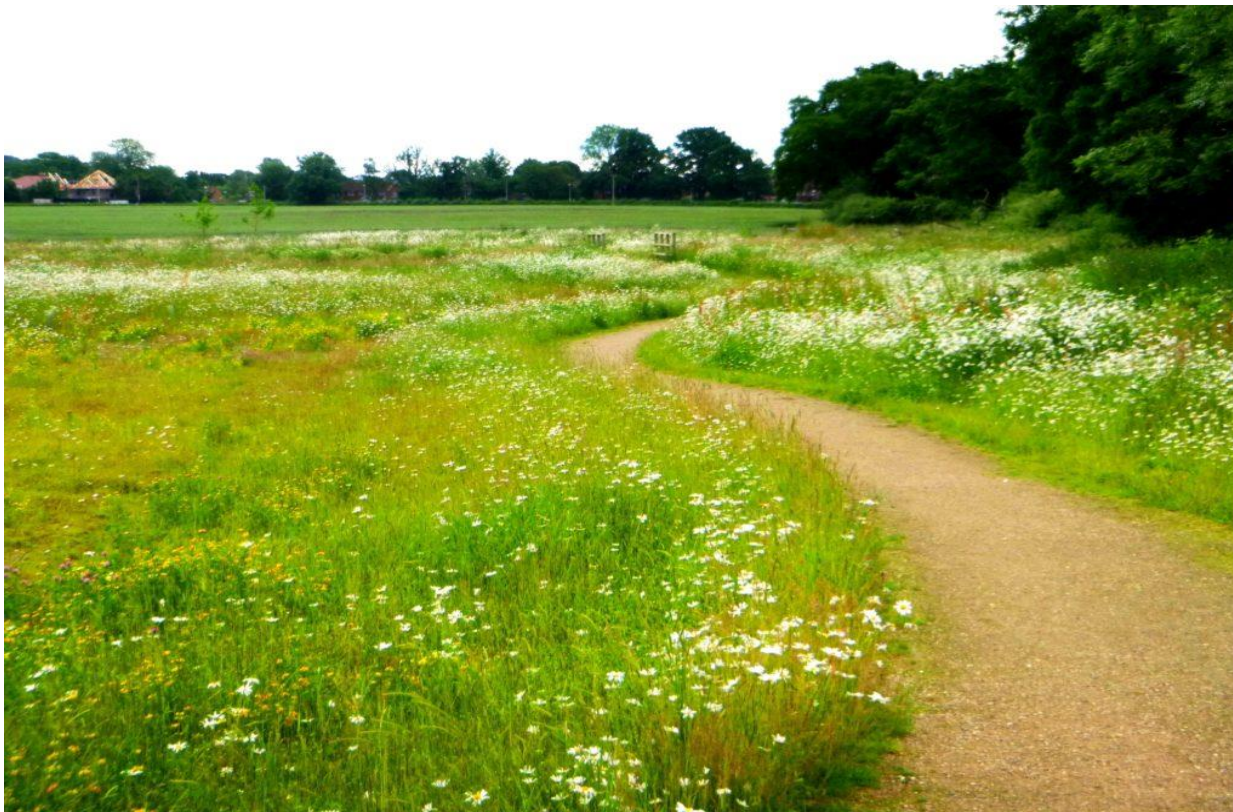


Awe and Wonder: Mathematics, Science and the Outdoors

Section 1



(Source: Kentwood Meadow, no date)

Section 2

Curriculum for Wales (2020) states that learners should be given various opportunities to explore mathematically rich environments both indoors and outdoors. There are a lot of opportunities for children to learn in the environment around them such as wide-open spaces, fields, beaches, local parks and gardens.

Feature 1 – Meadow

The above picture shows a large green meadow with wide open spaces and a woodland in the background. Lots of opportunities for children to learn in. There are many features of this outdoor space which can be useful in developing a child's mathematical and scientific skills. These include the long grass and flowers which the child can explore including the different lengths and sizes of the grass blades and the flower stems. A child can feel and touch the textures of the greenery to help promote gross motor skills as well as counting as many grass blades or flowers as they can.

A meadow such as this will enable children to discover the many varieties of green and look at the many colours of the flowers in the meadow. When the child revisits the area during different seasonal transitions, they will have different experiences as the meadow and greenery will look much different.

Meadows provide opportunities for planting. Children can plant seeds and monitor the growth of the plant, learning how it grows through photosynthesis and the life span of a plant. The children will ask many questions such as how long the plant will live for and how tall will it get. By planting seeds, children can monitor this for themselves. There is also opportunity to learn about bees and pollen, and the importance of this life cycle.

Kids Gardening Club (no date) claim that by planting seeds, this will help children to develop their hand-eye coordination as well as learning patience while they wait for the seeds to grow. They will learn how long it takes living things such as these to grow and how

important it is for the seed to have access to water and sunlight. Isaacs (2021) states that Montessori (1952) initiated that by caring for plants or animals, children learn that they are directly dependant on their care for them, giving the children the responsibility.

Vygotsky (1934) believed that children learn best when active and develop their knowledge and understanding through hands-on experiences, which is why it is essential for children to learn in the outdoors and gain experiences for themselves. By being in the outdoors, children will gain a respect for nature and are more likely to look after the environment around them.

Forest School Training (no date) claim that children help to lead development of healthier lifestyles as children will often ask parents/carers to take them to woodland areas and green spaces. Children tend to gain confidence and improve self-esteem which can impact on their emotional and mental well-being.

Curriculum for Wales (2020) mention that children being curious and searching for answers is essential for their understanding and that children are encouraged to be curious about science and technology which will then lead to them asking questions about the world.

Independent School Parent (2021) state that high quality learning experiences are proven to:

- develop a love, appreciation and respect for nature and all living things.
- develop an understanding of how we can look after the environment in which we live in.
- provide positive health benefits which include assisting with gross motor skills.
- develop a love for the outdoor environment in the world in which we live in.

Feature 2 - Woodland

The above picture also shows a woodland in the background. According to Dancer (2021) children can learn using natural resources such as leaves and twigs. Children can collect twigs and measure the lengths of each twig. Children can also collect leaves and discover their different shades of colour as well as size and texture. The children can then count how many natural resources which they have found and what uses the natural resources have.

The woodland is a great space for the children to learn about light and shadows. They could put paper down and draw around the different shadows that they can see.

Within the woodland, there will be many different forms of wildlife such as birds, squirrels and insects. Children can look around and listen to the different sounds each animal can make. They can spot wildlife in their habitat, ensuring not to go too near and respecting the animal's space. The children can also draw the wildlife or things that they can see around them. Children can go bug hunting in the woodland area and discuss what they have seen and the life cycle of the bugs.

The Wildlife Trust (no date) mention that by ensuring that children have access to the outdoor environment and experience nature, children are more likely to take better care of it. It is important for children to experience the outdoors whether it is rain or shine. The outdoor experience is different in each type of weather. When going through woodland in the rain, the children might hear different sounds as to of it were not raining. They may also see different wildlife as to when the sun is shining, such as slugs or snails and other living things.

Wesley (2019) states that there are many activities to do in the woodland when it is raining. This includes making leaf and twig boats. Children will need to find similar size twigs to tie together using string or long grass, and they will then tie a leaf around the top to create the sail. This will help promote gross motor skills. They can then find a puddle or stream to see if it sails, helping the children to learn about weight. Children can also use logs as a ramp and roll a car on it to monitor speed and use problem solving skills to make it go faster or slower, helping the children to learn about force and gravity.

Feature 3 – Open field

The above picture also shows a large open field offering open space and a further green area. Children can sit here and listen to the noises around them as well as the different smells. They can touch and feel the texture of the grass and mud. Children often like to run as soon as they see a large open space. When looking at the picture above, you can see a winding path heading towards the field. By walking along this, this will help children to learn balance and coordination. The adult could provide the children with magnifying glasses so that they can look for different creatures and wildlife within the meadow, helping to develop the child's vestibular and proprioceptor sense.

According to Dickinson and O'Connor (2019) a child with a healthy vestibular sense will be more likely to:

- feel confident and safe during movement and play.
- feel comfortable to take developmental physical risks such as small falls and be able to get up and carry-on continuing play.
- have a good sense of their bodies ability and be able to adapt to activities well.

Adults can provide the children with a clipboard, pencil and paper and the children can count how many butterflies, birds or insects which they can see and make a tally chart to show which they have seen the most of. Children can also see if they can stand in height order from shortest to tallest as well as measuring the area around them. Children can roll down the grass and see if it has a different gradient, helping the children to decide if a steeper gradient means they roll down the hill faster or slower. They could also lay on the floor so that they make shapes such as a square or triangle using their bodies, helping with mathematical development. Children will also experience the breeze and the wind whilst being in wide open spaces, helping them to experience different forces. Children can make kites using materials which they have found in the woodland area and fly them in the open field determining the wind or breeze strength on that day. They can use various size twigs to do this as well as material provided by the adult and string.

Bristow et al (2018) claims that outdoor activities in green spaces is important for mental, social and emotional well-being of children. Bristow et al (2018) also claims that outdoor nature play is important for children to develop connections with the natural environment whilst also stimulating imagination and their creativity.



(Source: Capri+3 Explore, 2021)

Curriculum for Wales (2020) claim that one of their four purposes is that children are to become ethical and informed citizens of Wales and the world, which is why it is essential to teach children as much as you can in the outdoors, to gain various experiences and knowledge of the environment and the world around us.

Section 3

RISK BENEFIT ASSESSMENT

Location / Activity:	Meadow/Woodland/Open space	Date:	12 th September 2021
Assessor:	Emily Williams	Review date:	12 th May 2021

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.

ACTIVITY	How will young people BENEFIT from this activity?	Possible hazards	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
Exploring plants and living things	Children will have the opportunity to see and touch plants and other living things such as insects. Children will have the opportunity to see these living things in their natural habitat. Children will have the opportunity to ask questions and learn about life cycles. Children will have the opportunity to practice gross motor skills such as bending, touching and grabbing. Children will have the opportunity to learn to respect all living things within the environment.	Children could become allergic to a plant or insect. Children could get stung by an insect or poisonous plant. Children could walk off and get lost from the group. Children could collect inappropriate materials such as glass or cans left in the meadow. Children could get hit with a branch or cut from a thorn.	Children and adults	Have a group discussion with the children before they go off and explore the meadow, about the possible dangers around them. Children could go off in small groups with an adult who can keep an eye on them rather than letting them all go off to explore on their own. Adults can look around the meadow beforehand to ensure that there are not any inappropriate materials within the meadow. Ensure that there are boundaries which the children cannot cross. Adults should keep an eye on the children at all times.	L

ACTIVITY	How will young people BENEFIT from this activity?	Possible hazards	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
Collecting materials in the meadow area	Children will have the opportunity to learn and feel different textures. Children will have the opportunity to use maths skills and count the different materials which they have collected and to look at the different shapes and sizes. Children will have the opportunity to learn different shades of colour. Children will have the opportunity to learn different weights of the objects found.	Children may cut themselves on a sharp object. Children may hurt themselves trying to pick up a heavy object. Children could get a splinter from collecting twigs or branches.	Children and adults	Discuss with children what objects are suitable to collect and what are dangerous. Adults should check the areas which the children will collect materials from to ensure of any dangerous objects or substances and that these are disposed of correctly. Adults should check that the children are collecting suitable materials and are not trying to lift heavy objects which may result in serious injury.	L

ACTIVITY	How will young people BENEFIT from this activity?	Possible hazards	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
Being outdoors in various weather conditions	Children will be able to experience the outdoors during different weather conditions such as sun, rain, wind and snow. Children will get to see how different the environment looks during different weather conditions.	If the weather is quite windy, branches could fall off trees and hurt adults or children. Children could become unwell from very hot or very cold weather. Children could get exposed to too much sun and develop sun burn or heat stroke. Children could be exposed to very cold weather resulting in hypothermia.	Children and adults	Adults should monitor the weather to ensure that it is appropriate for the children to go out in. Adults could check the met office for accurate weather updates. This should be checked regularly. Adults should ensure that all children are dressed appropriately for the weather, such as sun cream and sun hats for hot weather and coats and woolly hats for cold weather. Wellington boots should be worn for wet weather. Adults should ensure that the children should have access to water at all times.	L

ACTIVITY	How will young people BENEFIT from this activity?	Possible hazards	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
Children exploring the area independently	Children will have the opportunity to gain independence and explore the environment on their own. Children may decide to explore the environment alone or with friends, helping to promote friendships. Children will observe and decide which things within the environment may be harmful to themselves or others.	Children may wonder off on their own and get separated from the group. Children may find an object which they may think is harmless and they could end up getting hurt. Children may decide to climb a tree and fall resulting in serious injury.	Children	Adults should discuss with the children of all the possible dangers within the surrounding environment. Adults should set boundaries so that the children should not leave a certain perimeter of the meadow and woodland area. Adults should regularly check on the children and walk around the area to ensure that all children are safe. Adults should count the children regularly to ensure a child has not wondered off.	M

ACTIVITY	How will young people BENEFIT from this activity?	Possible hazards	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
Children playing with different materials in the woodland area	Children could 'make potions' mixing soil, water and leaves together to make a messy substance. Children could use the 'potion' for messy play and use it as paint on the ground. Children could build a den using various sized broken branches, leaves and twigs promoting teamwork and friendships. Children could use twigs and other materials to make a kite.	Children could taste the 'potion' and become unwell. Children could become injured from a sharp twig or branch. Children could get stung by stingy nettles or other hazardous plant. Children could climb to get a branch and fall resulting in serious injury.	Children	Adults should discuss with the children of all possible dangers within the surrounding environment. Adults should regularly check on the children to ensure that they are safe at all times. Adults should ensure that a first aid box is kept with them at all times and to ensure that it is always fully stocked.	M

Section 4

Adults have an important role with supporting children and giving them various opportunities for developing their learning. When children are learning, especially in the outdoors, it is vital for adults to supply the children with suitable opportunities. Adults should provide the children with examples and ideas of what the children could do with the loose parts by modelling and ask open-ended questions to get the children thinking.

According to Arnerich (2019) adults should contribute to sustained shared thinking by asking the children questions, promoting thinking and problem solving. This includes the adult and child working together and contributing ideas to conclude together. This is supported by Brodie (2014) who claims that the adult should provide plenty of visual and verbal feedback for children. The adult should also model good language and encourage the children to extend their thinking.

This is then supported by the Reggio Emilia approach where it is believed that the main goal for the adult is to listen and observe the child as well as question and listen for opportunities to discuss with the child further.

Council for early years outside the classroom (2009) state that there are many benefits of learning outside the classroom. These include:

- supporting the development of healthy and active lifestyles.
- direct contact with the natural world as well as experiencing different seasons and weather changes.
- helping the children to gain a respect for nature and understanding their natural environment.
- supporting problem-solving skills and promoting imagination.
- adults can provide children with open spaces to explore children's physical abilities.
- children learn to assess risk and manage new situations.

Lyons Early Childhood School claim that in 1972, Simon Nicholson developed the theory of loose parts which is the idea that materials can be moved around, designed, re-designed and tinkered with creating more opportunities for creative learning. Kingston-Hughes (2020) states that according to Nicholson, in any environment which offers multiple possibilities, offers a much greater play value, contributing to a higher development of creativity and imagination. Kingston-Hughes (2020) goes on to say that by practitioners encouraging and supporting possibilities, children will begin to do the same resulting in the child experimenting and using their imagination. Children see the adults as role models and if they see the adult expressing awe and wonder, the child will often copy whereas if the adult is looking uninterested in the environment, the child will also do the same.

Adults should ensure that they attend appropriate training for effective outdoor learning such as Forest Schools (2019) who state that adults who have the relevant training will have the knowledge and experience to help transform children's lives by engaging the child's instincts with the living planet. By attending the relevant training, adults will gain a new found confidence to support children in the outdoor environment and to give the children the best possible opportunities for learning and development.

If an adult provides the child with items to play with in the outdoors such as a loose tyre, a giant log and some twigs, the children could make a den one day, and perhaps a table to have a tea party at the next. Children will begin to see endless possibilities of what to do with the loose parts resulting in use of their imaginations and experimental abilities being developed further. The adult could ask the children what they are going to make and why they are going to make it. Children will learn and discover for themselves, re-discovering new possibilities.

Anna (2019) mentions that ideally, loose parts should be easily accessible to the child which can then be selected freely. Anna (2019) also mentions that the possibilities are endless and that children are only limited by their imagination.

Cawley (2019) states that adults have an important role when it comes to loose parts play. This includes ensuring that there are a wide range of loose parts available for the child to play with, as well as supporting materials such as string, crayons, or paper for the children to perhaps draw what they see. Cawley (2019) also states the importance of the adult being the observer and that the adult is ensuring the child's safety. It is important to let the child explore and try not to 'take over' the play by telling them what to do. Let

the children use their imaginations and explore freely. The adult should also ask the children open-ended questions to make the children think further into what they are doing and why they are doing it.

Cawley (2019) goes on to say that the adult should prepare the environment for the children, assessing any possible hazards which may result in injury. The meadow could be deemed as dangerous, so it is essential for the adults to have appropriate training to support children learning in the outdoors. Risk assessments will need to be completed beforehand to ensure that any dangers are identified, and appropriate safety measures are in place. Children will need to be spoken to before going into the outdoors, highlighting any dangers and boundaries as well as rules should be in place to ensure of everyone's safety.

Froebel (1852) believed that play is the highest expression of human development in childhood and in play, children will construct their understanding of the world by experiencing it directly. Froebel (1852) also believed that adults should provide children with the freedom and guidance and consider environments which include people and materials. Froebel (1852) goes on to say that adults should create a physical environment both indoors and outdoors without pressure from adults and practitioners. The adult should nurture the child's feelings and support their ideas by providing help sensitively to help the child to build their confidence.

Froebel (1852) mentions that the environment and tone used should be encouraging for children and not be critical by the adult. Children should be given a lot of space to learn and build but the child would benefit from the adult talking to them about what they are doing and going to do. It is important for the adult to listen to the child and support ideas which the child may have.

This is supported by Vygotsky's (1934) theory who claims that a child's initial development is prompted by immediate social interactions. Vygotsky (1934) also claimed that children were apprentices who learned best alongside those who have more experiences and who understand their individual needs and abilities.

Gibson (1966) claims that affordances of the environment are what it offers the child and what it provides. For example, if an object is of knee height, it affords sitting on, which is also known as a seat, stool or chair. It could be a natural object such as a tree stump, but it offers many affordances. Adults should provide many affordances in the outdoor environment for the child. Children will use logs and stones for various uses such as building a fort or a tower. They may use stones to spell out their names or make different

shapes. There are many affordances of the outdoor environment which children can learn and benefit from, as well as adults such as low-level branches, puddles or even gates as children will not only see these to get through but to climb on or use to measure themselves.

Learning through landscapes (2021) states that play is the most important thing for children to do outside, and that the outdoor environment should be well suited to meeting children's needs for all types of play and direct hands-on experiences. Children require adults who enjoy the outdoors themselves and who see potential for a child's well-being and development. A positive attitude, understanding and thinking will ensure that the best outdoor opportunities are taken advantage of, and effective learning is carried out. Outdoor provision should be organised, and adults should ensure that children are stimulated and can follow their own interests through play giving them independence and participation. Adults have a crucial role to ensure this is being achieved effectively.

When the Welsh Government (2020) introduced the new curriculum, one of the four purposes was that children are to be encouraged to be healthy and confident individuals who are ready to lead fulfilling lives as valued members of society. Adults can help children to acquire this by encouraging them to explore the outdoors and to learn about nature and the world in which we live in by providing them with suitable tools and opportunities to do so. One of the other main purposes is that children will become ethical and informed citizens of the world around them. Outdoor learning with confident adults to teach and support this will help to gain this for children and young people of Wales.

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