

Awe and Wonder- Science, Mathematics and the Outdoors

Section one: Photograph of chosen outdoor area



(Source: Greenscape, 2023)

Section two- Learning story

The above image shows the outdoor space that I will be using for my learning story, and I will be discussing how and what I would do to the area to promote scientific thinking in early years. I have chosen a woodland area with different natural elements such as, trees, earth, a large area on a slope to enable open-ended play and ignite curiosity, exploration that may lead to discovering something new. My aim is to create an enhanced outdoor space full of awe and wonder for young learners, which creates excitement and the urge to explore the world around them and start to question why and how?

It's Monday morning and the children are entering their reception class. I can see some children are excited to be back, although there were a few unhappy faces amongst the class. The sun has finally appeared after a wet and windy weekend. After our morning routine, the children are split into their three groups of ten. My group bounce over.

"Mrs Charles, what are we doing?" little voices echoed. I quickly reminded them we have outdoor learning, and asked the group what they would like to do down "The Wild". A number of children wanted to play in the mud kitchen, and some asked to play games.

"Now boys and girls, sut mae'r tywydd tu allan?" I asked as I pointed to the window.

"Mae hi'n heulog" the group proudly answered. "I wonder what the ground will be like because it has been raining all weekend?" I said looking deep in thought.

"Do you want me to touch the grass Miss and then we will know if we need to put our wellies on?" an eager learner asked. "What a brilliant idea!" I exclaimed. So off we went to explore the texture of the ground. I stood back and observed the children testing different parts of the ground and listened to their conversations between each other.

"Eww its' really muddy here!"

"I can see a puddle!"

"This bit is really hard"



(Source: Dynamic Earth, 2023)



(Source: Raritan Headwaters, no date)

The children run back to share their findings. "But why have we got muddy bits and hard bits Miss?" a puzzled girl asked. "Well what a great question to start the day." I replied. "Let's take a closer look at the puddles and muddy patches and compare them to the dry parts. Can anyone notice a difference when you look at them?" I questioned. After a few minutes a couple of hands shot up.

"Miss, the wet bit is all dark and on the dry bit it's really sunny!" an excited child explained. "Da iawn" I applauded.

"So when something blocks the light from the sun, shadows are formed", as I point at the large shadows from the tall trees. Once I explained the sunlight is needed to dry out moisture from the water on the ground, therefore it will take the shaded areas longer." I explained.

“Like Incy wincy spider?” a gentle voice appeared. Then all together the children starting to sing the nursery rhythm, what a magical moment I thought as I joined in.

As I look around I see a number of children waving their arms in the air. “Look Miss, that’s my shadow!” I heard.

We head back to swap our shoes for our wellies and begin to ask the children what resources they would like to take with them on today’s adventure; magnifying glasses, crayons, pencils, treasure baskets and our important investigators notepad, gets packed into our ‘box of tricks’ and we are ready to explore. Perfect!

The Wild is in the school grounds and secured by large metal fencing around the perimeter with a wooden fence to enclose the area. The children are safe to explore and roam the space freely. I watch the children form smaller groups and off they go, running down the banking and into the wild heading in different directions equipped with their chosen “investigator tools”. I stand back and observe giving the children freedom to be in the moment, whilst jotting down what the children are enjoying.

I spotted children identifying shapes and comparing sizes in the mud kitchen.

“I am going to use the rectangle baking tray for my mud pies.” One boy claimed. Another child picked up another baking tray and said “This one is bigger, look! We will be able to fit more on it” the little girl explained. Two other children had gathered all the circle bowls.

“Boys I have a challenge for you, can you put all them bowls in size order for me? Starting with the smallest first?” I questioned. I watched as they worked out which one would be next. Few moments have passed. “Look Miss, ta-dah!”. I smiled and gave them a thumbs up.

“Do you want some dinner Mrs Charles? A boy kindly asked. “Of course, what’s on the menu?” I replied.

“Chocolate cake!” giggled the children.

The children started to fill the bowl with tactile materials like dry sand, wet mud, acorns and stones they have gathered, whilst discussing the different properties each material offers.

“This mud is all wet and squidgy” one said. “Rub the sand on your hand, its ruff!” another said.

“My favourite is this big grey rock, it’s so smooth and shiny” I heard.

“Super learning here!” I beamed as I finish my delicious cake.

As I move around "The Wild" I can see a large bunch of children engaged over by the logs. Some children have paired up and running around the area filling up treasure baskets, sticks, stones, and leaves are piled up. I quickly grab my iPad and head over. I try to stand far enough away, as it is important not to disrupt their play, and take pictures of a great example of child-led play. The children have spotted shadows created from the logs and bushes around them. All their findings in the treasure basket are being used to go over the outline of the shadows. How amazing I thought.

"Group Coch, you have all been very busy and I have seen some fantastic learning here this morning, as our topic is all about life cycles I have a great idea. Let's grow sunflowers." The children all cheered. We start discussing what we might need as we pass around some seeds for the children to have a closer look at and feel.

"How long do you think they will take to grow?" I queried.

"5 minutes Miss" "7 years?" "2 hours?" a few guess.

"Okay children, let's make a sunflower diary, so we can write down any changes and see how long it takes to grow" I said.

"We can measure it too Miss, using your long ruler?" an excited voice squeals. "Wow! Yes we can record the sunflowers measurements weekly." I replied.

"Let's start an EXPERIMENT!! I have an idea, because you have all enjoyed learning about shadows, and we learnt that soil takes longer to dry in the shade, what could we do with some of the seeds?"

"WE CAN PLANT SOME IN THE SHADE" a loud voice screeches.

"Bendigedig" I screech back.

"This is officially a science experiment, so I need predictions. Which means, tell me what you think will happen to the ones planted in the shade and the ones in the direct sunlight? Will they grow the same? Once the sunflowers have grown we can look back and see who predicted correctly" I explained. Each child is thrilled, clapping their hands with enthusiasm. I can already hear some predictions amongst the group as we move over to the shed.

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Word Count:4178

“Barod let’s get planting!”



(Source: Jugseed, 2020)



(Source: Gardening for kids, 2023)

Section three

RISK BENEFIT ASSESSMENT

Location / Activity:	The Wild	Date:	17 th September 2023
Assessor:	Jade Charles	Review date:	27 th September 2023

The Wild	How will young people BENEFIT from this activity?	Hazards and associated risks	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk after precautions RATING: L/M/H
The Area	- Large open space to explore - Creates curiosity - Heightens imaginative play - Open-ended play - Can be louder - Roam freely - Different areas to play - Being outside and active - Exposed to different materials and objects - Fresh air - Boosts well-being	- Children leaving the area - Tripping hazards - Falling from climbing - Wildlife - Brambles and thorns - Nettles	Children	- Area surrounded by large school fencing - Adult to check no fencing has been damaged to allow children to leave the area or no one can enter - Gate across the entrance to ensure children cannot leave the wild unattended and roam the school grounds, which is to be kept closed whilst the wild is in used. - Explain the rules of being down the wild - Make sure adult to child ratio is correct at all times - Extra support staff for children with ALN	M

The Wild	How will young people BENEFIT from this activity?	Hazards and associated risks	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk after precautions RATING: L/M/H
Muddy ground	- Promotes imagination and creativity. - Improves fine motor skills - Stimulates immune system - Helps children get Vitamin D - Builds resilience - Children being active-improving health - Reduces anxiety and stress	- Risk of animal faeces - Slippery surface. Can cause falling, creating injuries and cuts that could lead to infections.	All	- Adults to check area before for faeces - Appropriate footwear to be worn and change of clothes if needed. - Explain to the children about being aware of the what could happen - First aid kit accessible	L
Allergies	Outdoors can boost immune systems and health	Allergies-pollen, bees or certain plants	All	- Take Children's medication i.e. epi pens to the area. - Access to first aid kit - Block off area of certain plants that may cause harm to an allergy sufferer.	L
Trees and sticks	- Encourages problem solving skills - Encourages critical thinking - Boosts imagination and creativity - Exposure to living things i.e. insects - Sensory play - Open ended play - Risky play - Helps build confidence - Activity	- Sharp branches could cause cuts and bruises - Falling from climbing - Thorns and brambles - Berries - Splinters	All	- Explain the risks of climbing and playing with sticks - Introduce climbing heights - First aid - Remind children not to eat berries - Adults to be observant at all times	L

The Wild	How will young people BENEFIT from this activity?	Hazards and associated risks	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk after precautions RATING: L/M/H
Using tools to plant	- Learn how to use real tools safely - Responsibility - Motor skills - Social skills - Sharing and taking turns - Exercises the hippocampus and cortical regions - Problem solve - Decision making - Increases concentration - Aids sensory development - Strengthens muscle and bones - Boosts well-being	- Tools can cause injuries if not used correctly - Using the tools as weapons that could hurt other children.	Children	- Children in small groups to take part in the activity. Smaller ratios. - Model Behaviour by showing the children how to correctly use tools - First aid kit accessible	L
Uneven ground	- Mobility and helps develop gross motor functions. - Helps with building balance - Introduces speed concepts - Explore risks	- Tripping causing injuries - Broken branches - Falling on stones	All	- Sensible footwear - Model risk to the children - Explain how uneven ground can change speed - First aid kit accessible	M

The Wild	How will young people BENEFIT from this activity?	Hazards and associated risks	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk after precautions RATING: L/M/H
Mud kitchen and utensils	- Open-ended play - Access to different materials and weights - Encourages imaginative play - Exploring differences in shapes and sizes - Critical thinking skills. - Exploring capacity- how much more will fit? - Social skills - Building communication skills - Boosts well-being	- Risk of injury through playing with metal - Using equipment as weapons - Playing too rough with pots and pans causing injuries to others.	Children	- Adults to be present and observe - Remove children if they continue to use utensils as weapons	L
The Shed	- Encourages responsibility - Explore different materials and learn about how tools are used - Promotes Independent learners - Critical thinking - Problem solving	- Tools - Children being locked inside	Children	- Adults to be present in the area at all times when shed is open for use - No harmful products or tools to be kept in the shed. - Door must be on the latch and open all the time so adults can see who is in the shed. - Must be unlocked at all times and key with adult - Limit amount of children allowed to enter shed.	L

Section four

According to Pacey (no date) the outside is beneficial to children's development, as the natural environment stimulates all five senses. Montessori Nature (2023) agrees and suggests the outdoors creates the perfect opportunity for exploration and discover the world through their senses. The children can connect with the world around them by; listening to the different sounds, whilst little eyes can explore the tall trees and clouds in the sky, feeling the wet texture of the mud while squeezing it into a small ball, finding a smooth stone in the mix and finally taking in a deep breath of fresh air and inhaling the smell of the outdoors (Montessori Nature, 2023).

Playing outside in the natural environment is a great way to boost physical activity, as children are often running around spontaneously, which helps develop coordination skills from climbing trees or balancing on logs, which supports muscle strength and gross motor skills (Play Scotland, 2023). Children using their imagination to create a den working as a team collecting logs, sticks, leaves and communicating with each other on how to build the den is a fun way to enhance language skills and boost well-being (Play Scotland, 2023).

Watts (2020) states the outdoors is a rich learning resource as it enables unique experiences with the different weather and witnessing the seasons change can introduce new learning topics, for example the life cycle of a plant, or how changes in the weather effects animals and humans.

The Welsh Government (2009) framework for young children's learning states settings should promote discovery and independence using the outdoor environment, as it enhances children's social, physical, creative, cultural and personal skills.

The Welsh Government (2009) explains children are able to take part in real life problem solving, for example how to move a tyre from the bottom of a slope to the top. The outdoors can be a great space to introduce mathematical development, collecting ten sticks and then placing them in size order, or using a branch to draw different shapes into the mud. Using the large space for a word hunt for encouraging language, literacy and communication skills and sending the children to find hidden words to work out a secret sentence. Outdoors is the perfect place to go on a sensory walk and listen to the wind blow through the leaves in the trees, or the birds tweeting, are all great examples of how nature can be used in all areas of learning, Welsh Government (2009). The curriculum for Wales (2020) promotes cross-curricular and encourages strong links across the six areas of learning with an integrated approach, which will enable learners to build connections and combine skills to help develop their learning journey.

The outdoors is a great space to learn about life cycles, living things, minibeasts and animals or have real experiences of planting a tiny seed and learning how to help it grow and what it needs to thrive (Welsh Government 2009). Encouraging children to care for the outdoors space can help children feel a sense of belonging and more connected to where they are from, Welsh Government (no date).

Although Waite (2011) argues children learning through hands on experiences outside will not learn more or less than children gaining information accessed through videos or books. Waite (2011) states children gain a different context from both learning environments, therefore the adult should carefully chose a suitable the learning environment the children will gain more from. Similarly, White (no date) states both indoor and outdoor environments offer significantly different strengths and experiences for a child's learning journey, and adds equal amount of time should be spent outdoors. White (no date) explains ideally the adult should provide an integrated indoor-outdoor environment allowing children continuous access, as children thrive from a stimulating outdoor area that encourages awe and wonder.

However, Richardson (2013) argues the benefits and features the outdoor environment offers are superior to the indoors, as the space available outside allows children freedom to roam and early years practitioners should recognise how nature is complementary for nurturing children's holistic development. Richardson (2013) explains the sense of freedom children feel outside playing on a larger scale which offers space to create the world's largest den, chance to explore different natural materials by mixing mud, water and sand to make pies in the mud kitchen to sell, ignites the children's imaginations whilst providing opportunities for open-ended play.

Although Grigg (2016) shares the same views as Richardson (2013), Grigg (2016) indicates children need to reconnect with nature due to children spending less time outside. An article by The Guardian (2016) supports Grigg (2016) statement by reporting children spend fifty percent less time outdoors than the generation before, a survey suggests. Action for children (2023) suggests as little as 15 minutes outside can boost physical and mental development and urge parents and guardians to explore the local area or change daily routines to increase time spent outdoors. Although the NHS (no date) indicates children need at least sixty minutes a day to improve health and mental well-being.

Isaacs (2013) indicates Montessori approach has similarities to Rousseau (1712-1771), Frobel (1782-1852) and Steiner (1861-1928) which implies children should always be at the centre of the

education process. Isaacs (2013) states the Montessori approach encourages hands on, self-directed learning and allows children time to discover at their own pace. Similarly, Froebel's approach also believes natural environments promote curiosity and children learn best through play and real experiences (Froebel Trust, no date). Seldin (2023) states Montessori believed children have a natural drive for discovery and referred to children as "little scientists", therefore should be encouraged to observe the world and feel a sense of wonder to develop critical thinking and analysing skills.

Daly and Beloglovsky (2015) suggest adding loose parts into children's play promotes problem solving skills and imagination prompting children to use questions such as "what if", which welcomes a sense of adventure and excitement. Daly and Beloglovsky (2015) state children prefer to play with rocks, shells, sand, water and even cardboard boxes, as simple materials stimulates curiosity and allows free rein to be creative and settings should add loose parts to enhance these qualities.

Ranheim (2020) suggests using loose parts to model mathematical skills, one to one counting using acorns, which stick is the longest or making patterns using stones and leaves. Ranheim (2020) explains being outside and using natural materials is a playful way to learn and typically children are more engaged when having fun and provides unlimited opportunities to develop and extend other areas of learning. For example, asking the children to describe the sticks they have used to make different shapes, adding language and vocabulary adhering to the new cross-curricula framework for Wales (Gov Wales, 2022).

However, Gibson, Cornell and Gill (2017) studies into the impact of loose parts play in primary school aged children showed there were insufficient empirical evidence to determine loose parts have an impact to their development. Although from observing different groups, the study showed children enjoyed playing with the loose part co-operative, which could have a positive effect on well-being and social skills, Gibson, Cornell and Gill (2017) added.

According to Thomson (2016) magic moments that captivate children into deep thought and wonder needs to be encouraged by allowing children the time and space to be in the moment, as this level of engagement and enthusiasm can lead to wonderful learning experiences. Thomson (2016) and Carson (2007) both state adults need to value the importance of curiosity and wonder, as it encourages questions that can lead to learning opportunities. Adults need to support children in making deep connections with nature and encourage critical thinking, sparking scientific interests on how the world works, and be able to share the joy and excitement that awe and wonder brings, as it is a vital learning tool (Thomson, 2016).

White (2014) indicates learning is more successful when the children share engaging learning experiences with adults and others, although states learning outdoors should not be indoor activities out. White (2014) argues the children are losing the unique experiences and a sense of attachment and belonging to the world, which contributes to the well-being of the children and ignite passion to care for the environment.

White (2014) theory has similarities to the Reggio approach, which also promotes the importance of the environment, as it can influence what and how children learn and is referred to as the third teacher, says Education Scotland (2017). According to the Reggio approach the adult should create a captivating learning environment with open ended resources that allows the adult to observe the children learning and use the information to help further development, according to Education Scotland (2017).

Knight (2016) states Vygotsky and Piaget shared similarly believes regarding children's need to experiment and the environment is key to enable learners to develop, although Knight (2016) highlights the difference in theories. According to Knight (2016) and Cherry (2022) Vygotsky's zone of development implies the adult is key to develop a child's cognitive development as they provide education opportunities through using scaffolding techniques. Although Cherry (2022) states Piaget's theory suggests the way children think is fundamentally different from an adult and believe children learn better independently through schemas.

Waters and Rekers (2019) agree it is evident that adults play an essential part for providing children with enabling outdoor experiences that maximise learning and promote holistic development. Waters and Rekers (2019) recent research regarding learning through outdoor play, shows how the role of the adult can impact children's experiences, and states there is a conflict between child-directed and adult-directed learning, and how children use the materials may differ on the adults expectations. UNICEF (2018) claims an important aspect is to allow children to use initiative, and take control over the experience, which links to the Mosaic approach stating children should be treated as experts and agents in their own lives, according to Clark and Moss (2011).

The research suggest some practitioners may limit areas of the outdoor space due to their own fear of risk, or underestimate the abilities of the children, which is removing the opportunity of risky play and educating the children on how to overcome challenges by building their confidence and understand their competencies (Waters and Rekers 2019). In addition to risk aversion, Waters and Rekers (2019) state practitioners may create uninteresting play spaces that are not challenging, or limiting the access due to weather conditions can minimise development as capable individuals.

Gibson 1979 (cited in Waters, 2017) affordance theory states the same environment can be viewed differently to a young child or adult, and how one individual uses the space could be completely different to the others depending on intentions and capabilities. For example, a small child may jump across log stumps like stepping stones, whereas an adult may use the same stumps to sit and observe. Gibson (cited in Waters, 2017) indicates the outdoor environment provides multiple affordances for different types of play, which provide opportunity to modify or change to suit their needs at that time. However, Martin (2005) disagrees with Gibson theory and states affordance is formed from ones imagination and is not what a place can offer.

According to Watts (2020) the outdoor space should offer a high affordance, which entails making the most of the natural area and adding resources to enable open-ended play, as oppose to expensive equipment. Watts (2020) explains along with an enabling adult, who is enthusiastic, creates opportunities for learners, creative and able to adapt and extend a wide range of learning experiences. Davy (2019) argues areas need different elements and textures, which offers space to manipulate to build, climb, and opportunity to create a challenging outdoor space, which has similarities to Gibson's affordance theory.

Throughout the portfolio it shows how beneficial the outdoors and being surrounded by nature can be to young children's learning journey and holistic development. Also how adults can support children to engage with mathematical and scientific concepts in an outdoor area with natural resources or what type of other items may be added to aid curiosity and discovery. The portfolio also analysed the negative and positive impacts an adult may have on a child's development, and the importance of creating an enabling environment for young learners. Finally, the portfolio also examined popular theories, and different approaches used from around the world which has stemmed the new curriculum for Wales (Welsh Government, 2022).

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