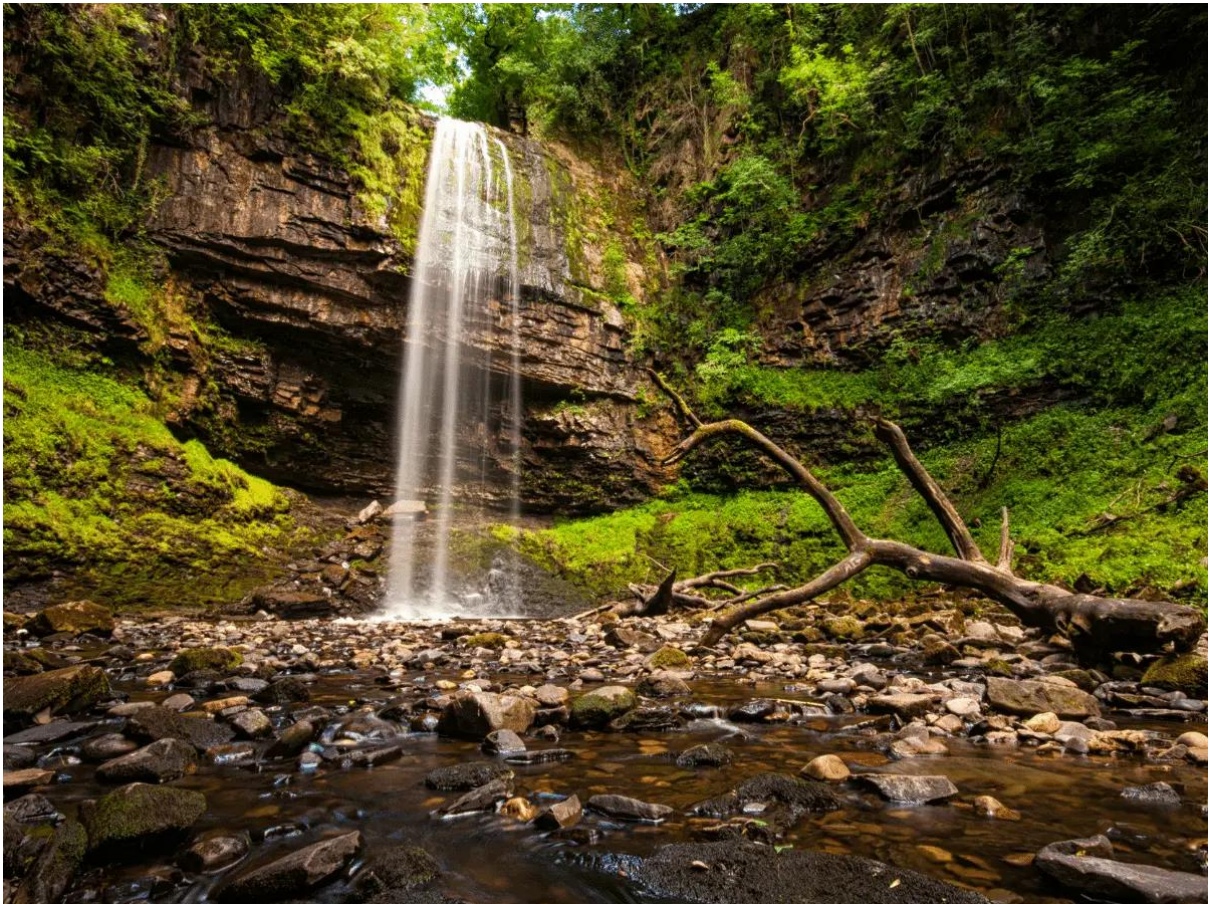


**Awe and wonder – science, mathematics and the outdoors**

**Part 1:**



(Source: Evans, 2018)

**Part 2: Learning Story****A Spring Trip To Explore Waterfalls****Name: Group A****Date: 5<sup>TH</sup> April 2023**

The ratio for this trip is 4 children per practitioner. This learning story focuses on group A's learning on this trip. Group A includes; Child A (female), Child B (female), Child C (male) and Child D (male). All children in group A are four years old.

At 8am the children arrived at nursery. During breakfast group A discussed the day ahead. Child D asked me "how are we getting to the waterfall? Are we going on a bus?" I replied saying "yes, the bus will be picking us up as soon as you finish your breakfast and put on your waterproofs and wellies". Group A excitedly finish their breakfast before running to the welly rack to collect their own wellies. I assist all children with putting on their waterproofs, then all children independently put on their own wellies. Group A then eagerly wait by the window for the bus to arrive and I listen to them discuss amongst themselves what colour the bus may be.



(Source: Lloyds banking group, 2018)

The children enjoy the bus experience, they spend time looking out the windows and talking amongst themselves and singing the wheels on the bus. Child B asks me "is it going to rain today? Why do we need to wear our waterproofs?" I explained that "it is going to be a sunny day today, it should not rain today but we need to wear our

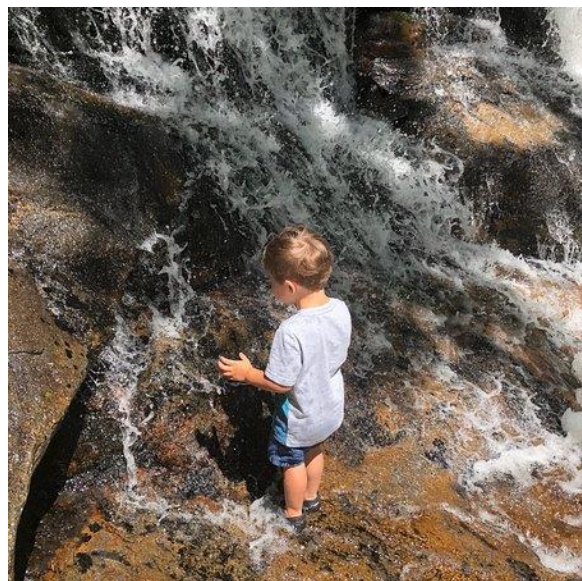
waterproofs so that we can explore the waterfall and not get our clothes wet". Child A curiously asks "can we jump in the water then?" I replied " yes of course".

The bus arrives at the destination and all the children climb off the bus. There is a short walk through the woodlands to get to the waterfall. As a group we stop to listen to the birds above us. The walk is downhill and child A laughs whilst trying to slow her pace and says " my feet are going to fast" I laughed and replied "yes, gravity makes us go faster down hills". Child D then picks up a large stick and uses it as a walking stick to assist him on the walk down, then the rest of the children look for sticks to copy him. Child B and Child C stopped a few times during the walk and spent time looking up and pointing " look how big the trees are" child B said, which I agreed with " they are very tall trees, how tall do you think they are?" which child B replied excitedly saying "as big as a house". Both children enjoyed exploring height and spent long periods of time admiring the trees towering above them. Just before arriving at the waterfall the children found a hole in the ground, I asked the group " who do you think made that hole?" Child A quickly answered " I think it is a mouse hole", I explained that " it could be but it looks too big for a mouse hole", Child C leans in for a closer inspection of the hole before saying " is it a fox hole?" I explained that " many animals make holes in the ground to live in just like mice and foxes, badgers and rabbits also make holes in the ground theses holes are called dens and burrows". The children began to discuss other animal habitats amongst themselves such as where birds live and how bears like to live in caves.



(Source: Zeeland Christian School, 2019)

As group A approach the waterfall and hear the water crashing into the rocks all four children squeal with excitement. I sit with the children by the edge of the waterfall and we discuss risks, boundaries and how to keep safe around water. The children are then free to explore their surroundings. I put out some resources around the waterfall to enhance the children's learning experience. All children ran straight into the water to begin with, Child B was leaning down with her hand in the water pushing it against the current, she then began walking against the current while laughing she shouted "the water is pushing me back". She was independently investigating forces and the flow of water. Due to the warm spring weather and lack of rain the waterfall is small and the water is shallow therefore the children are able to safely explore the waterfall, Child A and Child D enjoy running through the waterfall and experiencing the water falling on their heads, they also use buckets and watering cans and transport the water from one bucket to another from observation both children may be in a transporting schema. Child C uses some of the resources and experiments to see if they sink and float, he places a play silk into the water and watches as it floats on top, then when he places a rock on top of the silk he watches as they sink to the bottom. He repeats this process multiple times before I ask him "what is happening?", Child C replies "the rock is too heavy it is sinking the silk every time". Child C has begun to develop the knowledge of simple physics in terms of floating and sinking.



(Source: TripAdvisor, 2016)

The children begin to explore the surrounding area around the waterfall. Child D enjoys the uneven surfaces, he hops

from rock to rock and walks across the logs practicing his balancing skills. Child C finds a stick near the woodland area and begins mark making in the mud, he first begins drawing lines and then moves on to drawing shapes in the mud, we discussed the names of the shapes he had drawn and he counted how many he had made. Child C then finds a bucket and fills the bucket full of rocks before placing the rocks over his patterns in the mud. Child A and Child B are also playing with the rocks and other loose parts that they had gathered from around the area, they had gathered many acorns, sticks, leaves and petals off flowers while gathering these loose parts the children used resources such as a magnifying glass to hunt around the woodland area. Child A and child B used their creative, critical thinking and problem solving skills to work together and build a fairy house. They balanced rocks on top of each other to create the structure of the house and made the roof out of leaves. I asked the girls what they were building which they replied “ it is a fairy house, we know a story book that says that fairies live by waterfalls”. Child A and child B then use the paint resources to paint the top of the acorns and child B stated that “ the fairies can use the top of acorns as hats”.



(Source: Gonzales, 2013)

To end the trip I gather group A for shared learning and group discussions. We begin by reading the Gruffalo story for some calm time after an exciting morning exploring. As I read the story the children look around in wonder with the background noise of the waterfall and the surrounding trees allowing the children to imagine themselves in the story. After the story I ask the children their favourite part of the day and what they had learnt. All the children had positive and stimulating experiences from exploring the waterfall. The children came away from the trip with new experiences and knowledge of how the natural world works and how their skills can be used and developed in the real world.

**Part 3:****RISK BENEFIT ASSESSMENT**

|                             |                                                               |                     |                              |
|-----------------------------|---------------------------------------------------------------|---------------------|------------------------------|
| <b>Location / Activity:</b> | A spring trip to explore waterfalls – Woodlands and waterfall | <b>Date:</b>        | 5 <sup>th</sup> April 2023   |
| <b>Assessor:</b>            | Chloe Duffy                                                   | <b>Review date:</b> | 1 <sup>st</sup> January 2023 |

**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.**

| <b>Experience exploring outdoor space in photograph</b>                                            | <b>How will young people BENEFIT from this activity?</b>                                                                                                                                                                                                                                                                                          | <b>Hazards and risks</b>                                                                            | <b>Who is at risk?</b> | <b>PRECAUTIONS in place to reduce the risk of injury</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Overall risk RATING: L/M/H</b> |
|----------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| Walking on steep, uneven and slippery grounds in the woodland area and in and around the waterfall | <p>Improves balancing and coordination skills.</p> <p>Allows the experience of walking through different textures such as mud, rocks and water.</p> <p>The environment could benefit young people's health and wellbeing.</p> <p>Opportunities for scientific and mathematic learning by using the natural environment and natural resources.</p> | <p>Slips and trips causing harm or injury.</p> <p>Becoming lost which could cause fear or harm.</p> | Children and adults    | <p>Staff to assess the area and walk path to ensure that the grounds are not too difficult for the young people.</p> <p>All member of staff will have relevant first aid training and a first aid kit will be on hand at all times.</p> <p>Staff should cancel or rearrange the trip if there's bad weather that may affect the location such as heavy rain making the ground unsafe and slippery or high winds which may cause trees to fall.</p> <p>Staff and children must wear practical walking boots or wellies to reduce the risk of falling on uneven grounds.</p> | L                                 |

| 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 |
|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| Exploring The Waterfall                          | <p>Exercise and participation in educational activities about physical risk-taking and skills.</p> <p>Exposed to real life water experiences where they can learn water skills and be aware of water currents and the flow of water.</p> <p>Able to use the water environment for scientific learning activities.</p> <p>The environment can benefit young people's health and wellbeing .</p> <p>The environment may promote creative, critical thinking and problem solving skills.</p> <p>Promotes plenty of opportunities to practice mathematical learning such as counting rocks, comparing volume and weight of water in different resources and estimating how much water resources can hold.</p> | <p>Drowning even in shallow water.</p> <p>The young children getting wet and cold could cause illness.</p> <p>Injuries from items hidden at the bottom of the water such as sharp rocks, glass and rubbish.</p> <p>Slips and trips causing injury.</p> | Children and adults | <p>Children will not be allowed to swim in the water only paddling will be allowed to avoid higher risks of drowning.</p> <p>Staff should assess the area before allowing the children into the water to ensure that the current and flow of the water isn't too strong for the children as well as being observant for any dangerous items on the ground that may cause harm. Any areas that may cause harm should be out of bounds.</p> <p>Children and Staff are to wear their wellies at all times to protect their feet from any dangerous items hidden on the ground.</p> <p>Children are to be supervised and close to children at all times while they are in the water.</p> <p>Spare clothes are to be brought to ensure that children are not wet and cold for too long to try and prevent illnesses.</p> <p>All member of staff will have relevant first aid training and a first aid kit will be on hand at all times.</p> <p>Trip to be cancelled and rearranged if the weather is bad or if there's been high rain fall leading up to the trip to ensure that the water levels are safe for children and the grounds are safe to walk on.</p> | <p>L</p> <p>7</p>          |

| 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 |
|--------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| Climbing and balancing on trees, logs and rocks  | <p>Exploring risk taking and building confidence in the skill.</p> <p>Developing physical competence.</p> <p>Builds resilience through challenge and success.</p> <p>Improves balancing and coordination skills.</p> <p>Promotes critical thinking and problem solving skills.</p> | <p>Falling or loosing balance and causing injury.</p> <p>Getting stuck while climbing causing fear or harm.</p> | Children        | <p>Staff to supervise young people while doing this activity and assist if necessary.</p> <p>All member of staff will have relevant first aid training and a first aid kit will be on hand at all times.</p> <p>Staff to assess the area and place unsafe climbing areas out of bounds.</p> <p>Appropriate clothes and shoes to be worn during this activity. Loose clothes with hanging materials can get caught and cause injury.</p> | L                          |

| 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 |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|
| Outdoor free play and loose part play            | <p>Encourages the use of imagination and creative ideas.</p> <p>Promotes critical thinking and problem solving skills.</p> <p>Enables children to do mathematical and scientific learning through play.</p> <p>Develops confidence through play and learning.</p> <p>Develop language and communication skills by playing and exploring with others.</p> | <p>Slips, trips and falls while playing which may cause harm or injury.</p> <p>Skin and eye irritations from materials like sand and mud being thrown, blown or rubbed into the face.</p> <p>Injury or harm from finding dangerous items on the ground when looking for loose parts.</p> <p>Accidentally consuming objects or materials that shouldn't be consumed or choking on small loose parts.</p> <p>Materials and resources falling on children during building play.</p> | Children        | <p>Staff to inspect all loose parts that children are playing with to ensure they are safe and assess the area they're playing in to ensure it is safe as well.</p> <p>Any building or construction play where items may fall and cause injury must be supervised by staff at all times.</p> <p>Children to follow rules that no materials such as mud and sand are to be thrown .</p> <p>All member of staff will have relevant first aid training and a first aid kit will be on hand at all times.</p> <p>Staff to pick up any items on the ground that children are unfamiliar with to assess if they are safe before allowing children to play with them.</p> <p>Staff to ensure that all children stay in the dedicated area and don't wonder too far from the group.</p> | L                          |

**Part 4:****Academic Evaluation**

“Place young children in natural settings and observe their awe and wonder unfold. Young children frequently feel wonder and joy while playing in natural environments. Children learn that the natural world is exciting and full of limitless possibilities for exploring and learning. Individuals can observe children playing in natural environments and observe their unprompted joy and excitement. Children can be seen racing wildly through a pile of leaves, dancing and spinning when the breeze blows through their hair, and laughing aloud when they spot a frog hopping around. Practitioners witness boundless elation that is a reflection of an intensely felt emotional reaction to an unfiltered way of understanding the natural world.” Stated by Rosenow, et al. (2013) emphasizing how beneficial the outdoors is on children’s emotional wellbeing and learning.

The Welsh Assembly Government (2009) recognises the importance of the outdoor environment as a tool to aid children in their learning, and believes that a child’s learning setting can be enriched and improved by exposure to the outdoors’ unique stimuli, which include the weather, noises, smells, and textures. Children’s social, physical, creative, cultural, and personal growth are all improved by being outside. The new curriculum for Wales offers all 6 areas of learning more opportunities for outdoor learning experiences.

The Mathematics and Numeracy area of learning states how through experiences in this area, children will learn how to use their numeracy abilities. These experiences will help them develop into healthy, self-assured people who are prepared to live fulfilling lives as valued members of society (Welsh Government, 2022). These opportunities can be provided outside, as Learning through Landscapes (2023) notes that both natural and manufactured materials found in outdoor environments can be used to support young children’s growing mathematical abilities.

While the Science and Technology area of learning states that learning how to experience science and technology can give students the knowledge and depth of understanding they need to lead independent, fulfilling lives where they can make a variety of contributions to society and culture (Welsh Government 2022). Cremin, et al. (2015) conducted research to discover how children benefit from learning science in the outdoor environment. The study shows how teachers created engaging physical learning environments in their classes by utilising both natural resources and common household items. Even though there weren’t many that featured scenes from the outdoors, the ones that did showed how children’s curiosity and questions could be sparked by regular exposure to the natural world and living things. Furthermore the finding suggest that children are encouraged to link science and their natural environment through engaging in hands-on activities. This gives children the chance to come up with concepts and plans on their own or in groups, reason between them, and develop explanations that are in line with the facts at hand. They are given the opportunity to develop as able young scientists.

A resource that can be used during outdoor learning to develop Mathematic and Scientific concepts is loose parts. Jung (2023) explains how playing with loose parts teaches young children about natural and man-made materials with varying textures, shapes, colours, and other physical characteristics. Playing with loose parts can also aid children in learning early counting and sorting, hand-eye coordination, grouping and matching, and recognising patterns and designs. In order to allow children to experiment and invent through play, loose parts are described as materials that can be used in multiple ways. Many different types of play are possible when loose parts are incorporated into a play environment. The loose parts are versatile and can be carefully chosen to ensure that they are appropriate for any specific age group. Children can use them in ways that are reflective of their own individual development, whether they choose to use them for creative, dramatic, exploratory, cooperative, or constructive play (Houser, et al. 2016).

Beaney (2021) discusses the benefits of man-made loose parts as she talks about a well-respected toy brand called Grapat and how they are designed to develop children's learning and imagination in an open ended approach. A loose part set that Grapat create is called "Mandalas" in a colour range of three distinct shades. Mandalas can be used to encourage pattern-making and visual learning. Another set of Loose part toys that Grapat make are wooden discs called Grapat Coins which appear in six colours. Coins are a useful tool for teaching sorting, numbering, and stacking on their own. Early exposure to sets and numbers is extremely beneficial for a child's growth. It helps to bridge the gap between the world of abstract thought and the world of real, concrete examples. The benefits of these toys is that they can used in whichever way the child deems fit to use them. Also due to the open-endedness of this toys they are no rules on where they can be played with therefore they can become indoor or outdoor resources.

Natural loose parts are natural objects and materials that can become whatever the child can imagine them to become. Fox and Wirth (2016) explain how nature naturally creates a variety of loose parts with patterns and sequences that are difficult to duplicate with manufactured materials. Think about the complex designs on a pine cone or the swirls on a fern that is unfolding. Take note of the variety and patterns of tree bark as well as how it serves as an insect habitat. The best method for children to learn about these relationships is through hands-on exploration, testing, and understanding. Natural resources enable longer and more complex play because they are more complex and diverse. Therefore natural loose parts can help children to develop scientific concepts about how the world works and animal habitats.

To ensure that a child's learning experience in the outdoor environment is successful practitioners must play a vital role. Vygotsky believed that for meaningful learning to take place in the outdoor environment, practitioners must model social learning by using Vygotsky's sociocultural theory as a guide. As stated by First Discoveries (2022) in order for children to learn in the outdoors, Vygotsky suggested that, the more knowledgeable other who in this case is the practitioner must participate, collaborate, and be completely prepared to interpret and facilitate play situations

where such interventions will benefit the child. These scaffolding techniques have the ability to improve young children's intellectual understanding and learning.

However the Reggio Emilia approach believes that the environment acts as a third teacher that daily influences the child. The Reggio Emilia approach views children as inquisitive people with the capacity to grow and learn from their surroundings as well as the connections they form with others. Every child can foster their own learning and can communicate their knowledge and understanding, according to the Reggio Emilia approach. In a Reggio Emilia setting, the practitioners role is to learn alongside the child. Teachers are viewed as partners in the learning process rather than as authoritative figures who direct the students' actions. They assist the students in achieving the experiences and tasks outlined in the emergent curriculum (Berg 2021).

Arguable the biggest issue that practitioners face when attempting to provide children with a rich outdoor learning environment is the lack of outdoor space. Nursery World (2016) discuss how in a survey they conducted and reviewed, the lack of quality resources, outdoor space and training in settings means that children are at a disadvantage of gaining adequate experiences and knowledge from the outdoors environment. Duglan (2015) agrees that some practitioners struggle to provide enriching outdoor experiences by stating that in his questionnaire he conducted practitioners discussed how in order to offer more challenging outdoor experiences for the children they required more time to organise resources, more open ended experiences for the children and training in the benefits of risky play.

A theorist who was an advocate for risky play and outdoor learning in general was Froebel. Tovey (no date) states that Froebel understood the importance of outdoor, adventurous play. He felt that rather than focusing on the risks, practitioners should consider the advantages of such challenging tasks. For instance, climbing trees allows children to experience height, perspective, and distance while also fostering feelings of fulfilment and accomplishment. Froebel argued that children who play and experiment with risks and challenges are safer than those who have been shielded from them.

Practitioners and settings that are challenged by the lack of outdoor space available, should make a conscious effort to ensure that their children in their settings are still experiencing the benefits of outdoor learning with the limited resources they have available to them. As Gov Wales (2021) explains, all learners require regular access to a variety of physical experiences, both indoors and outdoors, utilising a variety of tools and resources. Children should be acquiring skills that enable them to use a variety of tools and equipment with their growing ability. In addition to developing an understanding of their potential effect on the living world, learners who are able to interact with and connect with the natural world can also develop an empathy for the environment. Waters and Rekers (2019) add how adults who are receptive to the child's interests and are able to support their growth, without controlling the activity, support children's outdoor learning. Children's ability to ask questions, feel independent, feel connected to the world, and be physically competent all seem to be supported by play in a variety of natural environments that is supported by

attentive adults. These advantages appear to be increased when adults are child-centered and receptive to children's questions and interests, supportive of children's managed risk-taking and mastery of physical challenges, and self-assured enough to not limit children's activity unless their safety truly in danger.

In conclusion it is evident that the benefits of outdoor learning is clear, and in Wales outdoor learning has an increased role in the new curriculum. Practitioners need to be aware that the natural environment offers many natural resources for children to learn mathematical and scientific concepts through child-led exploration and open-ended play. Resources such as loose parts can also be added to outdoor learning to enhance children's experience and learning. Challenges and Barriers involving outdoor learning must be overcome to allow all children the same opportunities that will eventually contribute into them becoming confident, curious and able adults.

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