Portfolio.

Section 1:

(Source: Longleaf Forest School, 2019)

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Section 2:

Oakley (2004) considers the statement Piaget made calling children 'little scientists'. This shows the natural curiosity children have for subjects such as science and mathematics, which therefore highlights the importance of providing children with stimulating, outdoor learning environments. Outdoor environments offer children and young people with exceptional opportunities to develop their skills, whilst aiding their development.

Welsh Government (2009) acknowledge that the outdoors is a stimulating environment which presents children with the opportunity to partake in experiential learning due to the unique opportunities. This highlights the significance of an outdoor learning environment on children's holistic development. Within the outdoor learning environment pictured above, a significant feature is the water/stream. Chalufour and Worth (2005) place emphasis on the importance of water play for children's development, stating that there are abundant concepts the children can learn from the process. Upon observing the outdoor leaning environment pictured above, it was clear that the water could be used to develop children's understanding of scientific concepts, introducing loose parts could extend children's learning within this department. In terms of science, water play is a significant activity as for example it can help them develop concepts such as forces, through a sinking and floating activity.

Welsh Government (2019a) consider the perspective and the importance of children developing an understanding of the concept forces where the water/stream will allow them to develop. They state that understanding forces and energy is significant for developing children's scientific knowledge alongside their holistic development. It suggests that understanding forces helps and aids individuals in predicting and controlling the behaviour of our environment. Gross (2012), strengthen this idea as she agrees that the concept of sink and float are common science curriculum, through an activity such as exploring the forces such as buoyancy and also density.

As discussed, the water pictured within the learning environment has abundant opportunities to develop children's understanding of forces, such as sink and float. In order to successfully encourage children's scientific knowledge surrounding these forces they may use loose parts and natural materials which could be found within the environment such as stones, branches and fallen pinecones. Through this, the children will have opportunities to follow their natural curiosity and it will also encourage and support

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the use of metacognitive speech. This is a significant element of children's learning as Welsh Government (2018) agree that children learn best through play and first-hand experiences, which this activity gives them the opportunity to do.

Within the pictured learning environment, the trees are also a feature which could encourage mathematical development. For example, the trees are different heights and also there are fallen branches which are different lengths, which are mathematical concepts. Davies (2017) highlights the substantial benefits of climbing trees within the Early Years, stating that it provides children with a strong sensory experience, whilst allowing them to develop their gross motor skills and extend their learning into mathematics. Through climbing trees, the children present at the learning environment will be able to develop an understanding on mathematical concepts, such as height. Within the curriculum, Welsh Government (2019) outline mathematical progression steps for the Early Years, one example stated is that children within the Early Years should begin to understand and use mathematical language to discuss quantities using language, such as 'bigger than'.

When climbing trees there are numerous opportunities to develop mathematical skills through a fun and playful way. The Department for children, schools and families (2009) discuss the significance of outdoor play focussing on mathematical development. They state that being outdoors and features such as trees, provide children with opportunities to measure and compare lengths which in this environment would be the trees. When climbing trees children will be encouraged to problem solve as they will be required to independently determine which tree they will climb, possibly based on the most suitable height. Therefore this suggests that the children involved within this activity will developing an understanding of concepts such as height and length.

Welsh Government (2014) agree that using the natural materials within the environment, such as trees and branches encourage children to practice mathematical skills such as counting and measurements. For example, children may climb trees and count their steps as they climb. Moreover, children may collect the fallen branches and sticks which will allow them to visually see and begin to comprehend the concept of different lengths. The illustration to the right demonstrates how children could use the trees and branches to develop and understanding of height and length, this activity would

(Source: Play of the Wild, 2019)

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encourage children to problem-solve. Welsh Government (2019b) highlight the outcome of this activity in progression step one, stating that children should have opportunities to compare and place objects into groups depending on their quantities, which in the example of the branches would be length.

Gradients are a mathematical concept which the children will have opportunity to develop an understanding of due to the slopes and uneven grounds within the pictured learning environment. Welsh Government (2019b) explain within their mathematical and numeracy progression steps. Stating that within the Early Years children should have opportunities to explore movements and directions. Further strengthening this viewpoint, Olson, Mazzacoo and Ridge (2021) highlight the importance of outdoor play on children's overall holistic development, also offering suggestions on the outdoors aiding a child's mathematical development. They suggest that the outdoors allows children to question different aspects of the environment for example, why a stone may roll down the slope whereas the twig may not. This will encourage children to become curious and seek answers for these questions, supporting them in becoming ambitious, capable learners as Welsh Government (2020a) explain.

Welsh Government (2015) outline in the Foundation Phase curriculum that to develop numerical reasoning children within the Early Years should begin to transfer their mathematical skills in play and activities outside the classroom. Therefore, this emphasises the significance of a stimulating outdoor environment and the use of the slopes and uneven grounds within this specific natural environment. As it will allow the children to develop an understanding of the mathematical concept which is gradients.

To explore the concept of gradients within the pictured environment, children could use the natural surrounding materials and loose parts, such as the stones and branches. The children may use these resources and roll or push them down the slope, which will allow them to visually see how fast the different objects will go depending on the steepness of the slope, this would also relate to gravity. This shows that the use of natural resources has the ability to significantly impact children's mathematical development. Welsh Government (2021), discuss cross-curricular skills in relation to mathematics and numeracy, expressing that within the Early Years children should begin to explore and develop an understanding on movement, which the slopes and use of loose parts will give them the opportunity to do. The outdoor natural environment is considered to be a significant and beneficial area for children as it presents them with exceptional opportunities to develop their mathematical and scientific skills and knowledge.

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Section 3:

RISK BENEFIT ASSESSMENT

Location / Activity:	Woodlands with a running stream	**Date:**	10th March 2022
Assessor:	Megan Louise Evans	**Review date:**	10th September 2022

Experience exploring the outdoor environment photographed	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
Walking on the uneven ground and service levels.	• Support and aid children's coordination. • Supporting children's vestibular (balance) sense. • Help children develop their gross motor skills. • Children will begin to recognise gradients from the slopes. • Children will begin to develop reaction time and postural adjustments. • Support children's body awareness, in relation to the environment they are in (woodlands).	• Children could trip, resulting in **cuts, grazes or bruises.** • There may be **sharp objects** / materials on the ground, children may **cut** themselves. • Children could fall in hidden dips resulting in **broken bones.**	• Childr en. • Adults.	• Carry an appropriate first aid kit, to ensure any injuries, such as cuts can be dressed in the suitable way. • Appropriate footwear. • Discuss with the children how the surfaces are different and unfamiliar, meaning they may need to walk using a slower pace initially. • Check the surfaces beforehand to remove any hazardous objects / materials, such as anything sharp on the floor. • Ensure all staff to child rations are correct and also include a supernumerary where possible to ensure the safety of the children.	• Low.

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Experience exploring the outdoor environment photographed	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
Looking in the stream.	• Opportunities for the children to learn about lifecycles if there are animals in the water. • Can develop concepts such as sinking and floating by dropping objects into the water (where safe). • Opportunities to extend scientific learning by discussing habitats of different animals. • The children will be able to learn about gravity, observing if objects drop to the bottom. • Children will be able to develop their understanding of pace, how fast the water is flowing, for example.	• Children may slip into the water, resulting in **cuts, grazes, sprains,** etc. • Children may slip into the water and **drown.** • Slippery surfaces near the stream due to the water, children may **fall.**	• Childr en. • Adults.	• Exceed the staff to child ration (use supernumerary), allowing a staff member to stand by the pond to observe the children. • All staff will have appropriate first aid training, and a first aid kit will be carried. • Discuss boundaries and the dangers of the water with the children, stating they can only go beyond a certain point without a responsible adult. • Children will wear hi-vis jackets to ensure the staff and responsible adults are able to quickly find them. • Ensure all children are clear on the boundaries and are aware of possible dangers, and how to minimise the risk, e.g., appropriate footwear.	• Low.

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Dipping / walking in the stream.	• Children will be able to develop their gross motor skills. • The children will be able to learn about concepts such as, depth as they will be able to see how deep the water is. • Opportunities for children to begin classifying different animals and creatures into groups, e.g., fish, amphibians (age dependant). • Children can develop an understanding of scientific concepts, including lifecycles and temperature (discuss temperature of the water). • Develop children's coordination and balance since it is an unfamiliar walking environment.	• Children could **slip and fall** over the uneven surface at the bottom of the stream. • Children could slip and **drown.** • Interaction with water features, such as slippery banks and hidden branches could result in **falls.** • Possible exposure to contaminated water leading to **infection**.	• Childr en. • Adults.	• Children will wear appropriate clothing, such as waterproofs and wellingtons, which will allow them to walk in the stream without getting too cold, for example. • Higher staff to child ratios, including extra staff and supernumerary to ensure maximum safety of the children. • Clear boundaries to be set to the children with reminders and awareness talks, to ensure they understand what parts of the stream they can go in. • Children will only be allowed to physically paddle / dip in the shallow parts of the stream when there is an adult present. • Staff will be first aid trained and will carry an appropriate first aid bag.	• Med ium

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Experience exploring the outdoor environment photographed	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
	• Allows children to experience their ecosystems first-hand. • Offers a stimulating sensory experience.			• Any open wounds to be covered with tape / plasters, and hands will be thoroughly washed after the session.	
Exploration of the environment, seeing things such as insects, animals and plants.	• Children will be able to develop their fine and gross motor skills, when bending down, stretching and picking up materials for example. • Opportunity to develop an understanding on lifecycles, habitats and living things. • The children will become aware of living things, becoming ethical whilst developing compassion from other living things.	• **Tripping** over the rocks and stones whilst exploring. • Animals / insects could **sting or bite**, could have **allergies** to stings**.** • May be animal waste and faeces, can cause infection.	• Childr en. • Adults.	• Have awareness talks and discussions with the children before they begin, to prepare them and explain what is appropriate to pick up and what may not be. • Discuss boundaries with the children, clarifying where they are allowed to explore and what part is off limits. • Provide the children with high-vis jackets beforehand which will make them easy to notice within the woodlands. • Explain to the children that they should not put anything or their hands in or near their mouths.	• Low

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Experience exploring the outdoor environment photographed	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
		• Irritant or poisonous planets may be within the area, causing a negative reaction. • Children may pick up inappropriate materials, such as litter. • Children may walk off beyond the suitable area, becoming lost.		• Discuss 'stranger danger' with the children, ensuring they know that if a stranger approaches them they should go to a responsible known adult. • A designated staff member should check the woodland are beforehand to check for any animal faeces, which could cause harm to the children. • All staff will be first aid trained, and an appropriate, up-to-date first aid bag will be accessible at all times. • Staff will be aware of the children's medical needs, such as allergies to stings and will carry the suitable equipment, such as an EpiPen.	

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Climbing trees	• Children can develop confidence and strong self-esteem, as they will feel as though they have achieved something. • Opportunities to develop the children's physical development, including their gross motor skills as they will be climbing. • Opportunities to extend children's scientific knowledge, surrounding animals' habitats, including trees. • Allows children to challenge themselves in terms of their physical ability. • Children will be able to develop their spatial reasoning. • Helps children develop their focus and concentration. • Aids mathematical skills, as there will be opportunity to	• **Falling** from the tree. • **Snapped branches, twigs falling** onto the children. • Low level branches could go in the children's eye causing e**ye injury.** • Possible sharp pieces on the tree could cause **cuts and scrapes.** • Children may climb too high and become '**stuck' and unsafe.**	• Childr en. • Adults	• A responsible adult / staff member should observe the children appropriately whilst they are climbing trees. • Children should wear appropriate footwear which will enable them to partake in the physical activity with ease. • Discussions and lessons surrounding 'testing' before climbing should be had. For example, placing light weight on a branch to ensure it is stable (age dependant). • A staff member will judge the trees and make an informed decisions on whether they are all safe to climb. If a tree is considered as unsafe, then the children will be informed of this boundary to minimise risk. • Adults will not lift the children up onto the tree, the children will only climb as high as possible independently to ensure they will be able to get down safely.	• Low.

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Experience exploring the outdoor environment photographed	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
	count as they climb, for example. • Opportunities for children to understand concepts such as, height, when thinking how high they will climb.			• Boundaries will be discussed beforehand to ensure the children are aware of what area / trees are acceptable and suitable to climb.	

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Section 4:

Adults have a significant role in facilitating and supporting children's play to ensure they are able to learn and develop new skills through the process. Whalley (2021) refers to Piaget quote 'play is the work of children' questioning where an adult begins to fit into the play process. Concluding that adults should play the role of the facilitators and also scaffolders, highlighting the importance of not taking over during play. Furthermore, supporting this ideology Ofsted (2021) emphasis that it is highly important that practitioners and teachers do not begin to interfere when children are focussed within their play and should alternatively work with the children extending their play where possible. For example, if a child was involved in water play, the practitioner may ask whether a loose part would float or sink, which supports the children's mathematical development in a fun, playful manner. Welsh Government (2020b) agrees that children should be taught through a playful approach.

Play Scotland (2022) acknowledge that loose parts are beneficial resources, stating that they are open-ended and children are therefore able to use their imagination to use the materials in a way of which they deem appropriate. Loose parts could be introduced into an outdoor environment by adults in order to support the children in engaging with scientific and mathematical concepts. Likewise, England (2021) suggests that loose parts are a highly beneficial resource in terms of mathematics. Stating that for example, no two loose parts are the same such as a leaf. This means that children can begin to categorise items based on size, shape or colour, highlighting the importance of loose parts within mathematical development.

However, although evidence concludes that loose parts are a significant resource which enable children to follow their natural curiosity and develop their mathematical and scientific skills, adults may find this a challenge. Spencer, *et al.* (2019) consider the benefits of loose parts whilst also acknowledging the challenges which they may present, including initial apprehensiveness and also limited creativity and imagination from the adults and practitioners. Creating Minds (2021) discuss how as we grow older, we begin to lose our creativity. This suggests that adults and practitioners may not be able to think and acknowledge the opportunities loose parts could provide in regard to mathematical and scientific skills. For example, a child may recognise the different lengths of sticks and create a playful game aiding their mathematical development, whereas this may be more difficult for an adult to recognise due to the decline in creativity. Consequently, this suggests that a challenge of using loose parts to aid children's

mathematical and scientific development is that there could possibly be some missed opportunities due to the creativity required of the open-ended materials.

Gibson (1966) developed the term affordance, stating that it is what an environment offers and provides the individual with. Suggesting that it is an adults role and responsibility to provide children with high affordance environments. Jones (2003) discussed this theory agreeing that it is significant that an environment is of high affordance for those involved to ensure they are gaining the best possible opportunities from the area. Heras-Escribano and De Pinedo-García (2018) move on to discuss the qualities of which contribute to creating a high affordance environment, they place emphasis on the natural resources and landscaping of an environment. This suggests that those qualities are what makes a rich, stimulating area. For example, sticks and twigs present children with the opportunity to partake in den building, this will consequently aid their mathematical development as they will be required to think of concepts such as, length, height and weight.

It may become difficult for practitioners and adults to create a high affordance environment with opportunities to develop children's mathematical and scientific skills due to some challenges, such as space and time. Estyn (2011) support this viewpoint discovering that practitioners, which includes teachers and support staff within school are more confident in planning for outdoor learning than those in non-maintained settings as they often lack a suitable outdoor space. This suggests, that although some children are benefiting from adults planning and using an outdoor environment appropriately, it is not always the case due to factors such as, lack of confidence, space and funding. However, since the report Welsh Government (2021) have since begun consulting on a curriculum for non-maintained settings, which may help overcome the challenges as the practitioners and adults will have a document to follow making them feel more confident.

Vygotsky (1978) developed the idea the zone of proximal development, which outlines the distance between what a learner is capable of achieving independently and where they may require additional support from the more knowledgeable other. For example, during a scientific sink and float activity a child may be unsure on the answer, therefore the adult or possibly a fellow learner may be introduced into the process to offer support acting as the more knowledgeable other. Vander (2002), suggests that the process of introducing a more knowledgeable other will motivate the individual allowing them to develop their mathematical and scientific skills to the best of their ability. This will therefore, help develop

the children's scientific skills in this case, as they will be working alongside an individual who is capable and confident within that field, aiding them to further develop their knowledge.

On the other hand, although there are many acknowledged benefits of adults introducing a more knowledgeable other there are also challenges. Abtahi (2017) raises concerns on how the adult will chose the more knowledgeable other and how this may also have an effect on both individuals involved. For instance, the individual who requires the help may lose confidence and begin to believe they are not good enough which could result in them not fulfilling or developing mathematical and scientific knowledge. Grossman (2004) acknowledges the importance of treating students equally within the classroom and across settings. Suggesting that if this is not achieved it will have a negative impact on the children's self-esteem, consequently effecting their learning journey. However overall, it is considered to be a beneficial learning aid as it supports diverse learning, Reynolds (2018) agrees that through outdoor play children are able to explore concepts involved in mathematics and science. Agreeing that the more knowledgeable other provides learners with a deeper understanding and enjoyment. This shows that it is significant that adults support diverse learning where there is a diversity in environments, such as the outdoors.

Pound (2006) discusses the different approaches and ways adults can encourage children in learning and developing their mathematical skills. She recognises that it is the adults role to ensure that there are open-ended opportunities in place to explore different mathematical skills such as length. Also, discussing the viewpoint that mathematics should be made relevant to real-life experiences and materials. This highlights why it is important that adults provide children with a stimulating, playful outdoor environment, alongside recognising and ensuring there are plenty of opportunities to develop their scientific and mathematical skills. Philipart (2021) consider the Montessori view of learning, stating that children learn through practical, real life experiences, which an outdoor learning environment could provide if the adult is able to tailor the environment to mathematics and scientific learning. Further strengthening this perspective, Keith (2021) states there is an increasing focus on outdoor play experience, it is highly important that adults are able to identify opportunities in the outdoors which will allow children to develop their mathematical and also scientific development.

Blatchford, J and MacLeod-Brudenell (2005) highlight the importance of introducing children to scientific concepts through a playful way within the Early Years. This suggests that the role of the adult is to

scaffold children's play and extend their learning where possible aiding them in developing their scientific knowledge. Education Scotland (2022) acknowledges the importance of STEM subjects which includes science as it underpins the economy and employment sector, highlighting the significant role adults have on ensuring children are provided with opportunities to develop their scientific skills. Best Chance (2022) discuss how self-directed and play-based learning are essential in allowing children to learn new skills through exploration. Therefore this relates to adults facilitating children learning science as they will be able to explain different concepts, such as gravity through play.

Willis (2009) acknowledge that young children are born naturally curious, due to this, adults can support this and extend the children's mathematical and scientific learning through sustained shared thinking, which Vygotsky (1978) described. This term refers to when two or more learners work with one and other to solve a problem or clarify a concept, therefore adults are able to support children's mathematical and scientific learning through this. Brodie (2014) supports this concept, stating that it helps children explore new ideas through a natural way and begin to make links and connections between different concepts. For example, when using the slopes pictured to explore gradients the children may roll loose parts. The adult could ask questions such as 'why does that resource roll faster than the last one?' Consequently, the children will be encouraged to further research and discover the answers to such questions, which therefore expands their scientific knowledge.

Moreover, in order to support and encourage children to engage with mathematical and scientific concepts adults should encourage and demonstrate children to metacognitive talk, Roskilly (2019), discuss this concept explaining that it is when learners talk out loud to focus and engage within their cognitive process and development. Therefore, this is a role of the adult as if they demonstrate this to their students, it will begin to feel natural to them which will help them build their mathematical and scientific knowledge. Mayer (1998) states that metacognitive thinking can encourages children to become motivated on what they are learning, which will therefore aid their mathematical and scientific learning.

In order for adults to expand children's scientific and mathematical learning, it is highly important that practitioners observe the children, allowing them to monitor their progress over time. Dubiel (2016) discuss the significance of observing and assessing children, as it allows the adults to accommodate and plan mathematics and science activities. NAEYC (2020) agrees that observing children during play

is an essential process as this allows the adult to plan and implement different activities, for example based on mathematics and scientific concepts.

Moreover, learning stories are considered to be a beneficial way of tracking and recording children's progress and are used widely throughout different settings. Alexander (2021) acknowledges that it becomes a learning story when an adult adds their interpretation of the child's abilities and competencies. This will help aid children's mathematical and scientific development as it enables the adult to visually see what the child is able to complete independently and what they may require additional support with. It is highly important that adults are able to provide children with the appropriate opportunities to develop these skills and observing children through play enables them to achieve this role.

Overall, the evidence and theory demonstrates that adults play a significant role in ensuring children have the appropriate and suitable opportunities of which will allow them to develop their knowledge of mathematical and scientific concepts. Furthermore, practitioners and teachers should be able to identify a stimulating, rich outdoor environment to ensure the children are able to benefit from the area, based upon their observations which would show them where the children may require additional support. This shows that the adult is essential in scaffolding and facilitating children's play, as it means they are able to learn in a playful manner.

Word count: 4,333

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