

Awe and Wonder – Science, Mathematics and the outdoorsPortfolio

## Part 1:



## Part 2:

The photograph above provides a rich learning environment for children with a focus on developing both mathematical and science concepts. However, there are many other skills that can be practised in an area like this enabling holistic development with a cross-curricular approach. Throughout part two some links have been made to the descriptions of learning from the Curriculum for Wales due to the learning stories being based on children in Reception which are four or five years old.

Learning Stories

Name: Child 1

Date: 11<sup>th</sup> September 2023

When we arrived at the Forest School area the children followed me in a line and we walked around the outside of the log circle singing the song 'We are going around

the outside, how safe are we?'. Once all the children had arrived safely in the area, they each found a log to sit on and I asked if anyone knew any Forest School Rules. Child 1 put up his hand and said "Only climb trees if they are dry". I questioned the child on why this was important and he went on to tell us a story about how he had tried to climb a wet tree once and had fallen and hurt himself because it was slippery. The other children came up with many more important rules to abide by to keep them safe in the outdoor area and they were then sent off to explore and play.

The children were greeted with a variety of natural materials and a plethora of loose parts that they could experiment with for example logs, sticks, leaves and shells. I brought baskets with me for the children to use to collect items and we discussed how some of the children may want to go on a 'treasure hunt' to see what they could find. Child 1 was excited by this idea and turned to his friend and said "Come on, let's go and look for the treasure". As I watched the children from afar, I could see that they were co-operating and communicating with each other well, however child 1 was more dominating and taking the lead. We agreed to meet back at the log circle in ten minutes to show each other what we had found.

Welsh Government (2022) maintains that children will learn to explore ideas, problem solve, collaborate with peers and establish connections through play. Numeracy experiences should be exciting and engaging for learners.

The children came running back to the log circle with a look of glee on their faces and eyes bright with excitement. Child 2 said "We have so much treasure, I'm glad we had the baskets as we wouldn't have been able to carry it all". The children then tipped out what they had collected and Child 1 began to count them. "Miss Thomas we have got 12 things!" said Child 1.



The children had collected a range of items which were various colours like green, brown, white and yellow. We sat down and I asked the children "How do the objects feel?". "This stick is bumpy and rough but the leaf is soft and smooth" said Child 1. This was encouraging the children to expand their vocabulary whilst learning about properties of materials.

Welsh Government (2022) say that children should have opportunities to examine properties of materials.

"What groups could we sort them into?" I asked. "Rough and smooth" said child 1. "We could sort them into colours" suggested child 2 quietly. Another child came over to see what we were doing and said "You could put them in order from smallest to biggest". Child 1 insisted that we sorted them into groups of rough and smooth objects so the children worked as a team to do this. Child 2 picked up a leaf and said "This is rough and smooth, let's have a group for both". I then extended the children's learning by

asking them “Which group has more in it?” encouraging them to count to check, whilst questioning their knowledge about smaller and bigger amounts.

Welsh Government (2022) state that it is important that children begin to make comparisons and estimates when describing quantities with language such as ‘less than’ and ‘more than’.

When they had completed this they finished off by creating pictures and patterns with their natural materials.

Welsh Government (2022) believe that to show progression children need to start to identify, extend, copy and generalise sequences around them.

Observing the children playing and learning in the outdoor environment highlighted to me how beneficial it was for their health and well-being.



Name: Child 2

Date: 15th September 2023

Child 2 was playing in the mud kitchen in the Forest School area with a small group of children. There were pots, pans, baking trays and spoons for them to play with and a tray of water which they could use. Child 2 turned to his friend and said “I am going to make you a cake, what flavour would you like?” the other child replied saying “Chocolate, please.” Playing in a mud kitchen improves the children’s social and communication skills. Child 2 went over and picked up a pan and started piling it high with mud with a look of delight on his face, counting each spoonful as it went in.

Welsh Government (2022) maintains that children need opportunities to explore and experience numbers in outdoor environments.

He picked up a spoon and tried to stir it, but the mud was too hard to stir. He said “I can’t stir it!”. “What could you add to it to make it softer?” I said. Child 2 responded by saying “I could add water”. Child 2 collected a jug of water from the tray and carefully carried it back to the mud kitchen, trying not to spill it but because he had filled it too high water leaked down the sides and he burst out laughing.

Welsh Government (2022) believes that children should learn about measure by using a variety of objects.

The movements of running over to the water tray and bending down to fill up the jug were working on his gross and fine motor skills, also developing his balance when transporting it back to the mud kitchen.

He began to fill the pan with water, starting with a little bit and then realising to soften the mixture he needed to add more. He went on to stir it with ease and added in some grass, leaves and small flowers. Child 2 said "The mixture is ready now, it needs to go in the oven". Child 1 said "Don't forget to put it in the baking tray". Child 2 picked up the spoon and started sharing it out. "How does the mixture feel?" I asked. "It's very sticky but tastes delicious. It will be ready in five minutes!" said Child 2 as he put the baking tray in the oven. Child 1 replied "Good, I'm so hungry".

Child 1 was making 'mud potions' in two containers. He pointed to one and said to his friend "This one has more in it", Child 2 responded by saying "Is it heavier?". Child 1 picked them both up and said "Yes it is".

According to Welsh Government (2022) children should develop the ability to question how things work and display curiosity.

Child 2 made a beeping noise and excitedly told his friend the cake was ready.



Children are curious individuals and letting them explore an outdoor environment like this is beneficial, with enabling adults there to facilitate their learning and support and observe their curiosity. Welsh Government (2022) believes that the skill to understand and predict phenomena requires curiosity and a desire to find solutions. Children will ask questions about the world due to curiosity about science and technology.

**RISK BENEFIT ASSESSMENT**

|                             |                               |                     |                                 |
|-----------------------------|-------------------------------|---------------------|---------------------------------|
| <b>Location / Activity:</b> | Woodland Area - Forest School | <b>Date:</b>        | September 12 <sup>th</sup> 2023 |
| <b>Assessor:</b>            | Rebecca Thomas                | <b>Review date:</b> | April 12 <sup>th</sup> 2023     |

| <b>Experience exploring outdoor space in photograph</b>                    | <b>How will young people BENEFIT from this activity?</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <b>Hazards and associated risks</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <b>Who is at risk?</b> | <b>PRECAUTIONS in place to reduce the risk of injury</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Overall risk after precautions<br/>RATING:<br/>L/M/H</b> |
|----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|
| Children collecting natural loose parts such as sticks, stones and leaves. | <p>Children will learn about properties of materials. Expanding their vocabulary and giving them the opportunity to identify materials for certain uses.</p> <p>It can develop mathematical skills including ordinal and cardinal counting. They may order the materials from smallest to biggest and create patterns with them.</p> <p>Enhances their sensory development learning about different smells, textures and colours.</p> <p>It develops their fine and gross motor skills when crouching down and stretching up, moving their bodies in different ways.</p> <p>It can develop children's schemas linked to connecting for example positioning,</p> | <p>Low-lying branches can cause cuts and scrapes on various parts of the body, resulting in eye injuries or head injury/ concussion if someone walks into them.</p> <p>Individuals may get bitten or stung and they may be allergic to insect bites.</p> <p>They may get cuts or splinters from the objects that they collect such as stones and sticks.</p> <p>Children may try to lift heavy objects such as logs and stones and they could drop them on their feet or jam their hands under them.</p> <p>Children may pick up rubbish or inappropriate materials such as dog poo.</p> | Adults and Children    | <p>Inform the children that they need to walk carefully and model how to do it. They must do this until they feel familiar with the outdoor environment.</p> <p>Staff should go and check the area before the children enter to assess if it is safe and remove any rubbish/glass bottles or dog poo etc.</p> <p>Remind the children to ask for support when lifting heavy objects.</p> <p>Discuss appropriate and inappropriate materials to collect, this could be done in the form of a game.</p> <p>Take flash cards with dangerous objects on them for example glass bottles and dog poo and tell the children to show an adult if they see them.</p> | L                                                           |

| Experience exploring outdoor space in photograph | 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<br>RATING:<br>L/M/H |
|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
|                                                  | transporting and scattering.                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                    |                     |                                                                                                                                                                                                                                                                                                                                                                          |                                                    |
| Walking on un-even ground                        | <p>It will develop children's balance - vestibular sense, co-ordination and spatial awareness.</p> <p>It will provide an awareness of gradients and slopes.</p> <p>It teaches children what their own bodies are capable of and different ways to move for example jumping and sliding.</p> <p>Develops understanding of energy and forces.</p> <p>It will strengthen the child's bones and muscle.</p> | <p>Un-even ground can cause trips and falls which can result in broken bones, sprains, bruises, cuts and many other injuries.</p> <p>There are a variety of hazards such as sticks that people may trip over, dips in the ground that may be camouflaged by leaves and wobbly logs and stones.</p> | Adults and Children | <p>Inform the children that they need to walk carefully, especially if it is an unfamiliar surface and model how to do it.</p> <p>Ensure they are wearing appropriate clothing and footwear – long sleeved t-shirts, long trousers and wellingtons.</p> <p>Play a game to improve their balancing skills.</p>                                                            | L                                                  |
| Children climbing trees                          | <p>Develops children's muscle strength and co-ordination.</p> <p>It is risky play which provides challenge for the children and develops their confidence.</p> <p>Works on their problem-solving skills as they must figure out how to climb up and get down.</p> <p>It provides children with a connection to</p>                                                                                      | <p>If a child falls out of a tree it can result in cuts and scrapes, broken bones, spinal injury, head injury/concussion.</p> <p>Child may get stuck in a tree due to climbing too high and an adult may have to get them down.</p>                                                                | Adults and Children | <p>Remind the children that they are not allowed to climb trees if they are wet/it has been raining.</p> <p>Discuss the type of trees that are safe to climb. The trunk must be thicker than their thigh.</p> <p>Tie string around the trees that are safe for the children to climb.</p> <p>Put impact mats under the trees that the children are allowed to climb.</p> | M                                                  |

| Experience exploring outdoor space in photograph                                                                                 | 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<br>RATING:<br>L/M/H |
|----------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
|                                                                                                                                  | <p>nature and develops their resilience.</p> <p>May develop their social skills if they are playing and helping peers.</p> <p>Aids imaginative and creative play.</p>                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                     | <p>Discuss rules and tips to ensure 'safe climbing'.</p> <p>Ensure there is access to an extendable ladder which can be used if a child gets stuck in a tree.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                    |
| Children exploring the environment, searching for insects/living creatures. Also, examining things like flowers, logs and trees. | <p>Children will learn about life cycles and other living creatures.</p> <p>It teaches the children the importance of respecting living things and caring for the environment, becoming ethical citizens.</p> <p>It will teach children the impact of human activity and let them explore nature and habitats.</p> <p>It may develop the children's mathematical skills due to counting woodlice/flowers. May introduce concepts like less and more.</p> <p>It will develop their muscle strength and gross motor skills if a child bends down and lifts up a log to find creatures.</p> | <p>There may be poisonous berries which a child could eat/consume.</p> <p>There may be irritant or poisonous plants that a child may have a reaction to.</p> <p>Children may try to lift heavy objects whilst searching for things such as logs and stones, they could drop them on their feet or jam their hands under them.</p> <p>Low-lying branches in the Forest School area can cause cuts and scrapes on various parts of the body. They may cause eye injuries or head injury/ concussion if someone walks into them.</p> <p>Children may get lost if they wander off or try to talk to strangers as there is a public path next to</p> | Adults and Children | <p>Remind children that they are not allowed to put anything in their mouth and they need to wash their hands when they get back to school. Staff should be aware of any allergies the children have.</p> <p>Children must have appropriate clothing – long sleeved tops, trousers and wellingtons to protect them from stingy nettles and irritant plants.</p> <p>Ensure the Forest School area is enclosed with secure fences and the gates are shut. Talk to the children about the fact that they are not allowed to leave the area without an adult.</p> <p>Discuss stranger danger with the children and remind them not to disclose any personal information to anyone they don't know.</p> | L                                                  |

| Experience exploring outdoor space in photograph | 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<br>RATING:<br>L/M/H |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
|                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | the Forest School area.                                                                                                                                                                                                                                                                                                                             |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                    |
| Playing in the mud kitchen.                      | <p>Develops their creativity and sensory skills through messy play.</p> <p>Aids their social development through conversations during play with peers and co-operation skills.</p> <p>It gives the children opportunities to display curiosity and encourages questioning skills.</p> <p>They learn about mixing, different textures and measuring - scientific development.</p> <p>It enhances development of fine and gross motor skills through different body movements.</p> | <p>Children could get splinters from the wood.</p> <p>They may be playing with heavy pots and pans which could cause injury if dropped.</p> <p>Children may cause injury by crowding the area.</p> <p>There may be screws sticking out of the wood which could cause cuts, scrapes and puncture wounds.</p> <p>Children will get wet and muddy.</p> | Adults and Children | <p>The kitchen is sanded to make the rough surfaces smoother and lessen the likelihood of splinters.</p> <p>Remind the children that the pots and pans are heavy and to use two hands when lifting them whilst being careful.</p> <p>Staff will assess the kitchen is safe to use before each session, ensuring there are no dangerous screws that could cause injury.</p> <p>We will ensure there is a number restriction on the children playing in the mud kitchen at one time.</p> <p>The children must have waterproof trousers, coats and wellingtons on.</p> | L                                                  |

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#### Part 4:

To ensure scientific and mathematical development takes place in the outdoors there must be enabling adults facilitating the children's play. Richardson (2017) states that adults should be motivated, with the ability to set up outdoor play provision that the children can use to its full potential. Grigg and Lewis (2016) believe that practitioners should limit informing the children of what they are not allowed to do for example climb trees and play on wet grass, and within safe limits provide opportunities for them to act in accordance with their instincts. Many maths and science skills can be developed through 'risky play', also contributing to holistic development. Tovey (2017) maintains that Froebel valued risky play outdoors and focusing on the benefits rather than the risks was important. Children gain knowledge of distance, perspective and heights when tree climbing and may feel a sense of achievement. Mart and Waite (2021) say that children learn how to manage risk by being faced with some risky situations. Sometimes children are given less freedom in the outdoors due to safety concerns. Furthermore, Sandseter and Sando (2016) and Gill (2010) point out that if a child has an injury there is a possibility that staff will be held liable for it, resulting in them being sued. This can make practitioners anxious about letting the children partake in risky play with pressure to avoid injury from the insurance industry.

According to Wiedel-Lubinski (2019) meaningful STEM-based learning should be facilitated by teachers that promote experimentation, exploration and curiosity. Bilton and Waters (2017) maintain that a study showed Welsh respondents displayed many more references to numeracy-related aims in their outdoor environment than English respondents. The Welsh Governments Outdoor Learning Handbook states that the outdoor environment should be used regularly as a learning space. Yilmaz (2016) points out that Froebel believed that outdoor and indoor activities should be valued as much as one another and play is the most beneficial learning experience for children. Tovey (2017) says that Froebel noted the significant influence that adults may have on whether children's curiosity and interest are nurtured or crushed in the outdoors. They should provide opportunities for making connections, problem solving and open-ended exploration in the natural environment which are values of science and maths. Nevertheless, according to Ernst (2014) and Bilton (2010) sometimes natural outdoor settings are not associated with learning by practitioners, therefore they may not provide many outdoor opportunities. They cannot recognise the connection between developmentally appropriate practice in early life experiences and unconstrained play in nature.

Adults may provide loose parts to enhance the children's scientific and mathematical development. Play Scotland (No date) state that Simon Nicholson believed that children enjoy interaction with variables for example shapes and materials, physical phenomena such as gravity, magnetism and electricity and media like gases and fluids. The degree of creativity, inventiveness and how much children will discover is proportional to the number and variety of variables or loose parts in the outdoor environment. Nicholson (1971, cited in Mackley *et al.*, 2022) maintains that play

spaces will be high in affordance for fantasy and creativity if loose parts materials are available rather than play equipment. Loose parts are affordable and portable therefore it should be easy for practitioners to incorporate these items in an outdoor area in a setting. According to Campbell and Speldewinde (2020) by utilising the environments and the children's learning experiences in a variety of ways to assist learning, the educators themselves become a part of the 'affordances'. Cankaya *et al.* (2023) points out that loose parts are interactive and open-ended materials that develop problem solving and divergent thinking which are key skills for maths and science. Nevertheless, Mart and Waite (2021) maintain that barriers to effective outdoor learning can be lack of outdoor space or lack of sufficient materials outside.

White (2021) believes that early years outdoor environments should be contextual to each child and well designed, allowing staff opportunities to have more meaningful engagements with the children they are caring for and educating. Positive relationships between practitioners and children result in better learning outcomes. Tunnicliffe (2015) and Yelland, Diezmann and Butler (2014) say that early years educators should ask children appropriate questions during outdoor play, contributing to scaffolding the activity but should not tell the child what to do. Asking different types of questions can be invaluable as effective questioning skills develops the child's learning in science and maths. Vygotsky (1976, cited in Newman and Leggett, 2017) state that practitioners should aim to sustain children's engagement and development is lead in significant ways by collaboration with another more capable peer or adult that is in their zone of proximal development. If educators believe their role in outdoor areas is to solely supervise, this undermines the value of play. Khan, McGeown and Bell (2020) believe that according to Vygotsky's social constructivism theory, learning takes place through interpersonal relationships in a social environment in which adults and peers assist and promote children's learning. However, Leggett and Newman (2017) point out that there are constraints that make adults engaging with children in the outdoors difficult such as concern for sun safety regulations, routines for nappy changes and regulatory requirements stating that children must always be supervised.

Sustained shared thinking develops children's mathematical and scientific development. According to Early Education (2012, cited in Black *et al.*, 2014) sustained shared thinking enables the children to think critically, supporting them to make links and explore ideas with the key aspect being adults following the children's lead in conversations and discussing things together. Nevertheless, Black *et al.* (2014) states that adult-child interactions are complex and practitioners need intricate, high-level skills to guide the children's thinking.

According to Tovey (2014) Montessori believed that educators should give children freedom of movement, time and choice within an outdoor environment that has been well prepared. She placed emphasis on the importance of adults exercising caution when interrupting or intervening with children. She pointed out that nature gave children a sense of responsibility, developed skills in observing natural life and built a sense of awe and wonder. Bruce (2005, cited in Bilton and Crook, 2016) states that adults should acquire the ability to interact not interfere with children's learning and

carefully consider if they are doing the former or latter. Welsh Government (2022) point out that staff can learn about children's interests through carrying out observations and delving into these interests can aid learning. Children should be observed in the outdoors and adults should consider appropriate times and ways to intervene and interact with the children during learning. Cree (2009) maintains that Forest School practice promotes practitioners being observers and adopting the responsibility of letting the learning flow and not interfering. Knight (2017) state that the pedagogy of a Forest School programme is based on observations, which flow into collaborative work between practitioners and learners. This framework should clearly demonstrate learning progression. Inhelder and Piaget (1969, cited in Khan, McGeown and Bell, 2020) point out that independent discovery is the way that children learn the most. Wood (1998, cited in Khan, McGeown and Bell, 2020) says that when children make their own discoveries through exploration of the environment, they construct new knowledge.

West (2018) says that children need to experience the outdoors to learn and to become scientists they need to be involved in the process. This will inspire them to respect the natural world. According to Omidvar *et al.* (2019) children are provided with numerous nature-related experiences when following the Reggio Emilia pedagogical approach. This approach places importance on active education and suggests the child's role is a researcher which is consistent with Piaget's theory. McCormick Smith and Chao (2018) point out that activities based on the Reggio Emilia approach develop group and individual curiosity, discovery, exploration and creativity. Also, they promote using the five senses to explore, testing theories, asking questions and extending their thinking. Vygotsky's theories of social construction of knowledge are also in line with Reggio perspectives as the focus is on social interaction and culture.

Torquati and Ernst (2013) believe that early childhood educators' ability to capitalise on the opportunities provided by natural environments is dependent on their views of those affordances. Some practitioners may struggle to 'read' the affordances in an area due to not having foundational experiences and lack of exploration in a natural environment during their childhood. Learning through Landscapes (No date) says that is important that practitioners show that they want to be outside with the children, they should value being in the outdoors whilst embracing the benefits it has for children's development and well-being. Learning in the outdoors should be play-based and child-led. Maynard, Waters and Clement (2013) state that results of a study show that the more natural outdoor environments where child-initiated activities occurred appeared to magnify the positive impact of child-initiated learning and reduce the perception of underachievement.

Bose and Seetso (2016) maintain that as science is not intuitive, an environment should be created for children to engage with activities connected to volume, area, length, numbers, shape, colour, weight, function, texture and patterns, as well as hands-on materials to believe and see it happen. Babaci-Wilhite (2017) says that inquiry-based learning comes from John Dewey's Theory of Inquiry which is that the learning process is influenced by the environment in which the learner lives, acts and

inquires. Inquiry-based learning suggests that children look for evidence in the natural world and apply critical reasoning to develop and revise scientific conclusions. Practitioners should give the children opportunities to partake in 'hands-on' scientific experiences. Kiewra and Veselack (2017) point out that nature enables hands on, messy play which develops children's creativity and problem-solving abilities. Also, being faced with real challenges that need overcoming builds resilience. Natural outdoor classrooms are creative laboratories in which children can learn in ways that are consistent with human evolution and the most recent brain science. However, according to Van Dijk-Wessius *et al.* (2020) some teachers find it difficult to manage the children in the outdoors and are not confident in teaching in the outdoors due to lack of knowledge, training and experience.

According to Keith (2017) Young children require time to revisit and explore early mathematical and scientific concepts and layer new learning in order to develop confidence. Gibbs (2014) and Ireland and Mouthaan (2020) believe that Bruner's 'spiral curriculum' theory is that children should be given opportunities to revisit topics numerous times throughout school, with increased complexity of the topic with each visit. Therefore, the new learning and the old learning are connected. Practitioners should consider this theory when setting up outdoor spaces for children to play and learn. Coelho and Moles (2016) maintain that teachers must communicate with colleagues to inform them of the stage of learning the students are at throughout the different years, ensuring there is fresh knowledge added each year, without excessive repetition.

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### Reference List

#### PICTURE 1:

<https://www.bing.com/images/search?view=detailV2&ccid=Of28h7Rf&id=E1D8FB230B24FFC30A170DCEA5A8BEA39703D2E3&thid=OIP.Of28h7RfQgcG3rkopF8AKAHaLA&mediaurl=https%3A%2F%2Fwoodlandclassroom.com%2Fwp-content%2Fuploads%2F2017%2F03%2Fscavenger-hunt-kids.jpg&cdnurl=https%3A%2F%2Fth.bing.com%2Fth%2Fid%2FR.39fdb87b45f420706deb928a45f0028%3Frik%3D49IDl6O%252bqKXODQ%26pid%3DlmgRaw%26r%3D0&exph=743&expw=500&q=children+on+an+outdoor+hunt+&simid=608036721071912845&form=IRPRST&ck=D2E22AC5A739C04D31628B77D7AAB554&selecte dindex=12&ajaxhist=0&ajaxserp=0&vt=0&sim=11>

#### PICTURE 2

PICTURE 3 - <https://newsfromwales.co.uk/wild-blossom-forest-school-nurtures-nature-minds-with-a-little-help-from-robert-price/>

#### PICTURE 4 -

[https://www.google.com/search?q=mud+kitchen+utensils&tbm=isch&ved=2ahUKEwK7rj\\_2KSBAxUqmycCHd5oDMUQ2-cCegQIABAA&oq=mud+kitchen+utensils&gs\\_lcp=CgNpbWcQAzIFCAAQgAQyBQgAEIAEMgcIABAYEIAEMgcIABAYEIAEOgcIABCKBRBDoggIABCABBCxAzoKCAAQigUQsQMqqzoGCAAQCBAeUABY0Cd0ChoAHAAeACAAXmlAdoOkgeEMTUuNpgBAKABAaoBC2d3cy13aXotaW1nsAEAwAEB&sclient=img&ei=yiYAZcrhOaq2nsEP3tGxqAw&bih=708&biw=1471&hl=en-US#imgsrc=wuHhPdpykJpoNM](https://www.google.com/search?q=mud+kitchen+utensils&tbm=isch&ved=2ahUKEwK7rj_2KSBAxUqmycCHd5oDMUQ2-cCegQIABAA&oq=mud+kitchen+utensils&gs_lcp=CgNpbWcQAzIFCAAQgAQyBQgAEIAEMgcIABAYEIAEMgcIABAYEIAEOgcIABCKBRBDoggIABCABBCxAzoKCAAQigUQsQMqqzoGCAAQCBAeUABY0Cd0ChoAHAAeACAAXmlAdoOkgeEMTUuNpgBAKABAaoBC2d3cy13aXotaW1nsAEAwAEB&sclient=img&ei=yiYAZcrhOaq2nsEP3tGxqAw&bih=708&biw=1471&hl=en-US#imgsrc=wuHhPdpykJpoNM)

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