

Forest area



Outdoor opportunities that promote children's scientific and maths development

The picture above shows a waterfall and a rocky area in a wide Forrest with lots of natural resources, greenery and a safe banking area for the children. This image shows multiple chances and opportunities for children to learn whilst in the outdoor environment, specifically focussing on their mathematical and science development.

Senses activity

An ideal opportunity that could encourage a child's curiosity would be a senses activity, this would focus on what the child could hear, smell, see and feel. This activity mainly focusses on the scientific development of the child but also has links to mathematical learning.

Touch

There are multiple safe materials in this outdoor area that the children can touch, these consist of leaves, plants, rocks, mud, sticks and water from the small water pool, this will encourage them to understand different textures and patterns.

Smell

The picture above shows multiple natural resources that could contribute to what the children can smell. It is expected that each individual child will smell something different however potential things they could focus on are the smell of the plants, flowers, air, mud and water. This will encourage children to broaden their sense of smell.

See

There are endless amounts of things for children to see in the picture above, specific examples consist of;

1. Rocks
2. Water
3. Animals such as birds, dogs and water insects, this could be extended by discussing the biology behind the animals and insects as well as looking at how the birds fly high in the sky with their wings and the water insects skim down low across the water with their legs and bodies, this could encourage movement in children to see how they move from one space to another.
4. Their Friends
5. Leaves
6. Mud
7. Sticks

This can encourage children to explore their surroundings on a deeper level.

Hear

Expected sounds children could hear would be the sounds of the waterfall splashing into the water, their peers and practitioners, multiple different animals such as birds, squirrels, grass hoppers, crickets and dogs. Children could also speak at different tempos such as whispering and shouting to see if their voices echo through the Forest, this could be continued onto a more scientific approach with the reasons their voices travel and echo back when in specific areas of the woodland.

Welsh government (2009) states that making good use of the nature outdoors allows children to become active in their learning and when they begin to experiment with

things such as rocks, plants, the weather and sound, they are able to develop on their experiential learning.

Pattern and shape learning

Pattern and shape discovery would be another opportunity for a child to develop on their math development, an additional resource such as a magnifying glass would be beneficial for the children to get the most out of their open-ended learning. Children could look at the different patterns, marks, textures of rocks whilst also communicating about the different shapes they can see.

Whilst observing their surroundings, children could also count multiple things such as leaves, sticks, and animals, they could extend this by looking at the ripples in the small water pool and count the circles as they drop things inside.

Children can look at the different heights of resources such as trees in the sky and rocks down low, this will allow them to develop on their mathematical concepts.

The children could gather different sized leaves and look at the different lines and stems on each one, this could extend further as children could pick a selection of leaves independently or in small groups to compare sizes such as small, medium and big. Children could also participate in a mark making session by using things such as mud, water and sticks to create patterns on the leaves.

Children could look into the sky and observe the different shapes, sizes and patterns of the clouds on and potentially use a camera to capture the patterns and shapes and then draw them onto paper when they went back to the setting.

This well-structured activity has a high possibility that child led learning could also take place as the children can lead their learning by taking it in any direction they would like.

Welsh government (2009) state that practitioners need to ensure they provide as much focused, continuous provision in the outdoor environment as they do for the indoor environment, they comment that a well-resourced and structured area can promote child led learning and multiple play opportunities.

Waterfall activity

The photo above shows a waterfall in the picture that the children could learn about, children will have the opportunity to expand on their scientific development by learning the basic formation and causes of waterfalls. For example; explaining to children that waterfalls are made through erosion (breaking down of bed rock) where there is higher ground, the water then flows over the top and a waterfall is created. children can also observe the speed and motion of the waterfall going down into the small rivered area, adults can promote the child's curiosity by asking them questions such as;

- How fast is the waterfall flowing?
- Is it going fast or slow?
- Can you copy the sounds of the waterfall?
- Is it loud or quiet?
- Does this waterfall look powerful?

children can be offered binoculars to enable them to look closely at the waterfall whilst being at a safe distance, this will give them the opportunity to look at the structure and feel the calmness of the waterfall which is likely to encourage self-regulation.

Children could be given the opportunity to learn about why waterfalls are good for the planet, practitioners can explain that they increase oxygen levels, provide safer water for animals and plants to grow as well as creating a calming atmosphere, children could use this area as an opportunity to meditate which will allow their bodies to relax and improve their emotional wellbeing.

Welsh government (2022) talks about the curriculum for non-maintained settings and state that the opportunities we offer to children in the early years should be purposeful to each child, they should encourage independence, curiosity as well as risk and challenges, these experiences can involve Children's interests as well as their own choices, practitioners should support this by helping children make progress whilst on their personal learning journeys. They also state that practitioners need to ensure children are able to go to areas that allow children to feel emotionally safe as this allows them to self-regulate and become more curious in their surroundings which makes it easier for practitioners to observe and engage in children's play and learning.

How adults support and encourage children's science and mathematical development

Welsh government (2019) state that the outdoors is a special environment for experiential learning as it provides specific possibilities for children to participate in risky, creative and spacious play, this is because the outdoors is full of stimulants such as patterns, textures and senses such as smell, touch and sounds that allow children to experience a positive outlook on their environment. They state that practitioners should follow the foundation phase framework for children 3-7 years old in Wales as this is said to encourage curiosity, independence and recognition, they believe that understanding the outdoor environment is a key resource for a child's holistic learning. Furthermore, Anon (2018) states that a natural place for learning with lots of space allows children to investigate, combine and explore different materials, practitioners should offer children opportunities to sort, match, collect and problem solve as well as finding different patterns and shapes, this goes on to allow children to ask more challenging questions as they are able to think deeply resulting in them finding ways to overcome problems they could experience when playing.

In a social environment, a positive outlook is encouraged towards mathematical awareness, the skills of resilience, curiosity and creative development of the child. When adults value Children's ability to make sense of numeracy and maths, it shows they are capable of balancing the child's overall development. In a rich social environment, it is important that children watch modelling adults counting, mark making and using numbers as it models the positive behaviours for children to follow. Furthermore, Sargent (2015) states that the outdoor environment promotes social learning and skills which is key for children to develop on their scientific skills as it allows them to develop an understanding of the scientific concepts, the outdoors is an ideal area for practitioners to encourage children to explore, test, observe and experiment as it allows them to grow from developing more error free ideas. Moreover, Vygotsky (1986) also highlights the importance of social interaction for children to develop, he believed that children are able to extend on their learning and thinking through discussing their ideas and views with others such as children and practitioners.

Welsh government (2014) states that mathematical learning should be part of children's every day routine, when practitioners support children in activities such as

measuring, counting, learning about shapes, they then begin to develop an understanding of mathematics and numerical thinking. When children are learning maths, they are able to also take it to the next level when in the outdoor environment as they have a sense of freedom and a larger scaled area. In addition to this, The National Association for the Education of Young Children (NAEYC, n.d.) states that children should be offered multiple materials and opportunities in order to learn key principles of science and maths. Additionally, anon (2018) states that Mathematical play opportunities provided by practitioners allows children to understand the features of multiple resources, for example what things they can use them for and what is purposeful and what is not. As children explore different shapes, they become aware of patterns and sequences, as they count, they are capable of understanding the meaning of quantity and as they play, they can learn how to document information in a meaningful way in the play environment.

Welsh government (2015) talks about the curriculum for Wales and mentions that throughout the foundation phase framework for Wales, it states that Children are expected to develop on their number, measuring and data skills. In consideration on this they believe that children should also be given the chance to explore a mathematical environment that gives them the opportunity to grow and extend on their knowledge of mathematical concepts as well as developing through play through maths such as use of shapes, patterns and measurements. In addition to this, Welsh government (2015) talks about the successful future report based on the curriculum for Wales and states that the review believes that numeracy is an important aspect involved in a child's learning and development and adds that it is important for a child to be able to use numbers in a creative and confident manner. On another hand, A crucial factor to remember is that Successful Futures' is only relevant for children aged three to sixteen and this cuts out approximately 120,000 early years professionals that work with children under 3 years old. (Stats Wales, 2017).

Anon (no date) states that there is a correlation between children's scientific learning and their views of the natural world around them, these natural environments, allow children to develop a sense of wonder about science as they are looking at scientific concepts such as the biological, earth and physical science. Practitioners that encourage children to be responsible when investigating in the outdoor environment provide children with the chance to make informed decisions about the environment

they live and learn in, this relates back to the new curriculum for Wales allowing children to be ethically informed citizens. Welsh government (2020) states that the importance of science in the recent years cannot be overemphasized, the continuous development in the scientific areas have been motivation for change culturally and environmentally, when learning through scientific evidence, children are able to become ethical informed citizens and are able to make responsible ideas about their future, an example includes children that show awareness of their bodies and the eco around them allows them to promote a healthy lifestyle, another point they make is experiencing scientific learning allows children to live independently whilst being capable of taking risks and coming up with solutions to problems which allows them to have a purposeful learning journey throughout all areas of their development as they grow.

Sargent (2015) States that it is important for practitioners to give children the opportunity to experience first-hand scientific events, it is through exploring that allows them to understand how the world works. Without this, it can result in children having delayed learning as they grow. The outdoor environment allows children to develop on their scientific learning as children are able to observe, examine and learn about all living things.

A practitioner's role when working with children is to observe, interact and gain information, they should then respond with various materials, activities and questions to encourage children to engage with the world around them. In regards to a child's scientific development, Practitioners need to be aware of what stage each child is at in the scientific topics they teach to allow the children's learning to progress in that key area. (Duschl *et al.*, 2007; Gelman *et al.*, 2009).

Siraj, Kingston, and Melhuish (2015) talk about the sustained shared thinking and emotional wellbeing scale (SSTEWS) and explains that it is an observational tool which allows practices to support children's problem solving, imagination and task focus, similarly to Duschl *et al.* (2007) and Gelman *et al.* (2009), they explain that this scale encourages children to work alongside others and explore the world. The five main areas consist of building confidence and trust, looking at social and emotional wellbeing, supporting language and communication development, capability of storytelling and supporting critical thinking, this allows children to explore and investigate whilst using sustained shared thinking. However, buenos and Dios (2017)

talk about barriers that can limit sustained shared thinking and state that practitioners can sometimes limit children's growth and development when outdoors as they have fears about potential accidents happening whilst being in the outdoors, this can then lead to children being stuck inside and facing issues such as being disconnected from the natural world, this leads to them missing out on opportunities that extend their scientific and mathematical development. YPO (2020) adds to this and states that key barriers to children not experiencing the outdoors consist of practitioners having a lack of resources, time, space and safety concerns. They also comment that this can have a negative impact on Childrens ability to engage and explore different environments.

Froebel trust (no date) talks about the Froebelian trust and states that the experiences children have when they are young continues on and shapes the rest of their lives. They believe that the importance of hands on, natural play is key to a child's well-being and state that each child is different and focussing on what a child can do is the best starting point, children are capable of growing the most through doing things alone. They state that children are creative learners and are able to showcase their ideas in their individual way when supported by nurturing environments and people. Developing and experiencing nature and their involvement in it allows children to learn about living things and begin to look at the bigger things in life such as sustainability and the climate around them. They state that practitioners that guide and support this in Childrens learning are capable of providing a meaningful and stimulating environment for them.

When children experience stimulating outdoor environments, they are able to thrive, their bodies and minds also develop at a continuous rate as they are leaning through real experience and play. Knowledgeable and engaging adults are needed to help structure young children's development when outdoors. (Richardson,2014, sargent,2015) Additionally, halfpenny (2014) talks about how Piaget also supported a pedagogical approach and discovery learning theory, he believed that an engaging environment promoted opportunities for children to explore and investigate stating that children were little scientists when in the right learning environment.

Rasmussen university (2020) talks about Malaguzzi's belief that children needed a more holistic education, they discuss the Reggio Emilia approach he created on the belief that all children are unique and show their likes in different ways. This approach promoted a practical relationship where teachers learn alongside children rather than

being above children, the approach also relates to children's senses such as taste, sight and sound assisting their development and learning, this is why Reggio Emilia classrooms are more natural, spacious and involve multiple curiosity enabling materials. Similarly, Nursery world (2015) talks about the mosaic approach and mentions that they observe Childrens likes and interests by giving them a voice, their outdoor area includes swings that promote Childrens ability to learn about the science of motion and movement, grassy and planted area which helps children to understand nature and open ended materials such as slopes and loose parts that allow children to investigate by themselves or through the support of adults, all of these aspects promote awe and wonder to the child. In addition to this, Nicholson (1971) states that there is a high level of research between the love that children have when playing with loose parts, this is because loose parts have multiple variables and are open ended, this means that the child is not limited to what they learn and has endless opportunities they to learn, play, experiment and be engaged.

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