

Awe and wonder Science, Mathematics and the outdoors (ECEY5005)

Part 1



Wells, R. (2023) [personal image]

Part 2

As Welsh Government (2020) suggests every child should have access to outdoor learning. The photo in part 1 is a perfect example of an outdoor area that can be used by children to support the child's development and provide them with enriching learning experiences which supports the four purposes within the new curriculum for Wales. (Welsh Gov, 2020). Outdoor learning offers a holistic approach to education that nurtures physical, intellectual, social and emotional development in children. It provides a valuable complement to traditional classroom-based learning, helping children become well-rounded individuals with a strong connection to the natural world. There are numerous advantages to learning mathematics and science outside. First of all, it encourages a greater comprehension of abstract ideas through practical applications. Understanding is improved when natural occurrences like gravity, plant development, or geometric shapes are observed in their natural setting. Additionally, since children are free to ask questions and do experiments, outdoor learning fosters curiosity and critical thinking.

As an early year's worker if I were to take a group of 25 Children down to this area with two supporting staff, I feel there are many opportunities to explore Maths and Science outdoors. Children are very curious and Inquisitive and being within this setting they could be very hands on in supporting their own learning. There are many opportunities for counting within this forest area, the children could count the trees, leaves, the logs around the fire circle or the wildlife they encounter. The children could line the objects up and use 1:1 correspondence to count the objects. 1:1 correspondence is an important maths skill for children to have at a young age, it allows the child to understand the value of each number and the child can learn how to count objects in groups. Most children will move or touch the object as they count. As well as using the objects for counting they could use the objects they have collected for simple addition and subtraction. This area could give lots more other mathematical concepts as well as counting children could be noticing shapes and patterns, whether it's looking at the symmetry of leaves, the geometric shapes of rocks, or the repeating patterns of flowers that grow here in the summer. Creating and noticing patterns support children to notice and understand mathematical relationships identifying patterns and may help provide the foundations of algebraic thinking. Another maths skill children could learn from this area is length/height. There are many ways the children could explore length/height they could look at the trees, they could collect sticks to compare length. This is where lots of questions may be asked either by the adults supporting the child's learning or by the children. Questions like 'which is the longest,' Which is the shortest would be used, if this is done by the child it shows they are taking an active role in their learning and are curious and inquisitive. As the lead early years worker to enhance and support the child's learning in this area I would add equipment such as rulers, whiteboards and pens for the children to use. The new curriculum for Wales explains that mathematics should be exciting and engaging for the children (Hwb.Gov.Wales, n.d). What better way for children to be engaged than in this forest area where they are taking the lead on their own learning. Mathematics is very beneficial outdoors as it enables children to make useful links within their learning. It also encourages risk taking and exploration.

As I mentioned at the beginning as well as mathematics the children can learn lots of science outside. Science can happen all around us and this forest area allows the children to have hands on experience and observe science in the real world. In this area there are lots of animal homes and habitats that the

children would be very interested in. the children would like to investigate and explore more into the animal that they find and look at that specific animals' life cycle. Lifecycles are a way for a child to connect with nature and it allows them to develop a better understanding of the world around them. There will be lots of talk around this subject and lots of what happens when...? The children will become very intrigued on how the animal changes throughout their life cycle. This forest area is the perfect place for den building myself and others could support their den building by adding to this area tarpaulin, blankets string and rope. The children would use teamwork to build their dens and the adults there could be questioning but not taking the lead. Lots of discussion between the children would take place 'is this material waterproof?' 'I wonder if we would get wet?' Children may even ask for water to test their den building and check if it is waterproof or not. Den building uses lots of different materials this would introduce the children to properties of different substances. They would also learn about the strength of materials flexibility and how other materials interact with each other. Den building is a fun and interactive way that provides children with numerous opportunities to engage with scientific concepts and develop essential skills for scientific inquiry. It encourages curiosity, creativity, and problem-solving, laying the foundation for a lifelong interest in science and engineering. If I were to take the children down to this area when it had been raining there would be lots of puddles for the children to jump in. puddles ignite a child's natural curiosity, a puddle attracts any child and the child will explore, experiment and discover by doing this they will create new knowledge. There are so many discoveries children can get from one puddle. Through the child playing in the puddle, they gain foundational skills related to science. There is so much questioning again that could be had here and with little interference from the supporting adult the child will gain so much knowledge just by jumping in a puddle. New curriculum believes that curiosity in science leads to asking questions about the world around us (Hwb.Gov.Wales, n.d).

By allowing the maths and science outdoors to take place we are supporting the new curriculum and the four purposes making the children ambitious and ethically informed citizens of the world. (Wales.Gov, 2018). In conclusion, outdoor learning improves math and science instruction by developing hands-on experiences, encouraging observation and problem-solving abilities, integrating subjects, raising engagement, and establishing connections between students and the natural world. These advantages can improve children's' comprehension of and appreciation for mathematics and science, resulting in more assured and competent math and science learners.

Part 3 Risk Benefit Assessment

Experience exploring outdoor on 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. Rating L/M/H
Exploring site	Promotes a connection to nature along with Physical Development, encourages curiosity, improves basic motor skills, positive relationships.	Low branches, trip hazards, nettles and brambles, animals and bites, stings and falling.	All Children	Staff ratio, all participants to be briefed on safety, First aider always present, Any allergies or pre-determined health problems to be discussed among practitioners prior to session and any additional medication and first aid kit to be taken to site. Site to be surveyed prior to session to check for poisonous plants and insects like wasp nests.	L
Den building	Building on teamwork and developing relationships with peers. Develops social skills and environment awareness. It develops imaginative, creative and challenging play. Children use key skills such as problem solving, thinking logically and thinking about materials and their properties.	Slips trips and falls. Strangulation. Movement of large objects causing cuts and bruising. Falling objects or people.	All Children	Safety briefing to be held before sessions and demonstrations on how to tie knots and move large objects. Tree climbing to be done one person in any tree at any time and nobody to be under any tree while someone is climbing. All rope and paraphernalia to be demonstrated and used for purpose only. Rope and chord examined for defects before session. Site to be inspected prior to session. Weather will also need to be identified as safe.	M
Carrying of logs	Promote Teamwork develops relationships, children need to think logically	Slips, trips and falls, splinters, cuts and bruises.	All Children	Safety check of area to ensure materials are in safe position. Discuss with children about selecting logs that are suitable for them to lift and carry. Avoid injury by demonstrating safe handling.	L

Collecting natural materials	Creates strong connection to nature. Links to numeracy include surveys and bar charts of leaf plants and trees. Links to creativity and understanding of nature. Understanding of weather patterns and colours and textures.	Stings Bites allergies cuts and bruises. Slips trips and falls, Getting lost.	All Children	Pre inspection of area looking for hazards like poisonous plants and fungus, wasp nests. Dead trees and branches. Hazardous litter and animal faeces and Safety talk to Children before beginning activity. Boundaries established and adhered to by Children. Excluded areas identified if needed and removal of hazards if discovered. Wet wipes or water provided, make sure all hands are washed at the end.	L
Fire lighting/Open fires and cooking.	Encourages team building and respect for hazards such as fire. Helps develop trust amongst peers. Authentic learning of how to make a fire and how it works safely. Children learn to be aware of risks and the dangers of fires. Links to curriculum via size sorting quantities of fuels and how fast they burn. Supports literacy when debating and discussing world events, storytelling and sharing experience. Authentic learning and holistic development are prevalent through these activities. Learning about things we can eat and make from our natural surroundings linking to many parts of the curriculum. Evidence collected via photos and videos.	burns	All Children	Health and safety talk to be given to group before the lighting of fire and repeated to insure everyone fully understands the rules around fire lighting and open fires. water, first aid kit, fireproof gloves and fire blanket to be situated at pre-determined spot close to fire pit. Make sure there are clear boundaries around fire circle and that its at least three metres away from fire. Children to be seated at this boundary. Children only approach fire if invited to do so by practitioner. All loose clothing and hair to be tied back or tucked in to prevent ignition. Fire not to be lit until all twigs, branches and logs are collected. All cooked food to be cooked by practitioner with moderated help from participants. Cooked food to be consumed when temperature is cool enough to do so.	M

Part 4

Providing children with rich outdoor environments is one of the best ways to help and encourage them to interact with mathematical and scientific topics. Outdoor mathematics and science education improves academic knowledge, fosters physical and mental health, and fosters a lifetime love of nature. In part 4 we will look into the ways in which adults working with young children can foster outdoor learning opportunities that foster curiosity, critical thinking, and a love of mathematics and science. For young children's growth, outdoor learning has a wide range of advantages. It gives them a multimodal experience that stimulates all of their senses, encourages physical exercise, and fosters a strong bond with nature. Additionally, the introduction of mathematical and scientific ideas in dynamic outdoor settings engages young brains and makes learning more relevant and interesting. Froebel viewed children as engaged, inquisitive, and imaginative learners. He believed that children learn best through independent play, rich first-hand experience, problem-solving, and speech and believed that adults should allow this to happen both indoors and outdoors (Tovey, 2016). Froebel believed that children learn best when they are actively involved in their environment and are free to explore and discover on their own terms. Developing children's innate curiosity is one of the most effective strategies to encourage their engagement with mathematical and scientific subjects. Adults can accomplish this by posing open-ended queries that promote problem-solving and critical thinking. A holistic perspective of the natural world can be fostered through the use of open-ended questions, which also encourage curiosity, critical thinking, creativity, and a strong love of the outdoors. Children study in a supportive and interesting atmosphere thanks to them. Children must use critical thinking skills and interact with their environment in order to answer open-ended questions. Children are encouraged to investigate, observe, and examine their surroundings rather than being given a simple solution. Keith, (2017) believes that in order to advance children's learning, the adult's role is essential. To do this, we must respect the child's learning process and make good use of our observations to determine when to share the thinking, advance, and encourage new ideas for the children. According to Jean Piaget's constructivist theory, children actively create knowledge through their interactions with the outside world. This hypothesis supports the notion that children learn most effectively when they are actively participating in hands-on activities in an outdoor setting. We provide children the chance to make discoveries and naturally grow their comprehension of math and science subjects by letting them explore nature (Alhabib, 2012). As the adult it is important to allow the child to have hands on experience. Hands-on experiences offer a holistic approach to learning that benefits children's cognitive, emotional, social, and physical development. They provide an effective way to make learning enjoyable, memorable, and relevant to real-life situations, ultimately promoting lifelong learning and curiosity, but as Bruce, (2011) suggests an adult's role is also very important within a child's development. Adults play a pivotal role in encouraging the children to explore and inquire about the natural world. By creating a safe and supportive environment, they inspire curiosity and wonder. For example, adults can help children ask questions about the patterns in leaves, the behaviour of insects, or the shapes of clouds. These questions can lead to mathematical and scientific investigations, promoting critical thinking and problem-solving skills. Outdoor settings provide a wealth of tactile learning opportunities. Children should be encouraged to touch, smell, and manipulate natural objects. They could research the texture of leaves, look into the

makeup of the soil, or study animal behaviour, for instance. These encounters broaden their comprehension of both scientific and mathematical ideas. The adult should know when to interact with the learning and when to let the children carry on with their own learning. Bilton, (2010), believes that sometimes during outdoor learning the adult will become involved in the child's play but only as a resource, the adult should interact with the child's learning but not interfere. The adult should allow time for the child to revisit their learning and as Bruner suggests the spiral curriculum believes that in order to advance, knowledge must be refreshed and reviewed. (Aubrey and Riley, 2022). The new curriculum for Wales points out the importance of outdoor learning and how it will support each individual to become ambitious, healthy, confident learners. Welsh.Gov, 2020).

An adult's role during outdoor provision could be adding loose parts to enhance the child's learning. According to Daly and Beloglovsky, (2015), Children engage in a world of "what if" when they play with loose parts, which encourages the kind of thinking that leads to theoretical reasoning and problem solving. Children's play is made more exciting and adventurous by loose pieces, which also improve children's capacity for creative thinking and problem-solving. Loose parts outdoors is essential for supporting mathematics and science education in early childhood settings. Loose parts are open-ended materials that can be moved, combined, and manipulated in various ways, fostering creativity and problem-solving skills. When used in outdoor environments, they offer unique opportunities to engage children in mathematical and scientific exploration. Early years resources, (no date) suggests that loose parts allows independence and develops the child's problem-solving skills. Children can use their imagination and creativity to develop their own mathematical and scientific questions thanks to loose parts, which encourage open-ended play. They can build and disassemble using loose pieces, testing theories and discovering findings. Children's ability to solve issues and make choices is tested when they play with loose components outside. To accomplish their objectives, they must utilize critical thought and trial and error, which improves their problem-solving abilities. Sometimes that is all an adult needs to do during outdoor learning is to be a good role model by demonstrating respect for nature and showing a love for outdoors.

Whilst outdoor play is crucial for children there are many challenges which allows adults feel insecure to teach this way, as Knight, (2009) explains many practitioners struggle to embrace this in their practise as they feel nervous about the unknown or they don't have the experience to support this. (Gilbertson, *et al*, 2022) also states that Some adults might not be familiar with outdoor teaching techniques and require professional development. All children gain from spending time outside, engaging with their surroundings, discovering the natural world, and growing through play. These opportunities are made available to all children, regardless of ability or circumstance, and they can be especially potent for children with disabilities. While inclusive play does not imply that all elements are accessible to all children, it does imply that the sum of the experiences creates something equally wonderful for each child. Some children can't or won't climb a rope to the top, while others truly need to. The same is true for more contemplative and imaginative hobbies. We need opportunities that are varied and adaptable. Ensuring that outdoor learning is accessible to all children could also come as a challenge to many adults within the early years setting. (Vize, 2013).

Supporting children' math and scientific education outside is a fulfilling and enriching undertaking. Children can explore, experiment, and learn about the wonders of nature while simultaneously honing their mathematical and scientific abilities when adults provide a supportive environment for them to do so. Adults can inspire the next generation to have a lifetime love of mathematics and science that goes well beyond the classroom by encouraging curiosity,

practical discovery, critical thinking, and a strong connection to nature. Adults play a vital role in supporting mathematics and science in the outdoors By fostering exploration, connecting theory to practice, promoting environmental awareness, encouraging collaboration, and fostering a growth mindset, they can create a dynamic learning environment that enriches a child's understanding of these subjects. With the right guidance, children can develop a deep appreciation for the natural world and a lifelong passion for mathematics and science, ensuring a brighter future for both them and the planet.

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