

ECEY5009/C

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Awe and Wonder: Mathematics, Science and the outdoors

Section 1



Section 2

The environment in this picture will provide children with a wide range of learning opportunities through hands on experiences within the natural environment. This allows children to follow, develop and create their own learning. When children's interests are facilitated and supported, this is when they are at their most engaged, which is why the woodland is such a rich and nurturing environment, it allows them to discover and build on their needs and interests.

Providing real-life experiences is essential to children's development, well-being and self-esteem. By introducing children to the outdoors, it offers a range of cross curricular learning opportunities which extends their knowledge and skills for lifelong learning.

The stream

The stream in this picture offers a wide range of holistic learning opportunities for the children. Children are naturally drawn to the stream wanting to investigate and explore the water. This is done through observing, splashing, jumping, throwing stones, leaves and other materials. The children also enjoy using sticks to measure the depth of the stream before stepping into it themselves. The children subconsciously notice the flow, volume, and direction of the water. This is sometimes investigated through dropping a leaf into the stream this enables them to see in which direction it is going. They can explore capacity through pouring and filling containers or natural materials found in the environment. This type of activity involves using lots of mathematical language and allows them to see and understand mathematical concepts such as empty, almost empty, half full and full. This also includes big, small, heavy, light, less, more, shape, and size. Allowing children to see and experience this first-hand provides them with stronger and deeper knowledge and understanding, which is how they can make connections in the future.

Building a bridge across the stream will provide children with hands on learning experiences and opportunities. For example, exploring the different materials that can be found in our woodland enables them to investigate, question and discover new concepts. Allowing children the space and time to explore encourages them to communicate their ideas, this in-turn extends and deepens their learning.

For example, building a bridge to cross the stream, using stones sticks and branches will provide opportunities for the children to explore shape, size, colour, and texture. By grouping, sorting and identify the materials by shape, size, or weight. Or by sizing the sticks bigger to smaller, thin or thick? And



looking at the different shaped branches will increase children's mathematical concepts, understanding and develop their confidence.

The children can share their curiosity with each other and investigate how they could build the bridge and subsequently how would they could use the bridge. Encouraging the children to cross the bridge will provide them with the opportunity to explore with weight, height and size. Hopefully noticing if less or more stones are required to cross, they may problem solve such thing as, are bigger or smaller stones are needed to strengthen the bridge? This also helps children build awareness of their proprioception and vestibular senses helping develop an awareness of their body's movement, balance, direction, and coordination. Jumping and climbing the bridge will not only develop children's confidence and physical development but will also allow children to notice distance and height to gain a better understanding of gravity and energy. This can also be explored whilst in the stream by throwing stones and watching them land. Playing games such as who can throw furthest, do they float or sink? Which direction do they take? Do they move up down the stream? What happens to the volume of water and what impact do varied materials have on the water? These are all questions that children will naturally ask therefore encouraging and understanding language, this links to mathematics and science such as motion and displacement. It also helps the children make connections and identifying cause and effect. Using metacognitive questioning to engage children to deepen and develop their understanding to working collaboratively to promote sustained shared thinking, problem solving and communicating one another's thoughts and ideas.

Climbing and jumping

Climbing trees provides children with the opportunity to explore with height, weight and size. Children can develop an awareness of how their bodies need to move and be positioned to climb, jump, swing, and balance. By providing and allowing children these opportunities and

experiences they will also learn and understand their own weight, size, and strength and its impact. Introducing games such as counting who can balance the longest or measuring who can jump the furthest. Children can measure distance and height using sticks, leaves, or stones also using them for counting, comparing, and estimating. Can you climb as high as three stick or jump as far as five stones? These are all creative ways to strengthen children's mathematical knowledge and understanding.

By providing children with the opportunity to visit and revisit the woodland at various times of the year, children will develop and gain a better understanding of the seasons, weathers, and habitats. Noticing and observing the leaves changing colour. Understanding cause and effect for example why is it muddier when it is raining? Why is the ground harder when it is sunny? Why is the stream deeper when it is raining? It also enables the practitioner to facilitate continued learning and provision. For example, if a child had taken an interest in den building, they would be able to continue with this the following week.

Habitats and living things

By identifying and recognising and observing different habitats, living things from bugs, flowers, trees, and plants, children will be making connections with themselves and each other by discussing differences and similarities. They will be noticing and recording their findings, investigate shapes and patterns. For example, seeing a spider on its web, counting and jumping over mole holes, estimating the height of a bird's nest are all ways to encourage children's interests and curiosity with nature and the outdoors.

Location/Activity	Local woodland	Date	20.09.23
Assesor:	L.Sewell	Review date:	25.12.23

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 risk and injury	Overall risk after precautions rating: L/M/H
The stream	Understanding mathematical concepts -sinking and floating. Supporting scientific knowledge – exploring gravity by jumping throwing stones Physical development - balancing, lifting, jumping. Deepening understanding of the weather and session - visiting the stream at various times throughout the year. Making connections with the environment. Developing physical skills - jumping walking carrying. Understanding cause and effect by observing the environment Noticing and exploring capacity by filling and emptying. Increase imagination and creativity - building bridges, dams, making potions.	Drowning loss of life Falls causing cuts bruising and grazes Children becoming too cold in the water risk of hyperthymia Sliding and slipping causing marking or bruising Objects in stream- rocks sticks branches and boulders falling or dropping Poisonous plants causing reactions or allergies Objects in stream metals	All	Adult to discuss potential hazards and safety rules First aid kit and Mobile phone to be taken to sessions Observe and supervise children Children not to go in deep waters not higher than ankles.	MEDIUM

		glass waste plastics and sharps			
Tree climbing and jumping	Opportunity for children to explore their physical boundaries. Understand gravity and movement - jumping swinging and balancing Gain confidence and build resilience. Understand measurements – long, short, small, big. Mathematical language – more, less, add, circle, rectangle Develop gross and fine motor skills Develop balance and coordination Learn safety benefits and hazards – managing risk Children learn how to turn take and problem solving Provides sensory experience	Fall, trip or slip causing bruising cuts and grazes. Branches catching children's eyes skin causing scratches and cuts. Splinters Weather conditions wind blowing branches Rain making tress slippery Falling from height causing head injuries causing broken bones or muscle pulls Children climbing on top of one another, standing on hands fingers	All	Discussion on potential hazards boundaries and safety rules First aid kit medication asthma up, EpiPen if needed required Adults to do risk assessment removing any sharp or broken objects Appropriate footwear for example no flip flops. Appropriate clothing must be weather appropriate and not restrict children's physical movement Correct staff children ratio Weather conditions to be considered. High winds, heavy rain, and extremely hot days	LOW

		Stings from insects' nettles or plants Reactions and allergies caused by trees, plants or insects Hazardous materials broken glass or waste causing cuts			
Habitats and living things	Enhances children language and communication. Develops children's understanding with shape size and patters Encourages children's mathematical development by counting measuring and comparing. Identify and exploring natural habitats. Understanding sorting, grouping, and collecting. For example, green leaves, round leaves, bugs with legs, bugs with wings. Promotes physical development Enhances sensory development. Encourages children to make links and connections between living things such as	Children picking up sharp objects causing cuts or infections Trip or fall whilst collecting natural treasures. Splinters from collecting wood. Allergies or reactions to leaves trees seeds and nuts. Children eating or touching poisonous berries or plants	All	Safety discussion with children. First aid kit. Adult to check the area for sharps and glass waste Identify any poisonous berries or plants and remove if possible. Be aware of any allergies or medical conditions children might have. Check area for any animal faeces or remains and remove if possible.	LOW

	bugs, trees, and themselves. For example, we all need water and food to grow and develop. Identifying difference and similarities by observing mini beasts and other life within the woodland. Develops children's understanding of the environment and why its important we care and respect our woodland its trees habitats and wildlife.	animal faeces or remains. Bites and reactions to bugs.		Provide children with antibacterial gel when needed.	

Section 4

Froebel believed that the outdoor environment provided opportunities for children to understand how everything is linked and connected, that by providing space, time, hands on meaningful learning experiences allowing children to explore and spend time in nature would provide a holistic learning and understanding to children's mathematical and scientific development (Froebel Trust)

Froebel supported a holistic approach to learning believing that experiences with nature, music and arts led to a natural exploration of science and mathematics. Through play and the outdoors Froebel believe that children gained a better understanding of their own learning and interests when given space and time to play and explore and in the outdoors. Froebel disagreed that children learnt best through teacher led activity's instead he believed that the earliest years of a child's life where the most informative suggesting play was the leading form of development. (A Froebel's principles and practice today no date)

The new curriculum for Wales (2020) takes a holistic approach to development and learning. It's four purposes are a shared vision and aspiration for every young person to create ambitious, capable learners, enterprising, creative contributors, healthy, confident individuals

and ethical, informed citizens. According to Welsh Government (2017) this holistic approach will prepare children to live fulfilling as valued members of society.

Forest school offers a holistic approach to children's mathematical and science development providing endless learning opportunities for children to develop their understanding of number, shape, size and symmetry. Forestry England

Forest Schools is often used as an intervention with children who are struggling or choosing not to engage with learning, Forest School is believed to have a positive impact on children wellbeing, self-esteem and confidence. Intern this will also have an impact on their engagement levels as suggested in the Leuven scale observation, when a child's well-being is high their engagement and involvement levels are too. Meaning that children learn and develop more once they feel comfortable safe and secure with the environment. (Emotionally healthy schools)

The Forest School environment provides children with wide range of natural resources from trees to streams, leaves to flowers conkers to acorns. All these materials can enhance children learning and understanding of maths and science. Supporting Nicholson theory 1979 that loose parts offer children the opportunity to explore and investigate with materials that provide children with open ended learning opportunities to extend their knowledge and understanding of maths and science, encouraging children to explore cause and effect, differences and gravity. Loose parts challenge children to be creative and imaginative applying different purpose to the objects for example a stick can be used as many different objects as possible, from a wand to sword a spoon in the mud kitchen a mark making tool in the sand, the possibilities are endless. Nicholson felt that children should create and develop their own learning with the idea that loose parts and materials can be transported designed and redesigned would provide more opportunities for creativity and curiosity than static materials and environments. Gibson 1977 affordance theory suggests that the world is not only seen in terms of shape and object but also objects of possibilities, that perception drives action for example one child might see a fallen tree and decided to balance along whilst another child could see it as an object to jump over or climb under, new affordances develop when children are allowed to explore and investigate their environment. (Clarke no date) suggests that loose parts provide children with opportunities to challenge themselves to take risks by extending their own play and learning. For example, allowing children to create their own obstacle

course using planks of wood, crates and tyres would allow children to challenge their physical develop, understand mathematical and scientific concepts such as size, shape, height, balance and cause and effect. Providing and allowing children ownership over their learning with real-life hands-on experience will increase children's confidence to take risk, ask questions, solve problems, increase Involvement levels and independence, plus allow opportunities for self-reflection. (Non-maintained curriculum 2023).

Piaget's suggested that a child's world is constructed by their ideas and experiences within the word around them by interacting and exploring people, concepts and objects believing that child's curiosity is responsible for their learning, furthermore Piaget schema theory (1923) suggested we understand the world using schemas as a pattern of learning. Children demonstrate through play how they make connections and understanding of the world around them. Examples of schema are Transporting, picking and moving objects from one place to another. Enveloping wrapping themselves or objects, Enclosure putting themselves or objects into enclosed objects, positioning placing themselves or objects in patterns or rows, Trajectory throwing for movement up and down, connecting joining things together. Going through a boundary posting, threading. Rotational making of watching objects go around, spinning or rolling. Transforming mixing different ingredients textures and colour. (Brodie 2012) Whilst observing the children's it is important practitioners are mindful of schemas and that they don't restrict children's learning for example not allowing objects to be transported from different areas of the room. Observing a child's schema can help identify and understand a child's learning behaviour.

According to Early Years Education (2020) is the role of the adult is to provide a holistic learning environment for children to feel comfortable and confident in by building healthy trustworthy relationships with the children, they will then feel supported to explore their learning. Sustained shared thinking helps promote children's language, communication by asking open ended questions the adult can extend the child's learning at the same time keeping the learning child-led. The role of the adult would be to support the children's learning by allowing the children time to explore their curiosity, to make mistakes, encourage problem solving and revisit their work, this will build confidence and resilience. Montessori (2023) suggests the role of the adult is to provide guidance through interactions to increase children's confidence and independence. Learning journals (2023)

Perry (2022) explains the importance of outdoor learning highlighting that's it's not about taking the indoor classroom outside but valuing and inspiring children to learn in the outdoor using natural materials.

Forest School originates from Scandinavia where children are encouraged to play and learn outdoors, through child-led activities children will learn about the natural environment.
(STEM learning no date)

Froebel believe that children should experience nature in all aspects and that by providing children hands on experience with nature they will develop a wider understanding. For example, encouraging children to plant seeds, grow vegetables are all ways children will begin to make connections to themselves and the environment (Bruce 2017).

Reggio Emilia approach believe by providing children with environments that are welcoming, authentic, filled with purposeful materials that interest and engage children. Children will thrive learning, creativity, thinking, questioning and experimentation. Reggio Emilia saw the environment as the third teacher believing the environment provides children with meaningful learning. Reggio provide children with hands-on experiences and provides children with real life tools and objects to explore with (naecy2015).

The new curriculum for Wales promotes learning that will celebrates all styles of learning, providing a holistic learning curriculum where children will thrive and become valued members of society and the wider world.