

Awe and Wonder- Science, Mathematics and the Outdoor

Part 1



Part 2

Nature is a blessing, and Wales has an excess of natural beauty. The beautiful woodlands, rivers, mountains, lush forest, waterfalls, coastal paths and hilly walks, and rich cultural history of old ruins are mesmerizing. Being close to nature has a therapeutic effect on a child's health and well-being. It has a positive impact on the social, emotional and cognitive skills of a child. When a child walks and runs in an outdoor space, breathes fresh air, and looks around himself, it develops a sense of curiosity, exploration, creativity and experimentation. When a child walks in a local park or a garden there are loads of things to explore and play with such as playing with pinecones, running after squirrels, feeling the textures of different stones and pebbles, hearing birds chirping all these things activate sensory responses and also stimulate the Awe and Wonder. Sometime ago in my childhood, children used to go outside and play around the natural world filled with imagination, curiosity and experimentation. The children used to play with sand, twigs, pebbles, sticks, climb up the trees, and jump in puddles and return home dirty and muddy. This has a positive impact on children's social, emotional, and physical development, however

with time and development children have limited access to the natural world. According to Froebel, (2020) The child ought to encounter nature 'in the entirety of its angles - structure, energy, substance, sound and variety. Froebel emphasized the importance of natural play and learning through experience.

This picture was captured in Margam Country park, a glorious parkland situated in Margam in the south of Wales, which offers beauty, history and wildlife. I took this picture due to the enthralling beauty and enormous learning opportunities for a child. This image has a lot of natural beauty and the concepts of science and mathematics to explore. The natural environment of this image provides children with the opportunity to play outdoors featuring trees, different types of vegetation, hedges, stones, soil, fallen leaves, sticks, different textures of the land, slope, stairs, gradient, sunlight, shadows, mosses and flowing water. In this picture, children can explore the natural environment allowing them to be curious, and creative. A natural environment is essential to explore and develop imagination, and sensory learning and allows children whole body movement strengthening muscles, core, coordination and balance which support the Steiner and Bruner school of philosophies (Bates, 2019).

We know that every child is unique and has got his own interest, imagination, creative thinking and a different learning pace. If we look closely at this picture, the natural environment provides loads of learning opportunities to a preschooler that includes scientific and mathematical concepts. Firstly, considering mathematical learning we need to understand the environment and begin to think like a child. When a child sees this area, he feels happy and excited, and he wants to explore different materials and textures. A child can learn the concept of different shapes and sizes of stones, counting the number of stairs, making a twig tower etc. The activity planned in this image is a matching and sorting game. We need to collect a variety of leaves having different shapes, colours and sizes (Natural Resource Wales, 2021). The practitioner needs to pick one leaf and encourage children to match a leaf of similar shape colour and size. Another way of doing this is to arrange the leaves in order from smallest to largest or largest to smallest. It depends on a child's imagination and creativity and what he likes to do with it. The role of a practitioner is to set up the activity, however, in this case, the teacher needs to encourage the children to collect leaves from a different plant, which will improve muscle coordination and gross and fine motor skills. The activity based on sorting and matching will develop curiosity, and imagination improves coordination and concentration, and fine motor skills which links to the new Curriculum of Wales for Mathematics and Numeracy (Welsh Government, 2022).

This image was taken during the time of day to have clear visibility and sunlight to provide the best learning experience for a child. There are several activities and games based on the scientific process that could be an enthralling learning experience such as different plant life cycles, learning how plant prepare their food called photosynthesis, balancing on the rocks, the gradient, measuring viscosity by mixing water with mud, hearing natures symphony, learning and experimenting about floating and sinking, etc. However, the activity I am considering is Mini Beast Hunt, it involves finding the mini beast that lives under the logs, stones, rockpools, bushes, grasses, trees, mud, rotting wood and leaves. Several insects could be found in this space including spiders, slugs, snails, millipedes, centipedes, woodlouse, ladybirds and beetle. The children are always fascinated by insects, the role of a practitioner is to find a bug and show it to the children and encourage them if they could find any bugs. It would build curiosity, imagination, experimentation and exploration. These creatures are tiny and susceptible to harm, the practitioner should inform the children to be gentle with them. Children could find as many mini beasts as they want and they can learn about their names, colours, shapes and sizes. Secondly, they

can learn about different body parts of insects such as antennae, legs, wings, shells, etc. The most common insect found in any natural environment of Wales is a snail, which provides children with loads of learning opportunities. With a shell on the top and a large slimy foot, they walk very slowly and leave a shiny trail, eat plants as food and in some cultures, they could be used as food. From this activity, a child learns patience, independence and numeracy by counting the insects during mini beast hunt. Mini beast hunt is also a great opportunity to improve children's communication skills and language by asking questions and modeling simple descriptions like asking a child about having seen the legs of a centipede?

The mini beast hunt provides numerous physical, emotional, social and holistic developmental opportunities to a child. For example, looking for an insect in a natural environment improves balance and coordination, hand and eye coordination, gross and fine motor skills, improves concentration, and develops curiosity and exploration. Being gentle with insects shows ambitious capable learners are aware of their surroundings and responsibilities, showing a sense of care and the effects of their actions, and social and emotional wellbeing. A child showing curiosity and asking questions about the different types of minibeasts, learning about the function of their body parts and habitats links to the New Early Years Curriculum for Science for Non-Maintained settings. From September 2022, the New Curriculum of Wales has been taught. The New Curriculum recognizes the uniqueness of every child. Based on a child-centred approach that focuses on achieving four aims, those are ambitious and capable learners, enterprising and creative individuals, ethical and informed citizens, and healthy and confident individuals able to live independently. To achieve the aim, it is focused on six areas of learning including numeracy and science. According to the curriculum, learning should be fun, and experience based. These experiences should be meaningful to the child and based on his choice that supports holistic development and offers risk and challenges (Welsh Government, 2022).

Part 4

Play is a powerful tool for children. It develops an understanding of their surroundings, provides opportunities, supports their learning, deepens their curiosity and enables meaningful experiences. The definition of play is different for different individuals depending on their interests (Davies, 2022). According to the United Nations Convention on the Rights of a Child Article 31, every child has a right to play and take part in age-appropriate cultural and leisure activities, promoting the health and well-being of a child by providing non-discriminative equal opportunities (UNICEF, 1990). The definitions of play were elucidated by various child development theories and modern learning approaches. According to National Health Service, (2017), play is self-directed, freely chosen without external pressure and intrinsically motivated.

Friedrich to Friedrich Froebel, an early childhood educator who led the foundation of kindergarten, believed in learning through play. Children are curious learners that need to have first-hand experience which allows them to understand their surroundings and build relationships. Froebel believed in freedom, creative and explorative play and described the role of an adult as an observer and facilitator. Play is a form of human expression and how children connect with nature, he emphasized on the importance of playing outdoors in his setting every child was allowed to grow their own plant and look after it this develops connection with the environment, independence, allows them to take risk and

have rich sensory experience. Froebel's kindergarten was a place where children can grow and learn at their own pace according to their personal interests facilitated by adults. In Froebel's garden, every child had their own pot where they sow the seeds, watered it, took care of it, and through this activity, they learned about natural life cycle of plants, seasons, growth and decay, colours, textures and different odour. The outdoor play provided children with time, space, independent and explorative play, rich sensory experiences, and whole-bodied movement, making them young risk takers and engaged with the awe and wonder of nature (Tovey, 2017).

Outdoor play is spontaneous, independent, self-directed and enjoyable with no external pressure. Outdoor play, described by the name, is any form of play that takes place in an outdoor environment that includes natural resources. Outdoor play is exclusive to each child based on personal interests, offers space, movement, and time provides opportunities to develop fine motor skills, improves balance, and hand and eye coordination. Playing outdoors allows different bodied movements such as jumping, stretching, hopping, crawling, and pushing which develops gross and fine motor skills. Playing with a variety of natural materials and natural resources encourages curiosity, discovery and exploration equipped with multisensory experiences. Outdoor play provides opportunities for independent solitary play and playing as part of a group. It improves the speech and language skills of a child which has a direct impact on the social and communication skills of a child. Children playing outdoors use a variety of vocabularies such as oak, dandelion, snail, daisies, and squirrels. They also learn to negotiate, bargain and cooperate, for example making rules, explaining them, and agreeing to the rules improves social skills and builds confidence (Davies, 2022).

Reggio Emilia is a learning approach founded by Professor Loris Malaguzzi from Italy. Reggio Emilia believes that children are capable learners and have many languages. The well-known aspect of Reggio Emilia is The Hundred Languages of a Child Model believes that children have many ideas and ways to communicate to express themselves. Reggio Emilia argued that learning should be play-based, child-led, experience-based, and self-directed. The role of an adult is to observe a child's strengths and weaknesses, provide resources and facilitate the learning process (Reggio Children, 2022). Te Wahriki is another socio-cultural learning approach developed by May and Carr and is a preschool curriculum in New Zealand. It believes that a healthy mind and body with a sense of belonging can develop competent and confident learners that will make a valued contribution to society. Learning is based on play experiences, activities, and environment through people, places and things (Ministry of Education New Zealand, 2017). Reggio Emilia and Te Wahriki both support the objective of outdoor learning via child-centred, self-directed play where children choose, explore, learn and engage in different activities through unconventional methods.

Play is the foundation of child development and the primary right of every child. Outdoor play equipped with rich sensory experiences allows a child to be oneself and has a positive impact on health and well-being. Through outdoor play, a child has new experiences, explores emotions, builds relationships and develops confidence. A New Curriculum for Wales has arrived and is effective from September 2022 for children from ages three to 16. The Curriculum of Wales is based on the ambition of developing capable ambitious learner who enjoys problem-solving and can communicate effectively in Welsh and English. The Learners should be confident and able to express their ideas and emotions and become ethically informed citizens. The new curriculum for Non maintained settings focuses on effective principles of Pedagogy providing play-based learning opportunities and encouraging meaningful experiences in

outdoor play and promoting physical literacy (Education Wales, 2022). The New Curriculum positions outdoor learning as a major methodology that will be used in all non-maintained settings and places it on a scale with indoor learning. Learning outside the classroom has been shown to increase levels of engagement, confidence, and well-being. The outdoors fosters the development of a child's social, emotional, spiritual, and physical elements while also providing pupils with practical chances to develop and improve cross-curricular skills. The outdoors offers opportunities to astonish and surprise children in addition to offering children the ability to be themselves in open and stimulating environments. If a child can connect with and relate to nature, they could develop empathy for it and become aware of it. Children can foster their capacity to survey and experience risk, assisting with creating strength and certainty. The New Curriculum of Wales also focuses on learning Literacy and Numeracy through nature. Young children can learn numeracy through different activities in a natural outdoor environment such as sequencing, sorting, learning shapes, measuring height and determining the age of a tree by counting the number of rings in its trunk (Natural Resource Wales, 2022).

The theory of cognitive development was proposed by Jean Piaget, a Swiss psychologist who suggested that a child develops his knowledge based on experiences which are directly influenced by social, emotional, physical and mental stages of development. Piaget's theory was based on four stages of development named the sensorimotor stage starts from birth till the age of two years, a child learns through a sense of touch. The Preoperational Stage starts from the age of two years till the age of seven, intellectual development stage is when a child starts to think logically. The Concrete Operational Stage starts from the age of seven till 11 years old, a child masters the use of logical reasoning such as conservation and classification. The Formal Operational Stage starts from the age of 12 and over, a child can think systematically and starts reasoning. According to Piaget, a child develops his own knowledge exclusive to personal experiences and learns things without adult influence. Children are motivated to learn by nature and there is no need for a reward as stimulation. This theory emphasizes that experience-based learning and tangible play empower the utilization of outdoor play. Furthermore, it suggests the role of an adult in facilitating and encouraging play in a natural habitat by adopting a child-centred approach which structures the premise of the New Curriculum of Wales (Bates, 2019).

The role of an adult in the early years setting has crucial importance and is complex in nature. The perception of play is different to adults than children, for play to remain child-led, intrinsic and original to the children is a sensitive task that requires professional knowledge and years of experience. Play is an essential part of the child development process, the importance of play has been discussed by many child development theorists such as Piaget, Froebel, Issacs, and Maria Montessori. It is essential to understand children's perception of play to create meaningful learning experiences which have a lifelong positive impact on the health and well-being of a child. To understand what children, perceive as play, the role of an adult should observe a child but not directly engage in play. The early year's practitioner takes careful observation of a child's choices and interests to facilitate play (Davies, 2022). Vygotsky believed that social interaction and relationships have a critical impact on child development. Vygotsky's theory of the zone of proximal development focuses on the imagination through play. Vygotsky emphasized on the role of an adult is to develop a good understanding of the subject, build interest and engage with children to support their learning process when they are in the Zone of Proximal Development. Furthermore, an educational facilitator encourages children to move beyond their comfort zone and take calculated risks to develop a better understanding of their surroundings (Bates, 2019). Bruner's theory of spiral curriculum considers children as active learners, like Vygotsky,

recognizes the role of an early year's practitioner. Effective planning is the key to support a child's learning process. To plan effectively, a practitioner needs to observe a child's interest, developmental stage and level of engagement. Secondly, adults need to engage when a child cues to play, but it is crucial to understand that play must be child-driven, and the adult should not try to change the direction of play. When setting up an environment, it is essential to facilitate the child's interest, and provide open-ended resources and loose parts to promote exploration and curiosity (Davies, 2022).

According to the New Curriculum of Wales, outdoors learning has equal importance as indoor learning. The early years focus on the holistic development of a child and learning through playful experiences. The role of an adult is to facilitate the learning process of young children in an emotionally safe environment and model a fun learning approach to promote children's natural curiosity. Language development occurs as a part of playful experiences, adults should make sure that a child should have enough time to hear, process, understand and respond. The natural world equips children with a wealth of resources and language learning opportunities. The Numeracy skills of a child develops through open-ended mathematical exploration and authentic multisensory experiences (Education Wales, 2022). Outdoor learning is not only about climbing rocks and having long journeys but involves learning in a usual curriculum through simple everyday experiences. When planning an activity outdoors a practitioner should set the achievable expectation, keeping it simple, children should be equipped with weather-appropriate clothing, and keeping the environment safe by doing risk assessments. During the early years, children can learn mathematics and science in a unique and explorative way. A practitioner can promote the numeracy and literacy skills of a child by counting the rings on the trunk of a tree to determine its age, distinguishing the different shapes of the leaves, learning about different textures and surfaces like smooth and rough, the scent of different plants and materials, observing shadows, and learning about different sounds in nature like wind whistling, stepping on leaves, birds chirping (Woodland Trust, 2016)

The Early Years Curriculum of Wales is play based and outdoor learning forms an integral part of it. However, there are certain limitations or barriers in outdoor learning due to the social, physical and environmental factors such as harsh weather conditions, safety concerns, risk of trips and fall, small injuries and sting bite and presence of a first aider with the group of children (Davies, 2022). The idea of the play is intrinsically motivated. However, during play children make choices, develop imagination and act accordingly. Time-constrained pre-planned structured activities to restrict their creative and imaginative thinking process. A practitioner may feel under pressure to idea meaningful learning experiences when the outcome of the play is measured and driven. The timely observations, assessments, meeting the targets and obtaining results from it builds pressure on the facilitator that puts the true nature of play in danger (Macintyre, 2001). According to Health and Safety regulations, the goal is not to eliminate the risks and barriers but to weigh up the risk and opportunities, limiting the barriers and encouraging children to do their risk assessments and become confident and capable learners (Health and Safety Executive, 2012)

Reference list Awe and Wonder:

Welsh Government (2022) *The new Curriculum for Wales: An easy read guide for young people*. Available at: <https://hwb.gov.wales/api/storage/e4dcdb2e-f87f-4f00-b110-488289cc02ca/220209-easy-read.pdf> (Accessed: 02/10/2022)

Woodland Trust (2019) *Outdoor Learning Pack*. Available at: <https://www.woodlandtrust.org.uk/media/43645/outdoor-learning-resource-pack.pdf> (Accessed: 01/10/2022)