

Awe and wonder- science, mathematics, and the outdoors

Part 1



Part 2

From the image you can see a good environment for the children who would be surrounded by lush greenery, picture a group of young adventurers gathered with their teacher, for a special journey into the heart of a small, wooded area. Armed with their curiosity, excitement and imagination, these children aged 5 to 7 who are about to embark on a unique learning experience. The children would have suitable clothing on especially if the weather were to take a turn for the worst and start raining if this is the case then the lesson would not be moved indoors except we would embrace it and monitor the severity of it, the same can also be said if it is sunny then the children would have suitable attire whilst also wearing hats if and when possible, the area would have been walked through previously by myself in order to gauge if the area is suitable, appropriate in regards to the topics wanting to be taught, Safety would also be considered ensuring the area was clear of any hazards such as debris or litter and risk assessments would be conducted as well as dynamic risk assessments when we embark on our knowledgeable journey.

As we enter the wooded area, I would encourage the children to observe their surroundings closely. The towering trees, the rustling leaves, and the sunlight filtering through the branches created an atmosphere of wonder and excitement.

"Today, we are not just exploring the woods, but we will also use math and science to understand the natural world around us," I announced, "wow" a few of the children replied amongst other gasps and excited noises.

Lesson 1: The Magic of Patterns (Math)

Their first stop was under a grove of tall pine trees. I pointed to the pinecones scattered on the ground and asked with an open-ended question, "Can anyone spot a pattern here?"

The children observed the pinecones carefully and soon noticed that they were arranged in a spiral pattern, one child said, "look at the patterns in the leaves". I went on to explain, "Nature often follows mathematical patterns to create its beauty. Just like these pinecones, you'll find patterns in many places."

The children eagerly started to count the spirals on different pinecones and marvelled at how math could be found in the most unexpected places,.

Lesson 2: Understanding Forces (Science)

Next, they reached a small pond with a gentle stream. I led them to a flat safe area and handed each child a leaf. "We're going to test the force of the flowing water," I said. The children placed their leaves gently on the surface of the water and watched as the gentle current carried them away. I explained, "This is an example of how water exerts force. It can move things, just like wind or even our own muscles."

The children experimented by placing different leaves and twigs in the stream, observing how the force of water affected them. They learned about the concept of force and how it applied to the natural world.



Lesson 3: Discovering Life Cycles (Science)

As they continued their journey, they stumbled upon a collection of fallen leaves and acorns. I knelt and picked up an acorn, showing it to the children.

"Do you know that this tiny acorn can grow into a giant oak tree?" I said with a curious tone, "that's impossible this tiny little acorn" one of the children replied exquisitely. I went on to say that "Nature has amazing life cycles. Just like how you grow from little babies to big children, plants and animals have their own life cycles too."

The children were fascinated by the idea of tiny seeds growing into towering trees and caterpillars transforming into butterflies. They realized that everything in nature had a purpose and a cycle, at this point I promised the children that we can also take this experiment into the classroom where I will give each child a pot of earth and a sunflower seed and it would be up to them to each look after their sunflower by caring for it then we can compare who's has grown the tallest, the children were

thrilled by the idea of looking after a simple seed that could grow into such a tall sunflower..

Lesson 4: Exploring Size and Weight (Math and Science)

As the children were fascinated about the small pond and stream, we returned to that nice little area and I asked the children to pick up some objects of their choosing, heavy, light, big or small, some came back with leaves, stones, sticks, twigs and two attempting to carry a log. I then asked the children to compare their sizes and weight to each other's items.

"Notice how some are bigger and heavier than others," I said. "This is a great opportunity to learn about size and weight. It's like when you compare your toys or snacks at home."

The children engaged in comparing and categorizing all of their items that they selected and brought over, learning about concepts like size and weight through hands-on exploration.

Lesson 5: The Influence of Gravity (Science)

I then encouraged them to place their collection into the pond to predict if they would either sink or float to understand the concept of buoyancy and density.

The children quickly realized that the denser or heavier (as I explained to them) the item is then it would sink whereas the lighter it was then the more likely it would be to float, this then led to many forms of inquisitive questions from the children such as "why do boats float when they are heavy?".

I answered in the simplest terms that I could "because water itself is very dense (heavy) boats have air in them making them less heavy once on water and so they float," this took a lot and I do mean a lot of explaining but the curiosity and engagement on the children was fantastic to see and I could see that they were so engaged and simply fascinated this was knowledge they were going to remember. As the day drew to a close, the children gathered with their newfound knowledge and experiences from their journey through the small, wooded area. They had not only explored the beauty of nature with a nice holistic wellbeing approach but had also applied mathematical and scientific concepts to their surroundings.

I asked the children what they had learned, and their enthusiastic responses filled the air. They spoke of patterns in pinecones, the force of water, life cycles of plants and animals, size and weight comparisons, and the influence of gravity. Their adventure had transformed the woods into a living classroom, where math and science were intertwined with the wonders of the natural world.

As they left the woods, the children carried with them a deeper appreciation for the environment and the knowledge that math and science were not just subjects in a classroom but tools to understand the mysteries of the world around them. Their journey had ignited a lifelong passion for learning and exploring, reminding them that nature's classroom was always open for those who sought to discover its secrets, I knew the lesson was a success when the children were hopefully asking "can we come outside again tomorrow please.....pretty please?" the pretty please was enough for me, "how about tomorrow!" I replied and the children gleefully smiled back through the cheers.

Part 3**RISK BENEFIT ASSESSMENT**

Location / Activity:	Wooded play area	Date:	25.09.23
Assessor:	Ashley MacDonald	Review date:	

The boxes in the table below will expand as you type into them; pre-entered text is simply for illustration. You should delete irrelevant items and replace with text relevant to your circumstances.
Your overall risk rating – Low, medium or high – is based on your judgement about whether the BENEFITS of the activity or opportunity outweigh the RISKS.

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 RATING: L/M/H
Patterns on pinecones or leaves	Children will have a better understanding of mathematical patterns	Splinters, may fall bending down or reaching over head for items	The Children and I	Give children a safety talk on picking leaves, being careful when bending down and how to correctly handle pinecones	Low
Walking in outdoor wooded area	Physical activity, wellness, engaging in lessons	Slip, trip or fall uneven terrain, tree roots, and debris can pose a tripping hazard for children and adults.	The children and I	Ensuring myself and the children have the correct footwear, and the walking route is checked beforehand, Inspect the area for hazards on the ground. Consider the terrain's ruggedness and the presence of obstacles.	Medium

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 RATING: L/M/H
The lesson itself	The lesson is based on understanding mathematics and science through nature	May not be able to watch all the children, Inadequate supervision for child ratios	The children	Ensure adequate supervision is used for the correct ratios of children	Low
Water / Pond	Children will be learning about gravity, sink or float test.	Drowning – Child may fall into the water or Teacher	The Children and I	Determine if there are bodies of water nearby and establish clear boundaries and supervision guidelines.	Low
Picking up insects, sticks, leaves or branches	Children will be learning about patterns, increasing positive wellness and wellbeing	Children may encounter insects like bees, wasps, or ticks, which can lead to allergic reactions or diseases like Lyme disease	Everyone	Educate children on insect safety, provide insect repellent, and conduct tick checks.	Low
Weather	Physical, mental fitness and Holistic wellbeing will be improved, children may then have better concentration.	Weather conditions like sudden rain, storms, or temperature extremes can pose risks to children.	All children and adults	Monitor weather forecasts and have a plan for shelter or evacuation in adverse conditions. Ensure children are dressed appropriately for the weather and provide necessary gear, like rain jackets and hats.	Low

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 RATING: L/M/H
Walking or running	Physical fitness, mental wellbeing, socialising and communication	Children may have allergies or medical conditions that could be triggered by plants, insects, or other factors in the wooded area.	All children	Gather information on children's allergies and medical conditions. Ensure that adults are trained in basic first aid.	Low
Picking up objects	Picking up objects to see any patterns, or using items for experiments	Manual handling, children / teacher may pick up something with incorrect posture and cause injury	Teacher and children	Guidance on using correct posture when picking up items off the floor or above them and if any items are too heavy then ensuring you ask for help or leave it.	Medium

Part 4

Early childhood education is a critical period for nurturing children's cognitive development and laying the foundation for their understanding of mathematical and scientific concepts. The outdoor environment provides a rich and dynamic context for engaging children in these subjects. This part of the assignment critically evaluates how adults working with early years children can effectively support and encourage their engagement with mathematical and scientific concepts in outdoor settings.

Drawing on relevant theories and research, as well as various government documents, including the New Curriculum 2022, I will explore the contributions of theorists such as Froebel, Piaget, Malaguzzi, Bruner, and Vygotsky. This discussion will highlight the essential role that adults play in facilitating meaningful learning experiences for young children.

Adults play a crucial role in facilitating this exploration by creating a supportive environment, scaffolding children's learning, and fostering a growth mindset (Dweck, 2006). Through formative assessment and documentation, adults can make learning visible and engage parents in their child's educational journey, fostering a strong home-school partnership (Reggio Children, 2018). While there are challenges to outdoor learning, the benefits in terms of cognitive development, curiosity, and a lifelong love of learning make it a valuable approach in early years education. By drawing on relevant theory and research and using various references throughout, educators can create a foundation for children's mathematical and scientific understanding that will serve them well throughout their lives.

Outdoor learning promotes physical activity, increased sense of well-being, mental stimulation and increased social communication with others, which are essential for a child's overall development. Active exploration in the outdoors supports fine and gross motor skills development, fostering a holistic approach to early childhood development (National Council of Teachers of Mathematics, 2014). The New Curriculum 2022 in the United Kingdom underscores the importance of outdoor learning in early childhood education (Department for Education, 2022). It recognizes that outdoor environments offer unique opportunities for children to explore and develop their mathematical and scientific understanding. This emphasis aligns with the holistic approach advocated by Friedrich Froebel, an influential figure in early

childhood education. Froebel believed that children should learn through play and that the outdoor environment is a natural extension of the classroom (Broster, 2017).

In outdoor settings, adults can facilitate learning by providing open-ended materials, such as sticks, stones, and leaves, which encourage children to engage in exploration and experimentation (White, 2012). Outdoor environments engage multiple senses simultaneously. Children can feel the texture of leaves, smell the earth after rain, hear the gentle sounds of birds, see the colours of flowers, see the patterns of the sun flickering through the trees and watch any animals or insects in their natural habitat. These sensory experiences enrich mathematical and scientific exploration by providing a holistic understanding of concepts (White, 2012). The outdoor environment naturally sparks excitement and curiosity in children. The novelty of the outdoors encourages questions, investigations, and a desire to understand the world. This aligns with the constructivist theories of Piaget and Bruner, emphasizing that learning is an active process driven by curiosity (Piaget, 1952; Bruner, 1960).

Jean Piaget's constructivist theory supports this approach by emphasizing that children construct their understanding of the world through hands-on experiences (Piaget, 1952). As children interact with these materials, they naturally encounter mathematical and scientific concepts, such as shape, size, weight, and balance. Adults can guide these explorations by asking open-ended questions and providing opportunities for children to make predictions and test their hypotheses (Gopnik et al., 2015).

Outdoor settings provide tangible connections to real-world mathematical and scientific concepts. For instance, children can witness the change in seasons, observe the growth of plants, and explore the concept of cause and effect through activities like dropping objects from different heights. This real-world relevance enhances comprehension and retention of knowledge (Department for Education, 2022). Scientific inquiry begins with curiosity and observation. The outdoor environment abounds with opportunities for children to observe and inquire about the natural world (Malaguzzi, 1993). In an outdoor setting, children can observe the growth of plants, the behaviour of animals, and changes in weather. These observations can lead to questions and investigations, fostering scientific thinking.

Lev Vygotsky's sociocultural theory highlights the importance of social interactions in learning (Vygotsky, 1978). In an outdoor environment, adults can serve as co-constructors of knowledge, engaging in conversations with children that stimulate their thinking particularly by asking open ended questions to the children requiring them to think for themselves. For instance, while observing a bird's nest, an adult might ask, "Why do you think the bird built its nest in that tree?" This question not only encourages observation but also invites children to think critically about animal behaviour.

Mathematics is an integral part of everyday life, and the outdoor environment provides numerous opportunities to explore mathematical concepts (National Council of Teachers of Mathematics, 2014). Jean Piaget's theory of cognitive development suggests that children go through stages of development, and their understanding of mathematics evolves with age (Piaget, 1952). In early years, children may engage in simple counting activities using natural objects like pebbles, flowers, sticks, stones, or leaves.

The concept of symmetry, for instance, can be explored through activities like leaf rubbings, where children fold leaves in half to create symmetrical patterns (Thornton & Burgess, 2014). This type of activity draws on Jerome Bruner's concept of scaffolding, where adults provide support to help children grasp more complex ideas (Bruner, 1960). As children become more adept at recognizing symmetry, adults can introduce them to more challenging concepts, such as geometric shapes found in the outdoor environment.

Educators should receive training in outdoor teaching methodologies, safety protocols, and documentation practices to ensure they are well-prepared for outdoor learning experiences (Broster, 2017).

While outdoor environments offer rich opportunities for mathematical and scientific exploration, the role of adults as facilitators and guides is pivotal (Department for Education, 2022). Lev Vygotsky's notion of the Zone of Proximal Development (ZPD) is particularly relevant in this context. The ZPD represents the gap between what a child can do independently and what they can do with guidance and support. In

outdoor learning, adults must identify each child's ZPD and provide appropriate challenges to scaffold their learning effectively (Vygotsky, 1978).

Furthermore, engaging parents in outdoor learning experiences fosters a strong home-school partnership. Parents can contribute to outdoor activities, share their knowledge, and support children's learning at home (Gopnik et al., 2015), adults can create a supportive and enabling environment by fostering a growth mindset (Dweck, 2006). A growth mindset encourages children to view challenges as opportunities for learning. When children encounter difficulties or setbacks during outdoor mathematical and scientific exploration, adults can praise their effort and perseverance, reinforcing the idea that learning is a process.

The New Curriculum 2022 emphasizes the importance of formative assessment and documentation to track children's progress (Department for Education, 2022). This aligns with the ideas of Reggio Emilia, which emphasizes the role of documentation in making learning visible (Reggio Children, 2018). In an outdoor environment, adults can use various methods, such as photographs, videos, and written observations, to document children's mathematical and scientific explorations. These records serve multiple purposes. They provide evidence of children's learning and development, inform curriculum planning, and offer insights into children's interests and emerging concepts. Additionally, they can be shared with parents to engage them in their child's learning journey, fostering a strong home-school partnership. Regularly evaluating the effectiveness of outdoor learning practices is essential. Educators should assess whether outdoor experiences are meeting learning objectives and adjusting as needed (Reggio Children, 2018).

There can be potential challenges and barriers to outdoor exploration, but one should remember that outdoor learning encourages environmental awareness and responsibility. Children learn about the natural world, ecosystems, and sustainability by interacting with their surroundings. This holistic understanding aligns with the Reggio Emilia approach's emphasis on interconnectedness (Reggio Children, 2018). While outdoor learning offers numerous benefits, it also presents challenges. Weather conditions can be unpredictable, which may limit the amount of time children spend outdoors. Furthermore, ensuring the safety and well-being of children

in outdoor settings requires close supervision. Balancing safety with the freedom to explore is a delicate task that adults must manage. Ensuring children's safety in outdoor environments requires vigilant supervision. Adults must balance providing opportunities for exploration and discovery with ensuring the well-being of children. Adequate adult-to-child ratios and safety measures are essential (White, 2012).

Additionally, there may be logistical challenges in terms of access to suitable outdoor spaces and the availability of resources (Department for Education, 2022). To address these challenges, practitioners must be resourceful and creative, finding ways to bring elements of the outdoor environment into the classroom, when necessary, Educators may need to adapt and improvise with limited resources, such as bringing natural materials into the classroom or utilizing nearby green spaces.

Conclusion

In conclusion to this assignment, fostering mathematical and scientific exploration in early years through the various aspects of outdoor learning are based on a broad body of theory and research. The New Curriculum 2022, influenced by theorists such as Froebel, Piaget, Vygotsky, Malaguzzi, and Bruner, emphasizes the importance of outdoor experiences in early childhood education (Department for Education, 2022). These experiences offer children the opportunity to engage with mathematical and scientific concepts in a meaningful and experiential manner. Outdoor learning environments provide numerous benefits, including multi-sensory learning, heightened curiosity, real-world connections, physical activity, and environmental awareness. However, educators must also address challenges related to weather, safety, logistics, and documentation. By carefully considering these practical aspects and drawing on the rich theoretical framework provided by these prominent theorists, educators can create meaningful outdoor learning experiences that promote children's cognitive and holistic development. These experiences align with the New Curriculum 2022's emphasis on outdoor learning, making them an integral and valuable part of early years education in the UK (Department for Education, 2022).

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