

ECEY5005 Awe and wonder: science, mathematics and the outdoors.

I have not used any AI in this assignment.

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Part one

(Image: Copic, 2025)

Part Two

It was a typical autumnal day, the weather was dry with a chill in the air, and the slight breeze gave wings to the fallen leaves that lay on the floor. The children were excited to visit the community farm and were eagerly chatting about all the new and wonderful things they might see. The children were ages four and five and were accompanied by the class teacher and three teaching assistants. As we were walking to the community farm one of the children shouted out 'look miss, I can see my breath like a dragon'. I replied and said 'Wow, how amazing'. With this the rest of the class began to exhale and watch in awe as their breath left their bodies creating a mist. I explained it was because the air inside our bodies is warm and when we blow out into the cold air, we form a visible cloud that are in fact tiny little droplets of water. 'That's cool' said one child. 'It is called science' I exclaimed.

Upon arrival the children were immediately greeted by the roaming chicken and turkeys that live on the farm. Some of the children were sheepishly gazing at them while reluctantly walking past. However, other more confident children wanted to get up close and attempt to touch them. As we walked along the path to our leaning area the children were talking amongst themselves, asking each other questions such as 'why are there so many leaves on the floor' and 'do you think I could climb that huge tree all the way to the top'. I smiled at the children's natural enthusiasm and curiosity and then turned to the children to announce we were at our learning area.

The area was in the middle of the farm and had tall leafy trees that created shadows on the ground beneath them that changed when the wind blew. There were large logs that laid on the soil surrounded by leaves, sticks and mud, and there were chickens that would wonder freely in and around the outdoor area. I also provided extra resources for the children and offered magnifying glasses, bowls, tubs, paper, crayons and spoons. The whole area was fantastic and gave the children the children an opportunity to explore and play in the outdoors. Furthermore, the area gave the children the opportunity to learn and supported the four purposes of the Curriculum that according to the Welsh Government (2022) should support the children's holistic learning with a meaningful and enabling environment. The Welsh

Government (2022) suggest the role of the adult is to observe and enable the children to develop pathways such as exploration and well-being. The learning area provided me and supported the Welsh Government (2022) curriculum with many natural teachable moments where I could support the children's curiosity and indulge in play putting emphasis on mathematics and science.

The environment had many areas that could provoke and spark curiosity for learning mathematics and science in the outdoors. The environment supported the Welsh Government (2022) curriculum for Wales and offered risk by providing a hands-on approach that can challenge children and allow them to learn from their own experiences. The children immediately ran to the large logs on the ground and one child shouted, 'I wonder how many logs are here miss?' I replied, 'shall we count them together?' The children all counted in chorus and wondered around them touching each of the logs as we chanted the numbers aloud. This easy fun task supports mathematics in the outdoors by supporting the children with numbers and counting and using tangible objects such as the logs to help them (Welsh Government, 2020). This simple task also lends itself to mathematics and numeracy in the curriculum for Wales and supports the learners to be ambitious and capable which is one of the four purposes (Welsh Government, 2022).



(Image: Copic, 2025)

The children were examining the logs by getting up close and were eager to use the magnifying glasses provided to them. One of the children said, 'look at all these wriggly lines and swirls on them, it feels really rough and hard to touch'. I used this

interaction to promote metacognition and asked, 'do they all look the same?', a few of the children all agreed and said 'no, they are different'. I linked this opportunity to mathematics and patterns and gave the children each a piece of paper and a crayon and asked, 'what do you think would happen if I held my paper to the bark and then rubbed my crayon over the paper?'. 'You will make squiggly lines on the paper from the log' said one child, I asked the children 'do you think all of the pictures will look the same?', 'mmm I do not know' said one child. 'OK' I said, 'let us have a go'. The children used all the different colours and watched in awe as the grooves and ridges came to life and boomed from the paper. 'Wow, miss look at this', the children were eager to show me what they had created. I sat on the logs with the children admiring each picture and asked, 'does anyone know what this is?', 'it is pretty' said one of the girls, 'It is a pattern, you have all made your very own patterns'. The children were smiling and jumping with excitement. 'I wonder what would happen if we used more than one colour crayon? Do you think it will look the same as these?'. The children immediately rushed to the crayons and began to repeat the pattern using different colours. There were many 'wows' and 'look at my pattern miss'. This task included shared sustained thinking and encouraged the children to be creative using mathematics in the outdoors and would lend itself to progression step one in the curriculum for Wales and Welsh Government (2020) mathematics and numeracy that encourages children to recognise patterns around them. I made sure in line with the Welsh Government (2022) I enabled the children by creating the opportunity to learn using symbolic representation with real-life experiences to help them find meaning in their own learning. Furthermore, I was able to observe the children's learning so that I could assess their level of understanding.

A small group of children gathered around the chicken that was roaming around the learning area and were chatting, as I approached, I could hear them asking each other questions such as 'were do chickens come from?' and 'did this chicken come from an egg?'.



(Image: Copic, 2025)

I used this opportunity to encourage metacognitive talk about life cycles and any questions the children had. 'I think the chicken did come from an egg' said one boy, another eager to ask his question 'so does that chicken lay more eggs?'. I responded and said, 'you both have some excellent questions', then asked the children, 'where do you think chickens come from?'. The children shouted out 'an egg', I giggled and replied, 'wow you are right, such clever boys' and girls', ok' I said, 'so if this chicken came from an egg, do you think she will then lay more eggs to have more baby chickens?'. The children had curious looks on their faces watching full of wonder as the chicken clucked past. 'miss', said one girl in the group. 'So, this chicken will lay eggs and then those chickens will lay more eggs and then more after that?', 'That is exactly what happens, well done' I beamed and gave a little clap. 'It is what we call a life cycle, the chicken will lay an egg, the egg hatches and a tiny fluffy chick pops out, that little chick grows and then lays her eggs, then the cycle starts all over again'. The children were gazing at the chicken amazed. In line with the Welsh Government (2022) this outdoor activity allowed the children to learn beyond the classroom and gain real life experiences to help deepen their understanding. My role here was to observe and allow the children time to explore making use of the natural teaching moments that occur to spark curiosity and metacognitive talk. The children were exploring science and technology in a naturally fun environment. Furthermore, this learning experience met the first three progression steps in the Welsh Curriculum that include discovering how living things grow (Welsh Government, 2020).

Our time at the community farm had come to an end so I gathered all the children together and asked if they had learned anything new. Some children proudly said, 'we learnt all about the life cycle of a chicken and how it just keeps going around and around' and others said, almost as if in a competition to have learnt the most said with a loud voice, 'we learnt about patterns on the logs and made these bumpy colourful pictures'. The class all turned to see the picture that was being held up proudly. 'Well,' I said, 'what a wonderful day full of learning'. This gave me the opportunity to assess the children's level of understanding and plan next steps for progression (Welsh Government, 2021). We walked back to school, and the children were still buzzing with excitement telling each other what they had discovered at the farm.

Part Three

Location / Activity:	Community Farm	Date:	16 th September 2025
Assessor:	Kelly Copic	Review date:	16 th October 2025

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 to and from the community farm	By walking to the community farm the children will have the opportunity to get physical exercise that can have positive effects for them both physically and mentally. The short walk will allow the children time and the opportunity to bond with their walking partner and spark conversation and questions. The children will benefit as the walk will encourage independence and boost confidence whilst allowing them to engage with the environment.	Children may trip or fall causing injuries such as cuts, bruises or sprains. Children are exposed to the weather and may become too cold or too warm. Children could wander off from the rest of the class. Crossing the roads with lots of traffic and members of the public using the same footpath.	Children	Practitioners must carry first aid kits and have a designated first aider in case there is an accident. Ask the children to walk sensibly, making sure they have a partner and walk in a line to keep safe. Furthermore, make sure that there is an adult at the front of the line to lead the children, an adult in the middle and another at the back of the line to make sure all the children are kept safe. Ensure the children and practitioners are wearing high visibility waistcoats. Ensure the children are wearing coats and appropriate footwear. Before leaving school, children should be made aware that they will be going out in public and understand that they must behave a certain way. The children must understand the importance of listening to teachers and know not to talk to any strangers who may pass by.	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
Children learning in the outdoors amongst natural elements such as trees, rocks, mud, sticks, insects and bugs.	Children can explore in the outdoors being able to learn using their senses. The children will be free in an enriching environment where they will be able to feel the bark on a tree and play in the mud. This hands-on learning will spark curiosity and critical thinking. The activity will support the children's fine and gross motor skills. For example, lifting little stones, bending over and stretching up high. The children will benefit by learning mathematics and science in the outdoors by examining living things in their natural habitats, creating an understanding of eco systems. This activity will also teach the children to be respectful of all living things. Learning in the outdoors can offer children the opportunity to challenge themselves and boost confidence. For example, climbing or balancing on the logs can give children a great sense of achievement. Encourages children to work together and creates a sense of belonging.	Allergic reactions to bee stings, pollen or plants. Hygiene risks or concerns as children will be touching the soil that could contain animal droppings. There may be low branches that could scratch the children or large spiky sticks that the children could trip over. Children may wander off from the area or hide in unsafe areas.	Children	Practitioners must check the area for any loose objects such sharp sticks, stinging nettles or low branches prior to any outdoor activity and make the children aware of the hazards that are in the area, blocking any unsafe areas so that the children know they must not use that area. Children must wash their hands regularly and in between activities to reduce the risk of becoming unwell. The children should be made aware that they do not eat or put their hands in their mouths whilst playing with anything from the ground or area. Practitioners must carry first aid bags to deal with any allergic reactions the children may have. Children must be told that the bugs they discover must be left in their habitats and are not allowed to be collected. Children should know their boundaries and the area should be manned with staff to ensure no children can leave the area without a responsible adult present.	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
Children in the outdoors with roaming chickens in the area.	Observing animal behaviour is educational and gives the children the opportunity to learn about life cycles and eco systems. The children will be given the opportunity to learn where eggs come from and be able to see and feel them sparking curiosity. The activity teaches the children to be kind to animals and helps them to build empathy and compassion. Furthermore, this interaction can help with boosting self-esteem as the children will feel good about themselves for taking care of the chickens.	Chickens can carry bacteria such as salmonella. The chickens may bite or scratch the children causing injury.	Children	The children must be told not to touch the chickens or chase them and be told how they are expected to act when the chickens are around. The children must be made aware they have to always be kind to them. Practitioners must carry a first aid kit in case of an injury. The children must be supervised by an adult when near the chickens.	Low
Walking on uneven ground.	Supports children's vestibular sense and co-ordination. Helps build motor skill development by increasing spatial awareness and allowing them to be more aware of their own bodies.	Children are at risk of falling, slipping or tripping on the uneven surface that could result in cuts, bruises or sprain injuries.	Children and Practitioner	Encourage the children to wear appropriate footwear. Make sure the children walk slowly until they become used to the uneven ground. Practitioners must carry a first aid kit in case of any injuries.	Low

Part Four

This essay will evaluate how adults in the early years can effectively support and encourage children to engage with mathematical and scientific concepts in the outdoors, linking to theories of learning and curriculum guidance. Furthermore, this essay will explore the enabling adult and the environment they create to arouse awe and wonder for children.

In her introduction to play, Wilson (2018) talks about children and how they have an intrinsic need to play, she suggests play can impact development and help children develop physically, socially, cognitively and emotionally. She suggests outdoor creative play offers children an enriching environment that can engage their senses, offer risk and spark curiosity, imagination, awe and wonder. Similarly, a study by Trina and Monsur (2024) suggest learning in nature-based environments can create opportunity for children to problem solve and promote curiosity. The authors point out that children who are given the opportunity to explore with a diverse range of natural resources are more likely to have increased creativity and social interaction. Furthermore, the study has shown nature based outdoor learning provided by enabling adults has links to children showing an early interest in science, technology and mathematics. This runs in the veins of theorist Piaget (1951) who suggests children actively construct knowledge through hands on experiences, he states that outdoor environments are ideal for this because they offer rich, open ended, sensory and social experiences that can stimulate the children. White (2011) would agree and adds children need practitioners who value the outdoors and points out that the role of the enabling adult is to create meaningful, safe and enriching experiences for children in natural environments supporting development. This view is supported by theorist Friedrich Froebel, cited in Tovey (2024) who believed that practitioners should share the joy and delight in learning outdoors with the children and suggests practitioners must nurture and support children initiating open ended play whilst allowing nature to become the educator. He described the role of the adult as being an observer that supports the holistic development of children and suggests practitioners must respect the individuality of children giving scope to child led learning. Reggio Emilia approach echoes this and states the outdoors should be seen as the third teacher that can provide the children with rich sensory experiences and discovery (Rinaldi, 2021). This is underpinned in the Welsh Curriculum for Wales

(2022) that states practitioners must encourage children's natural curiosity by using teachable moments that happen naturally when children play.

The Curriculum for Wales (2022) states children should be encouraged to take natural risks to support confidence and that practitioners must offer hands on practical experiences in the outdoors encouraging them to use mathematics and science. However, according to research by Waters and Rekers (2019) children's play in the outdoors can be negatively shaped by the practitioner and suggest that such attitudes towards play will impact and limit the children's play experience. An example of this could be that the practitioner may fear risk and will therefore discourage play hindering development and enjoyment. In the same vein, Gill (2021) states a that a mindset solely focussed on safety will not provide children with any challenge or risk. Biton (2020) would agree, and states practitioners can become the barrier to play and suggests that negative attitudes towards play in the outdoors can influence children's perceptions of play, causing them to see play as unimportant or less valuable.

According to Gill (2021) children have a natural thirst for adventure and challenge and need some level of risk to thrive, he suggests children need to experience freedom and take responsibility of their own safety in outdoor environments. This freedom to explore and learn from challenge and risk runs in the veins of Lev Vygotsky, cited in Kellogg (2018). Vygotsky's theory of the zone of proximal development represents the gap between what a learner can do independently and what they can achieve with guidance and support. He believed that effective learning occurs in this zone and suggests tasks should pose an optimal level of challenge just beyond the learner's current capabilities to encourage growth. Furthermore, he believed that educators play a crucial role by providing support to help children navigate challenges until they can complete the task alone.

According to Nicholson (1971) and his theory, children are naturally drawn to variables or loose parts and describes loose parts as materials, shapes, smells that can include electricity and gravity. He claims that when children are given access to diverse, movable and manipulable materials such as stones, sticks, fabric, and recycled items they engage more deeply and suggests more traditional environments can often limit this creativity by being too fixed or structured. Along the

same lines and showing similarities in the importance of exploration and creativity is theorist Gibson (1979) whose affordance theory states that all objects are opportunities for action and suggests children adopt this theory naturally through interaction and exploration in the environment. This view is supported by Campbell and Speldewinde (2020) who state all environments offer affordances and have properties that create opportunity to be used as the perceiver wishes. Trina and Monsur (2024) would agree and suggest that affordances are key concepts to understanding mathematics and science in the outdoors and state an environment that can offer a diverse range of affordances for discovery and exploration can enhance children's learning.

Nicholson's (1971) loose parts theory set the foundations for loose parts in the early years and is still relevant today. According to Gull and Bogunovich (2019) loose parts are open ended play materials that can be natural or manufactured and offer limitless possibilities, the authors state loose parts can develop creativity, collaborative skills and imagination. In the same vein, White (2013) suggests loose parts have excellent play value and can stimulate all the senses including movement and action to support mathematics and science. She does however point out that more traditional materials such as sand and water can be limiting and prompts practitioners to look beyond the classroom for a more hands on experimental approach. This approach runs in the veins of theorist Montessori and her hands on child led approach to learning through play using loose parts to offer open ended play with materials such as stones, shells, wooden blocks or recycled items. She believed that children could be offered endless possibilities for imaginative and creative play by offering loose parts and the freedom to explore and create supporting children holistically (Issac, 2018). This approach is underpinned by the Welsh Government (2022) and the curriculum for Wales that shares its child centred pedagogy that states the importance of play in the outdoors. The curriculum suggests children should engage with the natural world where they can be offered real life experiences with natural loose parts that offer open ended play and authentic experience for mathematical exploration. This approach runs in the veins of the Curriculum for Wales (2020) that aims to support children with mathematics and science in the early years, the curriculum suggests that children exploring with loose parts can support elements of mathematics such as geometry, and states

children can manipulate, compare and count these found objects. Furthermore, science progression steps can be met by allowing children to use the objects, looking at forces and energy and how we roll objects down a hill or push them up. The Welsh Government (2022) and the curriculum for Wales suggest practitioners can use these natural teachable moments to spark and observe the children's curiosity in mathematics and science in the outdoors.

Nutbrown and Credo (2014) highlight the importance of recognising schemas as vital patterns in children's thinking and behaviour and suggests that by observing children, practitioners can support the repeated behaviours by planning more meaningful learning experiences. Similarly, Athey (2007) suggests that children display repeated patterns of behaviour and suggests that these patterns reflect deep level thinking and learning that can help children organise and make sense of their experiences. This view is supported by the Welsh Government (2022) suggest that that by observing children in schemas practitioners can gain an understanding of how to support and extend learning and state repetitive patterns can help deepen understanding for children. Moreover, they point out schemas can lay the foundations for mathematics and science in the early years and suggest this is because they provide the children with opportunities to problem solve. Vygotsky, cited in Kellogg (2018) and his concept of the zone of proximal development aligns closely with the idea of supporting and extending children's schemas by providing scaffolding, encouraging deeper learning through interaction, language and shared experiences.

In conclusion, adults play a vital role in supporting young children's mathematical and scientific development in the outdoors by creating opportunities for meaningful hands-on exploration. Through well planned enabling environments that spark curiosity and open-ended play children can apply mathematics and science to real life contexts. Finally, by acting as facilitators practitioners can empower children to learn from their own experiences of the world and nurture the children's confidence, independence and cognitive development.

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