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Portfolio

Awe and Wonder- Science, Mathematics and the Outdoors.

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I can confirm that artificial intelligence has been used in this assignment for grammatical and syntactical purposes.

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Part 1 – Photograph



Part 2 – Discussion

An Autumn Adventure

The autumn air was thick with a scent of damp soil and fallen autumn leaves as children ventured in pairs to the outdoor area. Each child was wearing bright, vibrant wellington boots and marched eagerly whilst singing. With every step they took, the rain-soaked ground seemed to invite them to jump and feel the satisfying splat of muddy water against their boots. They did not hold back; each puddle was an opportunity. The children took turns, and it soon became a competition of who could make the biggest splash. As they neared the outdoor area, their giggles grew louder as though they could no longer contain their excitement to explore the mud kitchen and sand pit in front of them. The children made observations about the size and depth of the different puddles, noting that some were small but deep, while others were large and shallow. They also recognised that the deeper puddles created bigger splashes. One last large puddle lay just before the entrance, a shimmering pool that seemed to stretch across the width of the path. Without a moment's hesitation, a countdown from three to one and the children charged forward with their arms stretched and faces lifted in pure delight. The splash was a magnificent roar of water and laughter, their boots leaving deep temporary impressions in the soft ground as they finally enter the outdoor learning area, wet, muddy and beaming with satisfaction.

Most children darted to the corner where a little mud kitchen sat waiting, a place where adventure and creativity was about to come alive. The ground was soft and squishy beneath the child's feet as they approached, their hands eager to begin. The kitchen was made of all sorts of objects, an old wooden table with a few dents, a large bucket of muddy water, some old pots and pans and even a shiny spoon ready to be used. With a big smile, the children rolled up their sleeves, ready to make something special. A puddle of squishy, brown soil was their main ingredient, they scooped it up with a small shovel and watched as it slid off the edge and plopped back into the pile. The mud felt cool and slippery in their hands, like soft chocolate cake batter. They mixed and stirred, pretending to follow an ancient recipe. "Just a pinch of this", they whispered whilst adding some twigs and rocks. "And some leaves", exclaimed one child. The leaves crunched as they broke them into pieces and dropped them

into the bowl. A few more scoops of water and the mud become a perfect, thick paste. Next, the children placed some old, dented pots on the counter and began filling each one with the mixture. Counting each pot until they reached number six and ensuring to measure each one carefully. "This one is only half full", declares one of the children. Another comes to the rescue with more delicious, thick mud to fill up the pot. "Now they are all full", asserted another child. Each pot was a different colour, making the muddy mix look even more magical. The children encouraged the rest of their friends to gather around to enjoy the appearance and smell of their delicious recipe. At this point, the sun decided to make an appearance and peek between a fluffy cloud, casting a warm, golden glow over the outdoor area.

At the other end stood an inviting square sand box where children were gathered. The sandpit had taken on a slightly different character from the rain. What was usually a bright golden oasis of play had transformed into a darker, more textured landscape. The fine sand, soaked by the downpour, had turned into a soft, wet paste that clung to the children's hands like dough. Some of them built walls and bridges, their small fingers working with intention and concentration, admiring how the builds stood strong and tall. While others simply let the wet sand squish between their palms, commenting on how the rain had changed the consistency. Two children managed to discover a patch of sand that had been sheltered by the walls of the box, fine, light and still golden in colour. The children admired the feeling of the silky, loose sand as it slid easily through their fingers. The children quickly understood that this patch of sand was useless for building, every time they tried to form a bridge, it simply crumbled apart. One of the children then discovered some shells and began to form a pretty pattern. The other child remembered some pinecones that they spotted on the way into the outdoor area and immediately went to collect them. They then added the pinecones into the mix and formed a pretty and impressive repeating pattern. Counting each shell and pinecone until they got to the number nineteen. One of the children shouted, "we just need one more, to make twenty". At this point one of their friends handed over a single shell, just what they needed to complete their masterpiece. The pattern formed an almost perfect swirl, consisting of different shells and pinecones.

The atmosphere was a perfect blend of freedom and wonder. A world where dirt was magic and the outdoors, no matter the weather, was an open invitation to adventure. All the

children were soaked from head to toe and covered in sand or mud, but the smiles on their faces showed pure satisfaction and contentment after a busy afternoon spent freely exploring the outdoors.

After observing the children exploring the outdoor area independently it is evident that outdoor learning has many benefits, including covering mathematic and science concepts. Not only is outdoor learning beneficial for various areas of education, but it also greatly supports children's physical and emotional development which was clear after this observation and a key element of the Curriculum for Wales. By providing children with opportunities to release energy, develop social skills, and engage in meaningful, hands-on experiences there was little to no need for any behaviour management. The open environment encouraged freedom of movement and exploration, which reduced restlessness and frustration often seen in indoor settings.

When considering the Curriculum for Wales and the key concepts within Science and Technology, as well as Mathematics and Numeracy, it is clear that even during independent exploration of the outdoor area, many core elements from each Area of Learning and Experience were naturally achieved. Whilst engaging in sand play, children naturally explored the concept of forces and energy by building walls, bridges, and other structures with damp sand and then taking great pleasure in knocking them down. Another child naturally engaged with the concept of states of matter by noticing and commenting on the difference in texture and appearance between dry and wet sand. This demonstrates early scientific thinking and links to the Science & Technology statement: 'Matter and the way it behaves defines our universe and shapes our lives. Numerous aspects of mathematics were naturally embedded in the children's time in the outdoor area, including counting, patternmaking, and measuring which are all key components of the Mathematics and Numeracy Area of Learning and Experience within the Curriculum for Wales. Some children took time to carefully measure out a recipe they created, using mathematical language such as 'half full' and 'full' to describe their measurements. This demonstrates early understanding of capacity and comparative language, as outlined in the Mathematics and Numeracy Area of Learning and Experience.

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Part 3- Risk and Benefit Assessment**RISK BENEFIT ASSESSMENT**

Location / Activity:	Maesteg Welfare Park – Outdoor learning space.	Date:	20/09/25
Assessor:	Megan Ronan	Review date:	20/09/26

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
Children engaging with nature through hands-on discovery of different plants, insects and other materials.	Children have the chance to explore and gain a better understanding of living things. Learning about different habitats and life cycles. Development of both gross and fine motor skills. Enhancement of a child's confidence, independence and resilience. Children learn to notice and care for living things, developing kindness and respect for the world around them.	Stings, bites, allergic reaction. Skin irritation, allergic response to plants or insects. Low level branches may cause an eye or head injury, scratches or infections.	Children and staff.	Set boundaries prior to the activity, so the children are aware of things to avoid or be careful with (nettles, low branches, areas that are off bounds etc). Express the importance of not putting anything in their mouth prior to the activity. This can be done through a game or story, so it is more engaging, and the children are more likely to understand and remember. Make children aware of where they can go without an adult and where they cannot go. Discuss the importance of not interacting with strangers.	L

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
Being outdoors in different weathers.	Children develop resilience and improve their adaption to alternate weathers. Deepens the child's connection to nature. Splashing in puddles, feeling the sun, catching snowflakes. Becoming aware of different temperatures and textures.	Cold temperatures could result in the child developing a cold or hypothermia in severe cases. Sun exposure could result in sunburn or heat exhaustion. If the children get wet from rain it may result in them being uncomfortable, distressed or develop a cold. High winds may cause branches or trees to fall. This may result in minor head injuries, life changing injuries or death in extreme cases.	Children and staff.	Monitor weather conditions prior to and during the activity. Leave if weather becomes extreme and dangerous. Ensure appropriate footwear and clothing is worn. Hats and suncream in warm temperatures. Waterproofs, layers and wellingtons in cold and wet conditions.	L

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 on uneven surfaces.	Children develop balance and coordination walking on uneven natural surfaces. Navigating uneven grounds supports physical development and spatial awareness. Walking on uneven surfaces helps build strength, confidence and gross motor skills. Children will become more aware of their own bodies.	There is a risk that children may slip, potentially resulting in minor injuries such as cuts, grazes, bruises, sprains or a major injury such as a breakage.	Children and staff.	Warn the children of the uneven ground prior to the activity. Encourage them to walk slowly and carefully until they are used to the environment. Ensure appropriate footwear and clothing is worn. Have a clear plan in case of accidents or emergencies. Include First Aid procedures, contact information for parents and the nearest medical facility. Keep a First Aid Kit nearby that is stocked with materials to address minor cuts, scrapes or other common injuries. Ensure that those supervising the children are trained in basic first aid.	M
Children exploring the area independently.	Exploring this area independently will improve a child's problem-solving skills. The child can identify potential hazards and work out how to avoid them. Early math and science concepts: Measuring, pouring, cause and effect etc. Sensory exploration: different textures, smells and temperatures. Social interaction with peers about new discoveries.	Children may wander off. Children may overestimate their abilities resulting in an injury. Overexcitement may result in conflict.	Children.	Ensure there is the correct ratio of staff to children. Assign staff to different areas to ensure the whole area is covered and supervised at all times. Identify what tasks children can safely complete independently and which tasks may require adult assistance. Outline clear boundaries for what children are allowed to do on their own versus when supervision is required. Ensure that children know when and how to ask for help if they feel uncomfortable or encounter a problem. Ensure that all equipment present is safe, sturdy and fit for use by children.	L

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
Exploring and playing with different materials (water, soil, sand etc).	Improves language skills and vocabulary. Use of adjectives to describe the material they are using. Enhances fine motor skills and hand-eye coordination- scooping, stirring, pouring and the use of tools or utensils. Encourages social skills and emotional development. Risk-taking and resilience involved when dealing with mess or unexpected outcomes.	Contaminated water or soil may cause exposure to harmful substances or bacteria. Dirty hands or ingestion of soil/water may cause illnesses. Use of tools and utensils may result in cuts, pokes or splinters.	Children.	Children should wash their hands after using the mud kitchen, especially before eating or touching their face. A handwashing station or wet wipes should be available for this purpose. Ensure that the soil or water used is free of any contaminants. Inspect the area for any possible signs of infections such as Mold, fungi etc. Ensure that the tools and utensils used are safe and age appropriate. No small parts or sharp edges that could cause injuries.	L

Part 4- Academic Writing

To begin, it is essential to explore the significance of outdoor learning and the ways in which science and mathematics can be effectively integrated into these settings. Jucker (2022) states that there is mounting evidence that indicates that practical learning outside the classroom contributes to unlocking the full potential of learners. Trina *et al.* (2024) suggests that this may be because outdoor play and learning offers greater independence and provides children with the opportunity to explore, experiment and engage in self-directed activities. It also provides a more flexible environment, giving children greater freedom to take risks, explore solutions, and follow their individual interests. Jucker (2022) highlights that exposure to nature and opportunities for free play contribute to a greater sense of calm in children, enhancing their concentration, reducing stress levels, and increasing overall engagement. Furthermore, this approach has been linked to improved retention of subject content, higher academic performance, enhanced leadership and communication skills, and greater resilience. Trina *et al.* (2024) highlight that outdoor learning offers additional benefits beyond those of indoor settings, particularly noting that the early years provide an ideal window for informal, hands-on learning through active engagement with the environment. Jucker (2022) emphasises that learning in natural environments helps children develop a deeper understanding of the world around them while fostering a stronger connection to nature. Supporting this view, Trina *et al.* (2024) note that children actively explore their surroundings to make sense of their experiences, constructing their own theories through everyday interactions with the environment. Froebel Trust (2023) highlights that Froebel viewed play as an essential aspect of human nature. He believed that play was a vital means through which children learn, grow, and develop understanding. For Froebel, play offered a powerful space where children could form meaningful connections, explore their thoughts and feelings, and interpret the world around them. Supporting Froebel's theory, Trina *et al.* (2024) therefore acknowledged that outdoor learning plays a significant role in supporting children's overall development.

Trina *et al.* (2024) highlight the significant role of teachers and care providers in relation to outdoor learning experiences. Emphasising that education is not just passing on knowledge but enabling children to construct their own understanding through exploration and

interaction with their surroundings. Trina et al. (2024) encourage that teachers should view nature as a learning tool and not something distant or separate from everyday life. Teachers or care providers should observe closely whilst recognising what engages the child and any concepts they are exploring. Teachers should also interpret the child's inquiries and help them express and build on any ideas they may have. Guiding sensory engagement should be a further tool used by teachers, by encouraging the child to observe, touch, listen and ask question based on the environment. Lastly, to understand and utilise local natural resources and avoid misconception that meaningful nature experiences require special or specific environments. Implying that teachers or caregivers can provide simple outdoor learning environments and it will still be beneficial. Trina et al. (2024) convey that teachers act as moderators in the relationship between the child and the environment. Their attitudes, knowledge and creativity are key to successfully integrate nature into early STEAM learning, which stands for science, technology, engineering, art and mathematics. Portraying that how a teacher views outdoor learning can have an influence on the children they teach. Campbell and Speldewinde (2020) suggest that educators should observe and adapt their roles to support learning in flexible ways as the children explore independently outdoors. Nest in the Woods (2013) reflects on the differences between Piaget's and Vygotsky's theories. Piaget focuses on children's internal cognitive processes and how they develop through self-initiated experiences and schema-building. Vygotsky, in contrast, emphasises the role of social interaction and guidance from an informed adult. Nest in the Woods (2013) discuss that educational leaders can integrate both theories into their practise by offering diverse experiences for independent exploration, which covers Piaget's Theory. While supporting learning through interaction with adults and peers, which considers Vygotsky's theory. Recognising children's schemas and peer expertise is seen as key to effective facilitation.

Trina *et al.* (2024) proposes that hands-on experiences are essential for meaningful learning and that traditional methods such as textbooks or demonstrations cannot be a substitute. It is stated by Trina *et al.* (2024) that without a literal experience children learn facts but only develop a limited and rigid view of science, potentially losing confidence and viewing science as inaccessible rather than something they can engage with and understand. It is further explained by Trina *et al.* (2024) that hands-on exploration fosters essential scientific skills such as inquiry, discussion, reflection and theory building. Engaging with the natural world is

a fundamental part of childhood, making it an ideal context for science learning. Children's inquiries into nature not only lay the foundations for science education but also supports literacy, mathematics, collaboration and lifelong learning skills underlines (Trina *et al.* 2024). Campbell and Speldewinde (2020) portray that outdoor education, such as Bush Kindergartens, allow children to engage in exploratory, child-led play with natural materials supporting inclusive, meaningful, and science-rich learning experiences, shaped by the physical setting, educator involvement, and social dynamics within the group. It is added that children are seen as active participants in constructing knowledge through everyday experiences which form a foundation for scientific understanding. This process involves inquiry-based activities where children use their senses to explore, question, and observe the world. Through such play-based learning, they begin to build early scientific concepts by investigating, discussing, and reflecting on changes and properties in their environment. Suggesting that an outdoor environment enhances children's understanding of scientific concepts by offering direct, hands-on experiences, allowing them to explore and engage with the natural world rather than passively observing through books or screens.

Taranto *et al.* (2021) supports the use of outdoor mathematics by emphasising how it broadens learning opportunities beyond the limits of the conventional classroom setting by using real-world experiences and reflection. This approach, also described as out-of-class experiences or embodied learning, helps students understand mathematical concepts by engaging with physical objects or situations. Similarly, Blane and Clark (1984) express that people rarely think about mathematics present in everyday surroundings and outdoor mathematic activities provide direct, real-world experiences that connect learners with mathematics embedded in the environment around them. They highlight the importance of bodily engagement in outdoor learning and how interacting physically with the environment changes our perception and understanding of mathematical problems. The analysis focuses on how students use bodily movements and social interaction to make sense of mathematical tasks, demonstrating that outdoor settings provide unique, dynamic learning experiences that bridge theoretical math and real-world applications. This demonstrates that engaging in mathematics outdoors enhances children's understanding by allowing them to interact with real-world objects and contexts to support their learning.

Welsh Government (2023) state that outdoor learning gained importance during the Covid-19 pandemic, significantly supporting the health and wellbeing of children and young people. In Wales, this approach aligns with the new Curriculum for Wales, implemented in the 2022–23 academic year, which promotes outdoor learning as a key pedagogical method. It supports not only academic development, but also the holistic wellbeing of both students and teachers. In Wales, outdoor learning is a core part of early years education, especially in non-maintained nursery settings. The Welsh Government (2022) highlights outdoor play and exploration as essential for holistic development, fostering curiosity, awe, and a sense of belonging. It is further discussed that outdoor learning enhances performance in core subjects such as Mathematics, Science, Reading and Social Studies. Depicting that The Welsh Government and The New Curriculum for Wales recognises the importance of outdoor learning, especially in the early years, because of its influence on key concepts such as Mathematics, Science and reading.

Play Scotland (2019) express that loose parts are open-ended materials that, when offered to children, can be transformed into anything their imagination desires. These resources encourage creativity, exploration, and experimentation, as they can be used in limitless ways without predefined outcomes. With no instructions or fixed purpose, loose parts invite children to make their own decisions about how to engage with them. They promote sensory-rich play experiences, foster curiosity, and support the development of imagination, problem-solving, and fine motor skills. Muddy Faces (2025) explain that free play involving casual resources, otherwise known as loose parts, can influence a child's holistic development. Play Scotland (2019) stress that loose parts play can begin at home and extend out into outdoor environments. Playing outdoors provides greater opportunities for engaging with larger loose part items such as tyres, planks, crates, and guttering. These items can be freely moved, combined, deconstructed, and rebuilt, encouraging active, imaginative play. This type of physical interaction supports children's physical development, as they lift, carry, construct, and manipulate materials in creative and purposeful ways. Loose parts can also be discovered in many natural environments such as beaches, parks, woodland areas and gardens. Most of these materials are free and readily available such as driftwood, sticks, twigs, stones, shells and pebbles. These smaller loose parts items can be

used for early counting, sorting, matching and identifying patterns which will encourage children to cover mathematics concepts outdoors states (Play Scotland, 2019).

Maynard, Waters & Clement (2013) underline that findings revealed that natural outdoor spaces often enhanced children's engagement and reduced perceptions of underachievement. The outdoor space became a place where children could define themselves as capable and competent learners. The Foundation Phase promotes child-initiated and child-led play within structured environments, where adults may act as facilitators or guides, allowing children autonomy while still supporting learning through scaffolding or modelling. Whilst planned outcomes are present, the children are free to develop and build on their own ideas. Additional benefits to outdoor and child-led play include physical development, social development through cooperative play with loose parts, and emotional well-being due to the restorative effects of nature. A study revealed that children classed as underachieving performed better in child-led outdoor learning. The children presented increased concentration, engagement, and enjoyment along with improved social behaviour, such as cooperation and sharing, enhanced confidence and willingness to communicate. These improvements were seen especially in children with little emotional, social, and cognitive development (Maynard, Waters & Clement, 2013).

In conclusion, outdoor learning significantly contributes to children's holistic development, with notable advantages in deepening their understanding of mathematics and science. It is also clear that the role of educators and caregivers is pivotal in creating purposeful outdoor learning opportunities and embedding them effectively within educational practice.

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