



ECEY5005

AWE AND WONDER

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AI Statement:

I confirm that I have not used any AI tools in the research and creation of this assignment. I confirm that I have not presented any AI generated materials as my own work. I confirm I have copies of my drafts, notes, and other resources I used, which I may be asked to provide in evidence.



(ODC Education Network, 2023)

Awe and Wonder in the Outdoor Environment

Section 2 – Awe and Wonder in the Outdoor Environment

This reflection considers a group of eight children aged four to five years, accompanied by two practitioners at a 1:4 ratio, exploring an outdoor environment that features a sand pit, a log balance path, and a small bridge with tunnel. This area was chosen because it offers rich opportunities to spark awe and wonder while supporting children's early mathematical and scientific exploration. The environment itself is open and natural, with varied textures and surfaces that invite investigation and play. By focusing on three key elements, the sand pit, the logs, and the bridge with tunnel, it is possible to see how outdoor play can nurture both curiosity and skill development in ways that are closely aligned to the Curriculum for Wales.

Sand Pit

The sand pit immediately attracts children's attention. As they run towards it, some crouch down to let the grains run through their fingers, while others begin scooping sand into piles. Quickly, they notice differences between wet and dry sand, one slips easily away, while the other clumps together and holds its shape. This provides an entry point into the Science and Technology AoLE, (Welsh Government, 2020a) where progression steps encourage children to observe and compare materials in their everyday environment.

As play continues, children begin to fill buckets and turn them over, creating sandcastles. Here, their learning shifts naturally into mathematics. They notice differences in size and shapes, "Mine's bigger!" one child exclaims, while another cries "This one's round!" Through simple experimentation, they are comparing size, shape, and capacity, building early understanding of measurement and geometry from the Mathematics and Numeracy AoLE (Welsh Government, 2020b).

Practitioners can extend this play with subtle interventions. By providing buckets of different sizes, sieves, and jugs, they open new possibilities for exploration. Introducing

water into the sand pit further changes the material, offering a direct opportunity for children to investigate how dry sand runs freely while wet sand clumps together and holds its shape. This simple addition transforms the pit into a small-scale science experiment, encouraging children to test and compare what happens when they add “just a little” water versus “a lot.” Open-ended questions such as, “*Why does this one stay up while that one falls down?*” prompt children to notice cause and effect, linking their observations to early scientific enquiry. Even everyday items like sticks and leaves can enrich the play, when used as flags to decorate castles, they link to counting and one-to-one correspondence while also encouraging imaginative storytelling. The sand pit also encourages imaginative play. A child may decide a castle is a “fortress” or a “village,” prompting storytelling that connects with the Expressive Arts AoLE (Welsh Government, 2020c). In this way, sand becomes not only a scientific and mathematical material but also a canvas for creativity.

Log Balance Path

The log balance path offers a different kind of challenge, centered on physical movement and gross motor development. Children approach it with curiosity, stepping carefully from log to log, arms outstretched for balance. Many count aloud as they cross, “*One, two, three, four, five!*” blending bodily coordination with early number sequencing. This activity aligns to the Health and Well-being AoLE (Welsh Government, 2020d) which emphasises developing confidence, strength, and coordination, while also linking to the Mathematics and Numeracy AoLE (Welsh Government, 2020b) through counting and sequencing.

Social play naturally emerges here. Some children shout, “*The floor is lava!*” turning the logs into a game where collaboration and turn-taking are vital. They encourage each other to be brave, building resilience and trust. These elements connect to the holistic development valued within the Curriculum for Wales (Early Years Wales, 2020), showing how physical challenges also foster personal and social growth.

Adults play a key role in ensuring this play remains safe and purposeful. Close observation is needed, particularly when logs are damp or uneven. Practitioners can encourage children by offering a steady hand or prompting reflection with questions such as, *“Which log was the hardest to balance on?”* or *“What helps you stay steady?”* These small interventions encourage children to think about balance, stability, and risk in a reflective way.

There are also opportunities to add resources that deepen the mathematical learning. Numbered stepping stones, chalked measuring lines, or even placing objects at intervals could provide additional layers of challenge. However, the awe and wonder of the logs lies in their natural state, they are not manufactured equipment but living elements of the environment that encourage children to adapt, test, and persist.

Bridge and Tunnel

The bridge and tunnel offer both physical and imaginative possibilities. As children climb the steps of the bridge, they often count aloud, recognising the sequence of numbers as they ascend. Sliding down provides a direct encounter with the concept of forces, children feel gravity pulling them down, and some notice they slide faster when they tuck in their legs. This connects naturally to the Science and Technology AoLE, where progression includes noticing how things move and why.

At the same time, the bridge and tunnel spark storytelling. A child might crouch in the tunnel pretending to be a troll, calling out, *“Who’s on my bridge?”* Immediately, others join in the game, shrieking with delight as they rush across to escape. This links to the Expressive Arts AoLE (Welsh Government, 2020e) where role play and improvisation allow children to explore ideas and emotions. The combination of scientific discovery and imaginative play shows how outdoor environments offer a holistic approach to learning, where different areas of development naturally overlap and merge.

Practitioners can extend this play in several ways by adding balls or toy cars to roll down the slide. This allows children to test predictions about speed and friction.

Questions such as, “*Which one went faster?*” or “*Why did that one stop?*” promote curiosity and reasoning. Encouraging turn-taking and safe climbing practices also supports social and emotional development. The bridge and tunnel illustrate how one play space can support physical growth, scientific enquiry, and creative expression at the same time.

Reflection

On reflection, this outdoor space has become a learning environment that supports the six AoLEs, offering children active, authentic, and meaningful opportunities to engage with the world around them (Welsh Government, 2020). The Curriculum for Wales, with its significant shift away from traditional classroom-based instruction, gives young children the chance to learn through discovery, play, and lived experience. Within this space, awe and wonder emerge naturally as children test ideas, explore materials, and engage in imaginative play that is meaningful to them.

The three areas discussed invite curiosity and hands-on exploration, as children investigate materials, forces, measurement, and balance through play they initiate themselves. Practitioners can extend learning by observing carefully, providing resources, and asking open-ended questions at the right moments without interrupting play. Adding loose parts such as buckets, jugs, sticks, or natural objects further enriches play, encouraging experimentation and problem-solving. This reflects Froebel’s principle of natural materials as “gifts,” supporting holistic development (Tovey, 2020). At the same time, the concept of scaffolding, drawn from Vygotsky’s theory of the Zone of Proximal Development, reminds us that adults play a crucial role in helping children move from what they can do alone to what they can achieve with support (Vygotskij and Cole, 1981). More recently, Fler, (2021) builds on this by showing how imaginative, conceptual play frameworks create spaces where curiosity and wellbeing are nurtured. By bringing these perspectives together, practitioners can see how sensitive intervention transforms spontaneous exploration into deeper mathematical and scientific understanding.

However, the environment also raises issues of inclusivity and safety. Logs may be slippery in wet weather, or the tunnel less accessible for some children. Adaptations such as raised sand trays or alternative balancing activities can help ensure awe and wonder are accessible to all.

Overall, this outdoor environment supports scientific and mathematical concepts to develop in ways that are natural, playful, and curriculum-aligned. By following children's lead and scaffolding thoughtfully, practitioners turn every discovery, from noticing wet sand clumping together to counting steps across the logs into an opportunity for meaningful learning.

RISK BENEFIT ASSESSMENT

Location / Activity:	Outdoor environment (Sand pit, log balance path, tunnel and bridge)	Date:	12 th September 2025
Assessor:	Nicola Carr	Review date:	12 th April 2026

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 the sand pit	The sand pit supports sensory exploration and scientific investigation as children compare wet and dry textures and explore cause and effect. It links directly to the <i>Science & Technology AoLE</i> ,	Hazards: Sand entering eyes or mouth, unclean sand, or tripping hazards from scattered equipment. Risks:	Children and Practitioners.	Logs checked weekly for stability and decay. Ground surface inspected for unevenness. Children wear closed, secure footwear with	L

	where children observe materials and physical changes, and to <i>Mathematics & Numeracy</i> as they experiment with capacity, volume, and shape using buckets, sieves, and jugs. Fine and gross motor skills are developed through digging, pouring, and moulding, while collaboration encourages social communication and negotiation skills.	Sand in eyes may cause irritation or minor injury; sand in mouth may cause upset stomach if ingested; unclean sand could lead to infection. Children may slip or trip while running or moving around equipment.		good grip. Practitioners positioned close by to offer support and ensure safe turn-taking. Logs not used in wet or icy weather. Clear safety talk before activity. Emotional reassurance given to help children overcome small challenges safely, building confidence.	
Balancing on logs	Encourages gross motor development, balance, coordination,	Wet or uneven logs	Children	Logs checked weekly for stability and	M

	and strength. Links to the <i>Health and Well-being AoLE</i>, supporting physical confidence, resilience, and perseverance. Mathematical learning occurs naturally as children count logs, measure distances, and estimate steps. This play also promotes teamwork and problem-solving as children support peers and plan routes together, building social competence and collaboration skills.	Risks: Slips, trips, falls causing bruises, sprains or cuts		decay. Ground surface inspected for unevenness. Children wear closed, secure footwear with good grip. Practitioners positioned close by to offer support and ensure safe turn-taking. Logs not used in wet or icy weather. Clear safety talk before activity. Emotional reassurance given to help children overcome small	
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				challenges safely, building confidence.	
Tunnel and bridge play (climbing, sliding, role play)	Combines physical challenge with imaginative play and problem-solving. Supports <i>Expressive Arts</i> (storytelling, creativity) and <i>Science & Technology AoLE</i> (forces, gravity, movement). Encourages turn-taking, cooperation, and exploration of motion and speed. Provides a safe way for children to test strength and coordination, while developing understanding of	Hazards: Slippery steps/slide, bumping heads in tunnel, collisions during group play. Risks: Minor bumps, falls, collisions, sprains	Children	Soft landing surface (sand or rubber) installed. One-at-a-time rule for bridge and slide. Tunnel checked for debris and clear airflow. Practitioner stationed nearby for supervision. Turn-taking encouraged through discussion. Regular inspection of fixtures. Play	M

	physical forces through first-hand experience.			paused in unsafe weather. Opportunity for children to talk about how their bodies feel during play to build awareness of physical safety.	
Collecting natural loose materials twigs, leaves, stones	Encourages open-ended exploration, supporting <i>Mathematics & Numeracy</i> through sorting, classifying, comparing size and quantity, and exploring weight. Links to <i>Science & Technology</i> through observation of textures, natural materials, and seasonal change.	Hazards: Sharp twigs, unsafe items (glass, rubbish) Risks: Splinters, cuts, contamination if unsafe items handled	Children	Practitioners inspect area before activity to remove hazards. Children taught to identify safe natural objects. Clear rule of “look, not taste.” Handwashing before and after play. Practitioners model safe	L

	Promotes fine motor control, curiosity, and appreciation for nature. Encourages sustainable thinking through reuse and respect for natural resources.			collecting and sharing. First aid kit available for minor injuries.	
General outdoor play weather conditions.	Promotes resilience, awareness of weather, and descriptive vocabulary ("hot, cold, wet, dry"). Supports the <i>Health and Well-being AoLE</i> by encouraging independence, comfort management, and understanding self-care. Builds real-world understanding of environmental change and adaptation.	Hazards: Extreme heat/cold, wet or windy weather Risks: Sunburn, heatstroke, hypothermia, falling branches	Children and Practitioners	Monitor daily forecast. Play suspended in high winds (>30mph). Provide shaded rest areas and hydration in hot weather. Ensure sun hats and sunscreen used. Waterproof clothing and layers available in colder weather.	L

				Encourage children to talk about how they feel (hot, tired, cold) to develop self-awareness.	
Emergency provision (general)	Reinforces safety culture and ensures rapid response to incidents. Builds trust between practitioners and families, promoting wellbeing and confidence. Helps children feel secure knowing adults can help in emergencies.	Hazards: Lack of first aid equipment, no mobile contact, or delayed emergency response. Risks: Worsening injury or anxiety if incident not handled swiftly. Communication failure could delay support	Children and practitioners	Fully stocked first aid kit on site and checked regularly. At least one first aid-trained practitioner always present. Mobile phone charged and accessible. Emergency contacts displayed clearly. Practitioners familiar with local	L

				emergency procedures. Debrief after incidents to support emotional recovery.	
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Part 4: **How adults support early years engagement with mathematics and science outdoors**

The Curriculum for Wales places play and discovery at the heart of learning, moving away from traditional classroom-based methods towards experiences that are active, authentic, and meaningful for children's development (Welsh Government, 2020a). This experiential approach ensures that engagement with science and mathematics is not limited to abstract tasks but instead emerges through meaningful, hands-on experiences that can strengthen children's understanding and improve academic outcomes (Ranken *et al.*, 2023). Outdoor play, for example, allows children to encounter concepts such as capacity, weight, force, gravity, and balance through direct interaction with natural materials (Ranken *et al.*, 2023).

Kiviranta *et al.* (2024) emphasise that outdoor environments support both wellbeing and cognitive development, as children manipulate loose parts, compare sizes, measure volumes, and test cause-and-effect relationships. Similarly, Bento and Dias (2017) highlight that natural outdoor spaces promote resilience and problem-solving while also supporting physical health. These benefits reflect Froebel's long-standing principle that natural play resources are "gifts" that nurture self-expression, exploration, and conceptual growth (Tovey, 2020). When children fill buckets with sand or balance on logs, they are not only engaging their bodies but also experimenting with measurement, stability, and spatial reasoning. The Curriculum for Wales encourages such play-based exploration by embedding mathematical and scientific concepts within everyday activities, making learning natural, integrated, and child-led (Welsh Government, 2020a).

While outdoor environments provide affordances for exploration, opportunities for deep mathematical and scientific learning rarely unfold without adult mediation. Vygotsky's (1978) theory of the Zone of Proximal Development (ZPD) (Saul McLeod, 2024), demonstrates that children learn most effectively when adults scaffold their play, providing sensitive interventions that move them from what they can do alone to what they can achieve with support. For example, a practitioner who asks, 'Which bucket

holds more sand?’ or ‘Why do you think that log wobbles when you stand on it?’ introduces metacognitive prompts that help children connect sensory experiences with conceptual understanding. Research shows that adaptive prompts and modeling in scaffolding significantly improve young children’s ability to reason with evidence in scientific tasks (Hardy, Stephan-Gramberg and Jurecka, 2021).

Fleer (2021) extends this thinking through her theory of conceptual play, arguing that adults can embed scientific and mathematical ideas into play scenarios in ways that feel authentic to children’s narratives. For instance, when children pretend the sandpit is a construction site, practitioners might add tools for weighing or pipes for pouring water, asking them to predict which will flow faster or carry more. This not only sustains the children’s imaginative play but also supports mathematical reasoning about measurement and scientific enquiry into forces Fleer (2021).

At the same time, adults must balance guidance with child-led exploration. (Merrick, 2022) argues that professional development enables practitioners to use strategies such as sustained shared thinking (SST) to extend children’s reasoning, while Stephen (2010) warns against over-intervention, which risks undermining curiosity and self-motivation. Reflective practice is therefore crucial, knowing when to observe silently, when to scaffold, and when to step back is central to ensuring that awe and wonder are not lost to adult agendas (Donaldson, 2015).

A key strategy adults can employ outdoors is the use of loose parts. Nicholson’s (1972) theory, developed further by (Daly and Beloglovsky, 2015) demonstrates that open-ended, movable materials encourage children to test ideas, hypothesise, and experiment in ways that fixed play equipment does not. Gibson, Cornell and Gill’s (2017) systematic review of loose parts play shows that children use them to explore weight, balance, size, and motion, directly engaging with mathematical and scientific concepts. For example, providing buckets, pipes, stones, and planks enables children to explore capacity and flow, leading to experiments in estimation and volume. Adults can scaffold this by asking, “Which one do you think will fill quicker?” or by introducing measuring jugs to bridge experiential play with symbolic mathematical representation

(Education Endowment Foundation, 2020). In this way, children's spontaneous play is enhanced without being taken over, and the practitioner supports the natural development of numeracy and problem-solving skills (Education Endowment Foundation, 2020).

Outdoor environments offer rich opportunities for embodied mathematics and scientific discovery, where children learn through movement, experimentation, and interaction with their surroundings. As discussed by Uttal *et al.* (2013), spatial reasoning developed through physical exploration is strongly associated with later success in Science, Technology, Engineering, and Mathematics (STEM) learning. When children balance on logs, roll objects down slopes, or build structures, they are not only strengthening gross motor coordination but also developing mathematical reasoning about distance, weight, and stability. This experiential learning aligns with the Curriculum for Wales (Welsh Government, 2020a), which promotes active, authentic engagement rather than abstract instruction.

Building on this, Bento and Dias (2017) highlight how open-ended outdoor play encourages curiosity and resilience as children navigate obstacles and solve problems collaboratively. However, as Pruden, Levine and Huttenlocher (2011) note, children rarely use spatial or comparative language spontaneously. Here, the practitioner's role becomes crucial. Through modelling and subtle questioning, introducing words such as *over*, *under*, *between*, and *next to*, adults extend children's awareness of spatial relationships and measurement. This kind of language-rich interaction transforms physical movement into conceptual understanding, bridging embodied experience with mathematical thought (Verdine *et al.*, 2017).

Fleer (2021) argues that these adult interventions form part of "conceptual play," where teachers integrate scientific and mathematical ideas within imaginative, child-led exploration. A simple question such as "*I wonder how many steps it takes to reach the bridge?*" invites children to estimate, count, and reflect, moving their thinking from the concrete to the abstract. This approach embodies Vygotsky's (1978) principle of the Zone of Proximal Development, where skilled adult scaffolding enables children to

extend what they can do alone. At the same time, it resonates with Froebel's philosophy of the adult as a co-explorer who nurtures curiosity and awe rather than directing it (Tovey, 2020).

Through synthesising these perspectives, practitioners act as facilitators of discovery, balancing freedom and guidance, imagination and enquiry. Outdoor play therefore, becomes a dynamic site for both mathematical and scientific reasoning, where awe and wonder are sparked not by instruction, but through sensitive adult interaction that connects movement, thought, and meaning.

Science learning also emerges naturally outdoors through children's curiosity about materials, forces, and living things. Pouring water down slopes (flow/force) and testing ramps with balls (speed/stability) are both powerful entry points for early science; adults can nudge thinking with prompts like "What changed when you made the slope steeper?" linking hands-on enquiry to the Science & Technology AoLE, while drawing on evidence that engineering-style play with ramps/blocks fosters early STEM and spatial math skills (Welsh Government, 2020b; Welsh Government, 2022; Gold & Elicker, 2020).

Adults can support this enquiry by modelling scientific language, asking open-ended questions ("Why do you think the small ball went further?"), and encouraging prediction and reflection. Fler (2021) suggests that embedding scientific concepts into play frameworks, rather than presenting them in isolation, helps children connect their imaginative worlds to formal scientific reasoning. This reflects the Curriculum for Wales' emphasis on enquiry-led approaches in the Science and Technology AoLE, where learners are expected to ask questions, predict, and test ideas (Welsh Government, 2020b).

One of the most debated aspects of outdoor learning continues to be the question of risk and safety. Bento and Dias (2017) caution that excessive fear of accidents can restrict children's opportunities to explore freely, yet avoiding risk may in fact hinder their ability to assess and manage hazards independently. More recent research

supports this view, showing that risk-taking within safe boundaries strengthens children's executive functioning, self-regulation, and problem-solving abilities (Sandseter, Kleppe and Sando, 2021; Little, 2022).

In outdoor mathematics and science learning, risk forms an essential part of the enquiry process, allowing children to test, predict, and refine their understanding through real experiences. When children balance on logs or jump from small heights, they are experimenting with stability, weight, and friction; when they climb or slide, they are testing ideas about gravity, force, and speed. Practitioners who use dynamic risk-benefit assessment (Play Wales, 2023) can maintain safety while preserving these valuable moments of experimentation. This reflective approach aligns with current policy guidance that encourages practitioners to manage rather than eliminate risk, recognising its value for developing resilience, independence, and scientific thinking about cause and effect (Brussoni *et al.*, 2012; Welsh Government, 2022). In this way, outdoor play becomes a space where physical challenge and scientific curiosity work hand in hand, turning everyday experiences into opportunities for discovery.

Despite the growing body of evidence supporting outdoor learning, challenges remain in practice. Kiviranta *et al.* (2024) found that many practitioners still lack the confidence and competence to deliver outdoor STEM learning effectively, often due to limited training opportunities and the pressure to prioritise formal assessment outcomes. Stephen (2010) also critiques the tension between curriculum expectations and child-led exploration, cautioning that poorly timed adult interventions can undermine the spontaneity and authenticity of play. Inclusivity presents another significant consideration: children with limited mobility or sensory needs may find certain outdoor terrains inaccessible, reinforcing the importance of thoughtful, inclusive design (Nutbrown and Clough, 2013). Practitioners must therefore adapt environments, such as by using raised sand trays, accessible water play, or alternative balancing activities, so that all children can experience awe, wonder, and full participation in learning.

There is also an ongoing need for professional development. Siraj-Blatchford (2009) emphasises that practitioner competence in strategies such as sustained shared

thinking is crucial for extending children's enquiry and connecting play with deeper mathematical and scientific understanding. However, this level of pedagogical reflection requires time, mentorship, and structural support. Without these, outdoor play risks being undervalued and underused as a site for high-quality STEM learning in early childhood education.

On reflection, outdoor environments provide unparalleled opportunities for young children to engage with mathematical and scientific concepts through meaningful, hands-on experiences. Such environments allow learners to hypothesise, measure, compare, and observe natural phenomena in ways that indoor, abstract tasks cannot replicate. The role of the adult is central in transforming these experiences into learning by scaffolding sensitively, introducing mathematical and scientific language, modelling curiosity, and maintaining an effective balance between safety and challenge.

Practitioners also act as reflective researchers in their own right, continually observing, documenting, and evaluating how children interact with outdoor materials and peers. This reflective cycle enables them to adjust provision and questioning in response to emerging learning, embodying the co-researcher stance championed within Reggio Emilia approaches. By maintaining curiosity alongside children, adults demonstrate that scientific and mathematical thinking are not fixed skills but evolving processes of discovery. In doing so, they model the very habits of enquiry, observation, and reflection that the Curriculum for Wales seeks to nurture across all Areas of Learning and Experience

The Curriculum for Wales demonstrates that when outdoor, inquiry-led learning is placed at the heart of early education, children develop the curiosity, problem-solving, creativity, and resilience needed for lifelong learning. By following children's interests, scaffolding thoughtfully, and embedding awe and wonder within everyday experiences, practitioners transform outdoor environments into powerful spaces for mathematical and scientific discovery.

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