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Part 1

Part 2

last week a group of children from our early years setting went on a trip to the beach. The sun was shining, the sand was warm, and the children were excited to explore. The beach had a gentle slope, wet and dry sand, and lots of shells, pebbles, and driftwood scattered around. We thought this would be a great place to discover how things move and learn about forces like gravity and friction.

As soon as we arrived, the children ran to the sand slopes. One of the children picked up a small smooth pebble and placed it at the top of the slope. “Look! It’s rolling so fast!” she shouted. Another one tried a bigger flat stone and gave it a gentle push. “Mine stopped!” he said. The children watched closely and started asking questions:

“Why does mine go fast and yours stop?”

“Maybe because it’s heavy,”

The practitioner encouraged the children to test different ideas. Some chose tiny pebbles, some picked big stones, and some even tried shells and driftwood. They experimented by changing the slope of the sand and smoothing the path to see what would happen. They were learning about gravity without even realizing it—it was fun, and they were curious!

They added a few extra things to help the children explore: small ramps made from driftwood, buckets, spades, and some measuring tapes and stopwatches. This gave the children more ways to test their ideas. Some decided to build little ramps to see if their stones would go farther. Others dug channels in the sand to guide water or objects downhill.

One group made two parallel sand channels. They chose three stones of different sizes. “Which one will get to the bottom first?” asked one child. They made guesses and tested them. They timed each roll with the stopwatch. One stone rolled quickly and wobbled, another moved slowly, and the heaviest one stopped halfway. The children cheered, clapped, and laughed.

Some of them drew a simple diagram in the sand to show the paths of each stone. “This one is fast,” the others said, pointing to the pebble. “This one is slow, and this one stopped.” It was wonderful to see children using drawings to explain what they saw.

The practitioner asked questions to help them think deeper:

- What happens if we make the slope steeper?
- Why does this stone roll faster than that one?”
- Can you make it go all the way to the bottom?”

The children were full of ideas. Some dug sand to make smoother paths. Others built little walls to stop stones from falling off the side. Through all this, they discovered how gravity pulls objects downhill and how friction from the sand slows them down.

It wasn’t just about science. The children worked together, shared stones, and helped each other adjust ramps. They talked about their ideas and celebrated when something worked. someone said, “We made it go all the way!” and the group high-fived. They were learning teamwork and problem-solving while having fun.

Some children explored wet and dry sand. They noticed wet sand sticks together and dry sand falls apart. “The wet sand is like glue!” one of them said. “We can build here,” the other said. They used this knowledge to build sand ramps and even small walls to protect channels from collapsing.

Later, some children compared sizes. They laid down next to a big sand sculpture and measured with a tape measure. “The wing is longer than me!” one child said. They sorted pebbles into “big” and “small” piles and arranged them from smallest to largest. Some decorated sandcastles with symmetrical patterns. This was learning math through play—measuring, comparing, counting, and noticing patterns.

Throughout the day, the children were curious, asking questions, testing ideas, and learning through doing. Practitioners were there to observe, ask open questions, and offer small resources, but the children led their own learning. They explored,

discovered, and reflected on what happened when they changed something in their environment.

By the end of the trip, the children had learned a lot about forces. They saw how gravity pulls objects down slopes and how friction can slow them. They understood that the size, shape, and weight of objects can make a difference. And they learned to work together, share ideas, and try new solutions when things didn't go as planned.

The beach was more than just sand and water.it became a classroom where the children could touch, see, and experience how the world works. Through play, laughter, and experimentation, they explored forces naturally. What started as fun rolling stones and building ramps turned into real learning about science, math, and teamwork.

It was amazing to see curiosity in action, and it reminded us that children learn best when they can explore, experiment, and discover for themselves. The beach gave them space to wonder, test ideas, and enjoy learning in a hands-on way. Today was a perfect example of learning through play.

The beach trip provided rich, real-world experiences that align with the Curriculum for Wales, particularly within the Science and Technology and Mathematics and Numeracy Areas of Learning and Experience.

Science and Technology:

The children's exploration of materials and natural phenomena on the beach exemplified the principles of Science and Technology. This Areas of Learning and experience emphasizes the importance of learners developing curiosity and understanding through hands-on experiences. Activities such as observing how wet and dry sand behave differently, experimenting with rolling objects down slopes, and constructing sandcastles in response to tidal changes reflect the curriculum's focus on inquiry-based learning and problem-solving (Welsh Government, 2020).

These activities also fostered the development of scientific skills, including observation, prediction, testing, and evaluation, which are central to the Science and Technology. The curriculum encourages learners to engage with the world around them, ask questions, and seek answers through exploration and experimentation (Welsh Government, 2020).

Mathematics and Numeracy

Mathematical concepts were naturally integrated into the beach activities. Children compared sizes by measuring parts of the sand sculpture, sorted and ordered pebbles by size, and created symmetrical patterns, all of which are key aspects of Mathematics and Numeracy. The Areas of learning and experience stresses the importance of learners developing mathematical reasoning and applying it to real-world contexts (Welsh Government, 2020).

The activities also supported the development of numeracy skills, such as measurement, classification, and pattern recognition, which are essential components of Mathematics and Numeracy. By engaging in these activities, children were able to see the relevance of mathematics in everyday life and develop a deeper understanding of mathematical concepts (Welsh Government, 2020).

In conclusion, the beach environment itself acted as a teacher. Children engaged eagerly with movement, materials, and measurement through play. With gentle guidance from educators, introducing new vocabulary, resources, and open-ended questions- curiosity became meaningful learning. The trip reflected the Curriculum for Wales' focus on hands-on, play-based learning, allowing children to ask questions, explore freely, and make sense of their surroundings. Scientific and mathematical ideas appeared naturally while promoting creativity, teamwork, and critical thinking. What seemed like a simple day at the beach turned into a rich learning experience, showing that real learning happens best through exploration and play.

RISK BENEFIT ASSESSMENT

Location / Activity:	Trip on the beath	**Date:**	15/09/2025
Assessor:	Amira Abdelmagied	**Review date:**	20/052017

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 a 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**
Running and chasing games	Running and chasing games help children improve their fitness and stamina. They promote teamwork, resilience, and social skills. These games also help children use their energy and support their focus and happiness.	The main risks are slips, trips, and collisions, which can cause minor injuries.	The children playing are most at risk.	Supervisors should watch children during play. Create clear boundaries for play areas. Remind children to be aware of others around them.	Low to Medium.
Exploring the natural environment	Children explore grass, trees, and soil. This helps them learn through their senses. It encourages curiosity, imagination, and problem-solving. It also connects children with nature and supports their well-being	Risks include scratches from plants, insect stings, or allergic reactions.	Children are most at risk when exploring outdoors.	The practitioners should be aware of allergies. Ensure plants are safe. Supervise children during exploration. Encourage hands to be washed after the activity.	Low.
Exposure to weather conditions	Playing outside in different weather helps children build resilience and independence. It teaches them about their health needs, like staying hydrated or warm. It also helps them learn about seasons and nature.	Risks include sunburn, dehydration, cold discomfort, or slipping on ice or wet surfaces.	Both children and staff may be affected.	Use shade and sunscreen. Have children wear hats and coats. Provide hydration breaks. Check surfaces for safety regularly.	Medium.
Group play and role play	Group and role-play activities promote communication and cooperation. They help children develop empathy, imagination, and problem-solving skills.	The main risk is conflict or rough play, which can cause upset or minor injuries.	Children	Supervise children closely. Encourage positive behaviour. Teach conflict resolution methods.	Low.
Exploring rock pools (looking for crabs, shells, seaweed)	Learning about ecosystems and habitats, engaging senses, encouraging curiosity and observation	Slips on wet or seaweed-covered rocks, cuts from sharp shells or glass; contact with marine animals	Children and staff	Supervision by adults, suitable footwear, clear boundaries, first aid kit available	Low
Walking or climbing on rocks	This helps with physical development, such as balance and coordination. It also encourages teamwork and builds confidence.	There is a risk of falling on uneven or slippery surfaces. There is also a risk of splinters from wood.	Children.	Supervise children closely during play. Use equipment suitable for children's ages. Install soft surfaces below the equipment. Set clear safety rules for climbing to help children understand safe behaviour. Tell children not to climb too high.	Medium.
Walking along the beach area	Health, wellbeing, exercise, social interaction; awareness of nature,	Trips on uneven ground; risk of child wandering off	Children	Clear meeting points; buddy system; regular headcounts; adults spaced along group	Low

	develop empathy, imagination, and problem-solving skills.				
Observing the sun/sky/sea (weather patterns, reflection, shadows)	Scientific observation (light, reflection, weather); creativity in description and art	Risk of sunburn or glare from looking directly at the sun	Children, staff	Provide sunhats and suncream; teach children to observe shadows and reflections instead of staring at the sun	Low
Paddling at the shoreline	Science (tides, water movement, floating/sinking); sensory experience; wellbeing	Risk of deeper water, waves/tides; slipping on wet sand; cold water	Children	Boundary boundaries are set; staff stay along the waterline; more staff are present; no paddling alone; check tide times before visit	Medium-Low

Part 4

Introduction

All children have the right to spend time outside. They can learn and develop through play, exploration, and experience. A good early childhood setting provides equal access to indoor and outdoor spaces that are available at the same time. Outdoor play is important for children's health, feelings, and thinking skills. It should match their interests. We should offer experiences that help children connect with nature, their community, and themselves. Adults who are caring and motivated support this process. They ensure children feel included, safe, challenged, and have meaningful opportunities. Planning outdoor activities intentionally involves allowing some risks, encouraging creativity, respecting cultural differences, and listening to what children want to do (Bilton, 2010, Learning through Landscapes, 2019)

The importance of outdoor play in early years

Early experiences in nature during childhood are linked to how people feel about the environment and how they act toward it. Children who spend time outdoors doing positive activities are more likely to develop values that support sustainability. These values tend to last into adulthood. Playing outside also helps children develop physically. It improves motor skills, balance, coordination, and makes them more active. It also encourages imagination, creativity, problem-solving, and language skills. Spending time in natural settings can reduce anxiety, strengthen self-identity, and improve relationships with peers. Because childhood is a key time for forming values and behaviours, teaching about sustainability at this age is important. More research is needed to understand how this education affects children in the long term (Ernst and Tornabene, 2012 ,Robson, 2015)

How adults working help children learn outdoor

Outdoor learning helps children see math and science concepts in real life. Adults support these activities. Vygotsky's theory (1978) shows that children need adult help to move from doing things alone to working with assistance. For example, adults can ask children to compare stick lengths, predict how water moves on different slopes, or note small animals they see (Taylor & Francis, 2019).

Fisher (2016) states that good early years practice involves adults responding carefully to children's play without taking over. Outdoor learning needs a balance. Children should be free to explore, but adults should step in at the right time. When children build with natural materials, adults can explain ideas like balance, symmetry, or weight. This helps children learn math and science ideas.

Adults also impact learning by showing curiosity. Asking questions like why some plants grow better in shade encourages children to think scientifically (Rogoff, 2003). Research shows that when adults work with children during outdoor activities, children solve problems and think more creatively. Adults go beyond supervisors; they help guide, work with, and support children's outdoor learning experiences (Waller et al., 2010).

Adults play an important role in recognising and extending these affordances. While a child stacking stones may be engaging in imaginative play, a practitioner can highlight mathematical language such as "taller," "shorter," or "heavier," thereby linking the experience to measurement and comparison concepts (Worthington & van Oers, 2016). Similarly, while children dig channels in the mud, adults can pose scientific questions about flow, absorption, and cause-and-effect relationships.

Loose parts to develop mathematics and science concepts

Loose parts and affordances help us understand adult practice. Nicholson's theory of loose parts (1971) and Gibson's idea of affordances (1979) show that natural materials and environments offer many uses. For example, pebbles can be counted, sorted, used to measure distances, tested with water flow, or arranged in patterns.

Adults need to see the potential of objects and features like shadows, puddles, or tides. Adults can increase children's play by introducing language and ideas related to math or science. For instance, when a child makes a sand aeroplane, an adult can help explore symmetry, proportion, or balance. These links play with math concepts. Research shows that when adults add vocabulary and small challenges during play, children improve in math thinking and language. The quality of play remains high (Worthington and van Oers, 2016, Creative STAR Learning | I'm a teacher, get me OUTSIDE here!, 2024).

Approaches, theorists

Learning theories explain how adults help children understand outdoor experiences. Piaget's theory states that children learn by exploring their environment. For example, they compare shell sizes or test how wet sand stays in shape (Boulton and Thomas, 2022). Adults should create opportunities for children to explore and discover. They should also allow children to develop their ideas on their own. Vygotsky focused on social interaction. He showed that children learn best when adults and peers provide support, such as prompts, demonstrations, or language. Learning happens within the zone of proximal development (McLeod, 2025). Outdoors, adults might model measuring with a stick, ask children to compare tidal pools, or introduce words like "bigger," "smaller," "more," or "less. The Reggio Emilia approach views the environment as a third teacher. It shows how adults' attitudes and space design affect children's learning opportunities (Reggio Children, 2022). Research shows that children learn best in math and science when adults provide support and use clear language in meaningful activities. This is more effective than abstract instructions (Eshach, Fried, 2005,Meighan , Rubenstein, 2018)

Research shows some adult practices support outdoor learning in mathematics and science. One important practice is shared thinking. Shared thinking happens when adults and children work together to solve problems or explore ideas. Research finds that shared thinking improves higher-level thinking skills (Sylva et al., 2014).

For example, at the beach, an adult might ask, "What do you think will happen if we move this sand channel closer to the sea? Why?" This question asks children to

predict and think about what might happen. It also encourages them to consider how the tide affects the sand channel. However, research shows that adults do not often use shared thinking enough during outdoor activities. Adults may not have enough time or confidence to keep these conversations going outside. Safety concerns and organisational issues can also stop them from doing this. To help children improve their skills in science and math, adults need training and planning time. They also need support from organisations that focus on teaching and supervision (Bert van Oers, 2023 , Gibson, 2014)

Early years science / mathematical research documents.

The Curriculum for Wales (Welsh Government, 2022) and the Early Years Foundation Stage (DfE, 2021) provide guidance for adults to support outdoor mathematics and science learning. The Curriculum for Wales emphasises learning across different areas and in real-world contexts. It emphasises outdoor learning as a useful way to teach (Welsh Government, 2022). Similarly, the EYFS framework states that young children can learn basic math skills and understand the world through play, both inside and outside (DfE, 2021). These frameworks tell adults to spend time and resources on outdoor learning. They also ask adults to record children's progress. Following the Reggio Emilia approach, documentation involves watching and writing down children's questions and play. This helps practitioners plan future activities that support math and science thinking (Department for Education, 2024).

Some studies question whether outdoor learning programs work. Forest School and similar activities are often praised. But reviews show mixed results for improving math and science skills. They also show that the quality of programs varies (Leather, 2016). Just calling an activity an "outdoor program" does not mean it teaches specific skills. Some sessions mainly focus on building confidence and resilience. They do not always include clear links to math or science learning. Therefore, adults need to

plan outdoor activities carefully. It is important to include goals for emotional and cognitive learning. You should deliberately include math and science in outdoor activities ((Gibson, 2014, Google Books, 2016)

Practical activities like playing on the beach show both benefits and difficulties. Using sand for sculpting helps children learn about shapes, sizes, symmetry, and measuring. They can cut, mould, and compare parts of their sculptures. Adults can help children improve their math skills by asking questions such as “Which wing is longer?” or “How many buckets of sand did you use?” Adults can also introduce simple units like hands or shells for measuring. They can support problem-solving when sand structures fall. Safety rules are important because of sun exposure, hygiene, and the use of sharp tools. Adults need to supervise children during these activities. Exploring rock pools helps children learn about animals and plants. They can classify creatures, observe their behaviour, and learn about their habitats. Adults can guide children to look carefully with magnifiers, write down their observations, and test ideas, such as asking, “Will the crab hide if we touch the water?” Adults should also manage water safety, tides, and cold exposure risks. Activities involving the sky or water reflections let children learn about light, shadows, and time. For example, measuring shadow length as the sun moves helps children understand measurement, time, astronomy, and data collection (Cremin et al., 2015,

(P.Lee, 2019)

Research shows that outdoor learning guided by adults has benefits. Children pay more attention, stay focused longer, and work better with others when they learn outside (Maynard & Waters, 2013; Leather, 2016). Outdoor areas let children learn by doing. They can build models of erosion with sand and water, test if objects float with shells and pebbles, or organise physical charts, such as lining up by how many shells they collected. These activities help children understand mathematics and science concepts later. Adults can also help children connect outdoor work to

classroom work by having them draw pictures, write numbers, or make tables to show what they learned (Merrick, 2022)

Research also suggests ways to make outdoor learning better. Teachers can improve their skills by seeing how to share ideas over time, help children learn step by step, and use mathematical words during play (Meade et al., 2012). Planning outdoor lessons with clear but flexible goals makes the learning purposeful. Instead of just letting children play without direction, this approach aligns with the Welsh curriculum, which encourages learning that is meaningful and based on real situations (Welsh Government, 2022). Using a risk–benefit approach helps adults balance safety with exploration. This method involves assessing the risks and benefits before children take part in activities (Stem.org.uk, 2025). Working with parents and local organisations, like coast guard groups or science centres, can remove barriers. This helps more children get chances to explore and learn outside.

barriers and challenges

Although outdoor environments have benefits for learning, there are barriers to their use for mathematics and science. One barrier is that teachers and educators may not feel confident in teaching these subjects outdoors. They may also lack specific subject knowledge. Teachers often feel less prepared to teach science and math outdoors because situations can be unpredictable. Training that improves their knowledge about topics like buoyancy and measurement is important. It should also teach strategies like sustained shared thinking and scaffolding. A second barrier is that safety rules and policies limit children’s freedom to explore outdoors. Although adults are responsible for children’s safety, careful risk assessments can help children learn. Using different levels of supervision allows children to explore while staying safe (Stem.org.uk, 2025). The third barrier involves restrictions such as limited time, curriculum requirements, and limited access to natural places. These issues are worse in disadvantaged areas. It is important to give all children equal

chances to explore outside. Children who do not often get outdoor learning may not develop skills in science and math as much (Waite, 2011).

In conclusion, Adults have an important role in linking outdoor environments with children's learning in math and science. The work of Piaget, Bruner, Vygotsky, Froebel, and the Reggio Emilia approach shows that adults should plan, guide, and support children's exploration. They should not just watch or supervise. Research confirms that adults need to encourage shared thinking, provide help through the use of clear math language, and plan activities intentionally. Many challenges exist, such as teachers feeling unsure, curriculum rules, risk concerns, and unequal access. These issues can limit good practice. The photos of the beach show how outdoor spaces can support learning. For example, children can learn about sand, rocks, tides, and light. Adults need to carefully assess risks and help children transition their play into deeper learning. To fix these challenges, widespread support is needed. This includes training, time, policies, and
curriculum that recognise outdoor environments as valid places for science and math learning. When supported, adults can turn outdoor areas into places for inquiry. Children can develop math and science skills and curiosity, resilience, and teamwork.

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