Cover sheet

Component one – Image

Component two – Mathematical and scientific concepts or ideas

Component three – Risk-benefit assessment

Component four – Academic writing - role of the adult in supporting mathematical and scientific development

I confirm that I have not used AI during this assignment. I confirm that I have copies of my drafts, notes and other resources I have used which I may be asked to provide as evidence.

Component one – Image

(Davies, 2026)

Component two – Mathematical and scientific outcomes

The site in the picture above is the ‘forest’ of my setting. To reach the site, staff and children remain within the gated school property and walk through the schoolyard. A member of staff then opens the gate to let the children in, ensuring all children have arrived safely at the ‘forest’ area. During this visit there were four members of staff who took 28 4–5-year-old children.

Feature one – loose parts (branches, wooden planks, pinecones, flowers, leaves, twigs)

Learning and development opportunities

Loose parts offer a wide range of learning opportunities for children, from cognitive development to communication and language, depending on how children use the resources within their play. As loose parts have no predetermined purpose, they allow children to make their own decisions about how materials can be used and adapted to achieve their goals. Using loose parts develops children’s independence and problem-solving skills, as they must decide how different resources can be used during their play. Successfully achieving their goals with the use of loose parts may also support children’s self-esteem and confidence. Furthermore, loose parts encourage child-led learning, as children can decide which resources they want to use and how to use them. This gives children control over their play, allowing them to develop creativity, confidence and independence.

Activity

During this visit, a group of children used wooden planks to make the structure of a ‘shop’. The children balanced some of the wooden planks against a tree and placed others on the floor. The children then piled some wooden planks on top of each other to make the ‘counter’ of the shop. During the building of the shop, the children developed their physical strength by carrying and placing the planks and their language and communication skills by communicating with each other about where the planks should go.

The children then collected a variety of loose parts, including pinecones, leaves and twigs to sell in their shop. This provided mathematical learning as the children

collected, compared and organised the different materials. Therefore, the use of loose parts allows for mathematical learning to develop naturally, through child-led play.

Mathematical and scientific learning opportunities

There were several learning opportunities during this activity, including children developing the scientific skill of comparing weight. For example, the children may have noticed that some objects were heavier than others. A child asked me, “Why is this harder to pick up?”, as he lifted a longer wooden plank than before. I then answered, “Because the wood is longer and thicker, it means that there is more wood to lift, making it heavier." Through lifting and handling the wooden planks and other materials, children could further develop their scientific learning through making predictions, test their ideas and develop language such as “heavier”, “lighter”, “bigger”, "longer", and “shorter”. This provides an early understanding of weight and encourages children to investigate.

Furthermore, there was also opportunity for mathematical learning as children compared objects according to size, weight and shape.

Holistic development

The use of loose parts supports children’s holistic development as they develop their physical skills through carrying, lifting and building with the materials. Children can also develop their social and communication skills by working together and sharing ideas. As loose parts are open-ended, they encourage children to use their imagination and creativity, which will allow for confidence to be developed.

Feature two – leaves changing colours (seasons changing)

Learning and development opportunities

Observing the seasons changing through leaves changing colours supports children’s understanding of changes in nature and the natural world. Furthermore, it provides children with authentic hands-on opportunities to develop scientific enquiry. This hands-on learning makes meaningful connections to children’s experiences by allowing children to investigate their ideas and sort, count, compare and measure to support mathematical thinking.

Activity

During this visit, the children noticed that the leaves had changed colour since their last visit. As we had leaves from different seasons as part of the loose parts, the children gathered different leaves, compared and discussed with each other how they looked differently. I developed the children's learning and curiosity by asking the children, "what is the main difference you see between the old leaves and the leaves that are on the trees now?" A few of the children answered, "the old leaves are green and the ones on the trees are brown and yellow". To further develop the learning, I asked the children, "why do you think that happens?" which led us to talk about the changes in seasons and weather.

I then observed the children comparing the leaves and talking about how some felt "crunchy" and some felt "soft". Through observing the changes over time, children were able to develop scientific enquiry skills whilst also developing mathematical skills through comparing and sorting.

Mathematical and Scientific learning opportunities

Observing the changing colours of leaves provides children with meaningful opportunities to develop both mathematical and scientific skills. Children can investigate seasonal changes by comparing leaves over time, which may encourage them to make predictions and ask questions. Furthermore, collecting and sorting leaves by colour, shape and size, allow children to develop their mathematical skills such as counting, comparing and measuring. This demonstrates how the outdoor environment can provide meaningful hands-on learning where mathematical and scientific skills can develop through children's natural curiosity and exploration.

Holistic development

Holistic development is supported through this activity as there are opportunities for children to develop cognitive, physical, social, emotional, sensory and communication skills. Children can use their senses to investigate natural changes in the environment and to discover textures of different natural resources such as leaves, trees and grass. Moreover, children's social and communication development may be supported as they discuss what they have found with their friends and share their thoughts and ideas

Feature three – The trees

Learning and development opportunities

Trees provide children with opportunities to develop their understanding of the natural world by observing the differences between different trees. Children can compare the trees' heights, widths, trunks, branches, and leaves. The trees also open interest in nature and wildlife, as children could see animals such as birds or squirrels on the trees. The different trees also provide opportunities for mathematics and scientific learning through comparing, measuring, and learning new vocabulary such as "taller" and "shorter."

Activity

The children decided to find a sloped area of the tree and use it to place different items such as leaves, feathers, pinecones, and sticks and observe what would happen when they let go. They discussed with each other which item they thought would reach the bottom on the trunk first. To extend the learning, I asked the children, "Why was the feather the last to reach the bottom?" Asking this question allowed children to think about how light or heavy different objects are.

Mathematical and scientific learning opportunities

This activity allowed the children to explore gravity, movement, speed, and cause and effect. Children could compare which objects travel faster or slower and how far they travel. The children's mathematical learning could be developed as they count how long it takes for each item to reach the ground and use language such as "faster," "slower," "higher," and "lower."

Holistic development

This activity could support cognitive development as children make predictions, test their ideas, and solve problems. Communication and social development can be supported as children discuss their predictions and findings with others, while physical development can be encouraged through collecting and handling the different materials.

Additional resources

To further develop the children's learning about gravity and how different items will move at different speeds, I would take up some guttering for the children to make ramps off the trees, therefore they could change the height of the ramp to further investigate.

Curriculum links

These three elements link closely to the Curriculum for Wales, especially in areas of learning and experience of mathematics and science. All activities provide children with opportunities to count, sort, compare, and explore size, shape, and weight, supporting mathematical development through real-life play-based experiences. This reflects the Curriculum for Wales emphasis on using mathematics in meaningful contexts, where children can explore ideas, solve problems, and make connections, following the Health and Wellbeing Wales Act (GOV, 2025). These activities also support scientific development as children investigate materials, observe changes in the natural environment, and make predictions. This links to the curriculum's emphasis on children being curious, asking questions, and investigating the world around them (GOV, 2025). Therefore, following the Curriculum for Wales, the outdoor environment provides children with authentic opportunities to develop mathematic and scientific knowledge by learning through exploration and investigation.

The hazard	The risk	Who is at risk?	Benefits?	Risk rating before control measures	Control measures	Risk rating after control measures
Sticks and branches	Children using sticks and branches inappropriately could cause -Eye injuries -Cuts and scratches -Grazes -Infections -Insect stings -Allergies Children could trip over wet sticks or branches	Children and staff	-Develops gross motor skills by carrying, lifting, dragging and balancing -Develops spatial awareness -Develop strength by carrying, lifting, moving -Develops fine motor skills by picking up and holding -Develops creativity and imagination as sticks and branches are open-ended resources -Problem solving skills as children make patterns and build	3	-Provide adult supervision -Set clear rules for safety such as, no hitting with or throwing sticks -Encourage and educate children on how to carry sticks safely, pointing downwards, and away from their own and other's faces -Remove any sharp or broken sticks and branches -Monitor children's behavior and use of the sticks and branches and intervene if needed	2

			-Develops mathematical skills through exploring size, length, shape, quantity -Develops science skills by exploring concepts such as weight, texture -Develops an understanding and connection of nature and the natural world -Develops communication and language skills as they communicate with their peers and discover new vocabulary such as, bendy, smooth, rough		-Ensure children wash their hands after handling them to avoid any infection or allergy -Adapt the use or number of sticks and branches depending on weather conditions	
Slipping on mud	-Falling over -Cuts, grazes or bruises	Children and staff	-Sensory development as mud provides rich sensory experiences as it has a unique smell, texture and consistency	3	-Provide adult supervision -Check the muddy area beforehand to ensure there is no holes or sharp objects	2

	-Head injuries if a child falls heavily -Mud getting into children's eyes or mouths -Getting stuck if the mud is deep -Reduction in the child's confidence about playing in the mud again -Infections or allergies		-Develops physical skills as children balance and climb through muddy areas -Develops balance and coordination -Develops problem-solving skills as children navigate how to safely cross slippery or uneven surfaces -Develops creativity and imagination as mud can be used for playing in many ways including, potions and cooking -Develops science skills as children can investigate how the mud changes as they add water or the weather changes -Develops mathematical skills as children explore capacity and measurements		-Encourage children to walk instead of run to minimise the risk of slipping -Provide suitable, grippy footwear -Ensure children have appropriate, waterproof clothing -Encourage children to wash their hands after playing in the mud -Check beforehand that the mud is free from any animal feces, rubbish or any other harmful substances -Support children to manage the risks safely -Stop or adapt the activity if the mud becomes unsafe	

			-Develops language as children may discover new language such as, light, heavy, deep, shallow - Develops risk awareness as children can learn to recognize that slippery surfaces may make them slip			
The small gap under the fence	-Children may squeeze underneath the fence or get out onto the pavement or road -Children may get stuck under the fence -Children may injure themselves if they try to get underneath	Children	-It could support problem-solving as children independently decide what the best decision would be -Develops awareness of different sizes and shapes as children may discover they can fit certain things under the fence -Supports mathematical development as children may compare the size of the gap to other objects	4	-Regularly check the gap to ensure it remains safe -Ensure the fence is stable -Supervise children closely as they are playing near the fence -Ensure children are aware that they must not attempt to go underneath the fence -Check for sharp edges at the bottom of the fence	3

			-Supports independence and decision making as children explore within safe boundaries		-Carry out regular safety checks and record any concerns -Repair the gap immediately if it becomes big enough for children to fit under	
High winds	-Branches could fall off the trees and cause injury -Loose objects could blow into faces/eyes -Children could loose their balance and fall -Children may trip over fallen branches and loose objects	Children and staff	-Develops experience and awareness of changes in weather -Encourages scientific exploration by observing how wind moves different objects -Supports understanding of cause and effect as children observe how the wind moves different objects -Develops vocabulary such as, windy, strong, gentle, blow -Encourages problem solving skills by figuring out how to protect themselves and objects	3	-Check weather conditions before going outdoors -Avoid areas with large trees -Secure or remove loose objects -Provide close adult supervision -Clearly communicate safety rules -Adapt or relocate if the wind gets too strong -Check equipment regularly for damage	2

	-Gates or fences may become damaged -Outdoor equipment may break or blow over -Children may become cold or unwell -Difficulty hearing instructions for staff		-Supports physical development as children move and balance through the wind -Encourages curiosity of changes of weather and seasons -Develops mathematical skills by comparing how far and fast different items move in the wind -Supports children's confidence and resilience			
Climbing trees	-Children may fall, causing injury -Small risk of breaking bones if children fall from a high height	Children	-Develops gross motor skills such as, strength, balance and coordination -Improves spatial awareness as children judge height and distance -Builds confidence and independence	3	-Check the tree is stable and suitable for climbing -Provide close adult supervision -Ensure the ground underneath the trees is free from any sharp objects or rocks	2

	-Bruises, scratches and cuts -Children may get stuck -Children may get splinters from climbing the tree		-Develops problem solving skills as children figure out how to get up and down safely -Supports resilience -Encourages curiosity and exploration of the natural environment -Encourages imaginative play as children can role play characters such as animals or explorers -Supports social development as children encourage and help each other		-Teach children how to climb safely and within their own abilities	
Nettles and mushrooms	-May cause irritation or stings -Children may pick and eat them	Children	-Encourages curiosity of the natural environment -Develops scientific knowledge by observing different plants	4	-Check the outdoor area beforehand to ensure there are no harmful plants -Teach children not to touch unknown plants	3

	-They could be poisonous -Children may touch their eyes or mouths after touching them		-Supports mathematical classification skills by comparing size, shape, colour and texture -Encourages children to learn about habitat and living things -Supports sensory development by smells, textures, looks -Develops vocabulary such as soft, tall, rough, short -Teaches children about risk awareness and keeping themselves safe -Encourages respect for nature and wildlife		-Provide close adult supervision -Ensure children dress appropriately, including closed toe footwear -Ensure children wash their hands after playing in the outdoor area -Regularly monitor and check the area for any plants or mushrooms	
The wooden swing	-Children may fall, causing injury -Children may be hit by the swing	Children	-Develops balance and coordination	3	-Check the swing is secure and in good condition -Check the wood for splinters	2

	-Fingers could become stuck in moving parts of the swing -Splinters from the wood -The rope may become loose -Wet surfaces may increase the risk of slipping off the seat		-Strengthens core and leg strength by swinging and maintaining balance -Builds confidence as children swing themselves -Supports social skills through taking turns		-Check if there is any ware in the rope -Provide close adult supervision -Teach children not to stand on the swing -Stop use of the swing immediately if it becomes slightly unsafe	
Wooden planks	-Splinters from the wood -Planks falling onto children -Children tripping over the planks	Children	-Develops problem solving as children decide how to use them -Develops mathematical skills as children explore length, height and comparison	3	-Check planks before use to ensure there are no sharp edges -Encourage children to carry the planks carefully -Provide adult supervision and help children move heavier planks	2

	-Sharp edges causing cuts or scratches -Planks becoming wet and slippery in the rain -Infections -Allergies from things that may be on the planks		-Develops scientific skills as children explore weight, balance and stability -Supports physical development as children lift and carry the planks -Supports creativity as planks are an open-ended resource -Develops communication and teamwork as children share ideas and solve problems together -Develops resilience as children may need to try again or adapt if something does not work -Supports self-confidence as children make their own decisions		-Check for any wet, slippery or uneven planks -Ensure children wash their hands after handling them to avoid any infection or allergy	
Tyres	-Children may fall over the tyres	Children	-Develops gross motor skills such as, balance and coordination	2	-Check tyres beforehand for any damage or exposed wires	1

	-Tyres could roll into children -Children could trap their fingers or toes underneath the tyres -Children may fall into the tyres, causing bruises -If wet the tyres could collect insects or bacteria		-Encourages problem solving as children find different ways to use the tyres -Supports mathematical skills through counting and comparing sizes -Encourages imaginative play -Supports social skills through taking turns and sharing -Encourages risk awareness as children learn how to appropriately play with the tyres		-Ensure tyres are clean and free of mud -Supervise children closely -Remind children not to throw tyres	
Heavy rain	-Children may fall on wet surfaces -Puddles may become deep -Water can make equipment slippery	Staff and children	-Develops sensory skills as children explore water, mud and different textures -Encourages scientific exploration through observing how the rain	2	-Take children into the outdoor hut, or back into the classroom if the rain gets dangerous -Ensure children are wearing waterproof clothes and suitable footwear like wellies	1

	-Children may get wet and cold, potentially leading to slight illness like a cold		makes puddles and helps plants grow -Develops mathematical skills through exploring puddle sizes and depth of puddles -Encourages physical development through jumping in puddles -Develops problem-solving skills as children work out how to navigate the puddles and wet, muddy areas -Develops children's awareness of weather and seasonal changes		-Check the outdoor area for slippery areas and puddles -Avoid areas with deep puddles -Provide close adult supervision -Ensure children have access to the outdoor but to warm up -Adapt or relocate activities if conditions become unsafe	
Dogs getting close to the fence	-Children could get bitten on scratched by a dog -Children may get frightened if an	Staff and children	-Seeing a dog walk passed may encourage children's curiosity about animals -Encourages communication and language as children talk about what they see	3	-Check the fence for any gaps to ensure no dogs can get in -Provide close adult supervision when children are playing near the fence	2

	unfamiliar dog walk passed -Children may try to touch the dog through the fence, increasing the chance of the dog hurting them		-Helps children learn about animals and how we should act around them -Supports empathy for living things -Provides a real-life opportunity to discuss how to be safe around unfamiliar animals		-Teach children not to approach unfamiliar dogs -Do not allow the children to put their hands through the fence	
The road	-If a child got out of the fence they could go onto the road -Children could get distracted by things on the road such as cars or pedestrians -The noise from people and vehicles passing could make	Children	-Could promote an interest in road safety -Gives children an understanding of the local environment as they observe vehicles and pedestrians passing -Develops children's listening skills as they can learn what makes different noises	4	-Ensure the fence is secure and children cannot easily climb over or underneath it -Check the fence and gates for any damage and fix it if needed -Provide adult supervision -Carry out regular head counts when in the forest area to ensure all children are safe	3

	it harder for children to hear instructions		-Provides children with real world learning as they can connect passing vehicles or people to their own experiences		-Teach children about road safety	
Insect stings	-Children could be stung by bees, wasps or other insects, causing pain, swelling and irritation -Some children may get an allergic reaction from a sting -Children may develop a fear of insects if they get stung	Staff and children	-Develops scientific learning as children can learn about living things and life cycles -Could promote curiosity -Promotes a respect for nature	4	-Check the outdoor area beforehand for any nests or hives -Teach children how to observe insects without disturbing them -Teach children about the importance of bugs and insects so they understand and show respect towards them -Ensure relevant medication is taken for any known allergies	3

Wildlife	-Children could be bitten or scratched if they approach wildlife -Some animals may feel threatened if children get too close -Children could meet diseases carried by wildlife -Children may accidentally disturb nests and habitats	Children	-Develops an understanding of animals and habitat, and life cycles -Develops children's observation skills as they discover signs of wildlife -Promotes curiosity as children investigate -Gives children an understanding of the natural world and supports awareness to care for animals -Promotes respect and empathy for living things as children become aware of what lives around them	3	-Teach children the importance of looking after wildlife and observing from a safe distance -Maintain close adult supervision -Establish clear boundaries so children know where they can explore -Ensure children wash hands after playing outdoors	2
Animal feces	-Risk of infection or illness if children touch feces and then put their hands	Staff and children	-Allows children to learn how animals live -Supports curiosity as children may ask what animal it came from	4	-Carry out visual checks of the area before children enter	2

	in or near their mouths -The feces could carry bacteria and parasites -The feces could cause skin irritation if it contacts broken skin -Animal feces may attract flies or other insects		-Promotes respect for nature as children learn that animals are a crucial part of the ecosystem		-Teach children about not touching animal feces and the risks involved -Ensure children wash hands with soap after playing in the 'forest'	
Uneven grounds	-Children may trip or stumble -Children could fall resulting in cuts or bruises	Staff and children	-Develops balance children and coordination -Develops gross motor skills as children step, climb, and navigate the uneven grounds	4	-Carry out a visual inspection of the area and avoid any noticeable uneven ground -Provide adult supervision -Encourage children to walk carefully	2

	-Children may injure their ankle or feet -Children may loose their balance		-Develops confidence and independence -Develops problem-solving as children decide whether they need to step over, walk around etc -Supports resilience as children overcome challenges		-Ensure children wear suitable footwear to avoid falling over	
Pedestrian coming to the fence	-An unfamiliar pedestrian could attempt to speak to the children -A pedestrian could potentially pass children items through the gate	Children	-Allows children to learn about awareness and safety -If a staff member is present, interacting with a passing pedestrian could support children's social development -Appropriate exposure could help children learn how to become more aware of their surroundings	3	-Maintain close adult supervision, especially when children are near the fence -Encourage children to stay in the playing area -Teach children about the importance of not talking to strangers and approaching a staff member if a stranger	2

	-There is safeguarding concern if an unknown adult attempts to gain information about the child				approaches them from the other side of the fence -Record and report any unusual interactions from a passing pedestrian	
Phone	-Personal information could be accessed by others from a device -Practitioners may get distracted by their phones rather than supervising the children -Children may attempt to use the phone	Staff and children	-Having a phone means staff can contact the school quickly if needed -Staff can have parents' numbers stored to call if there is an emergency -Having a phone could provide learning opportunities if children ask about a certain plant or insects, they can take a photo of it for later inspection	2	-Only one member of staff takes a phone for emergencies while other members take a walkie talkie to communicate -Keep the phone secure and out of children's reach -Ensure all staff members know who to call and how to act if any emergency arises	1

			-With parental consent, practitioners can take photos to record children's learning			
Incorrect adult-to-child ratios	-Incorrect adult-to-child ratios may mean reduced supervision, meaning hazards may not be identified quickly enough -Practitioners may not be able to respond quickly to accidents or emergencies -Children may cross boundaries and hurt themselves without adult supervision	Children	-There are not any benefits to an incorrect ratio as it can compromise the children's safety	4	-Ensure the setting follows the required ratios for the children's age -Maintain head counts and registers -Consider additional staff where activities involve higher risk -Have clear procedures for staff absence so ratios are maintained -Ensure staff spread out in the environment to ensure all children are being observed	2

Component four – Role of the adult in supporting mathematical and scientific development

Waite (2011, p. 30) believes that children learn best through practical, hands-on, and experimental activities, as they explore through their senses. Similarly, Helen and Crook (2016, p. 15) agree that there is something special about the outdoors that allows children to discover and explore the uniqueness and depth of each sound, sight, smell and texture of the natural world, which may allow opportunity for children's mathematic and scientific skills to develop as they investigate and compare different elements of the real world. Furthermore, Juliet (2017, p. 24) suggests that children's mathematical learning opportunities are determined by the environment, available resources, their own previous experiences, and the conversations that may be required to allow for the learning. Therefore, Sargent (2015, p. 7) implies that adults have a significant role in providing appropriate access and resources to the outdoor environment to ensure opportunity for children to thrive whilst developing their science and maths skills in a variety of ways. Froebel's theory supports this, as he highlighted the responsibility of the adult in the environment they provide. Froebel believed that for children to develop mathematical and science skills, the adult must provide an enabling environment with natural, open-ended resources such as stones, sticks, leaves and pinecones (Askar and Durmusoglu, 2022). Providing these resources would then provide opportunity for children to explore mathematical ideas such as size, shape, weight and length, whilst also introducing scientific concepts such as balance and movement.

Similarly, Nicholson's (1971, cited in Flannigan and Dietze, 2017) loose parts theory suggests that children's curiosity, exploration and discovery skills are developed when children discover open-ended natural loose parts such as sticks, rocks, ropes, stones, leaves and wood, which would allow children to develop mathematical and scientific skills through exploring the material functions, building, testing ideas and solving problems as well as exploring weight and length. Therefore, as well as Froebel, both Flannigan and Dietze (2017) and Spencer et al, (2021) agree that the adult holds responsibility for providing an enabling environment for children to access and explore loose parts while also engaging in appropriate risk-taking, developing independence and creativity through outdoor exploration.

James Gibson's (1979, cited in Waters, 2017) affordance theory supports outdoor play and the importance of adults providing a variety of resources for children to explore. Affordance refers to the opportunities for learning that an environment can offer children (Waters, 2017). Outdoor environments are viewed as fundamental, as they provide a variety of different affordances, allowing children to use and interpret resources in different ways. Outdoor environments contain many opportunities for mathematical and scientific learning, as children may choose to count or sort natural objects, measure distances or explore and identify different patterns. Children may also discover and investigate living things, weather changes and different materials. These authentic experiences will develop children's knowledge through exploration and enquiry, which would make their mathematical and scientific findings and development more meaningful and relevant to their everyday lives (Waters, 2017). However, the adult has an important role in recognising these affordances and identifying when children's interests can be extended. For example, when a child questioned why one wooden plank was harder to lift than the other, I was able to use this opportunity to encourage further exploration of weight and comparison.

Furthermore, Keith (2017, np) emphasises the importance of the role of the adult and the importance of using observation, knowledge and respecting each child's individual journey order to do so. The adult's responsibility is to know each child's mathematical ability to enable them to provide appropriate interactions for learning outdoors to avoid a child getting frustrated if the mathematical based conversation or activity is above their ability (Keith, 2017, np). Froebel's theory supports this, as he valued that each child's learning journey is different and that children should be celebrated for what they can do instead of being expected to accomplish what is unachievable (Froebel Trust, 2022). Froebel also saw great value in the role of practitioners to ensure children develop holistically and learn through play to expand their exploration and investigation skills. Practitioners can do this by providing opportunities in the environment for mathematical and scientific skills to be developed but then taking a step back to enable the child to interpret the learning as they choose to (Hoshkins and Smedley, 2019).

However, Vygotsky's sociocultural theory emphasises that children would best develop knowledge through interaction with others who are more knowledgeable (Shabani, 2016). Therefore, Vygotsky's theory implies that children's learning can be

expanded by having an adult in the environment to support play for the development of mathematical and scientific skills. He implies that an adult present would expand learning opportunities through modelling vocabulary, such as 'heavier', 'lighter', and 'faster', and observing what children are exploring and then ask questions to lead the learning and extend mathematical and scientific thinking (Shabani, 2016). However, Vygotsky's theory shows some similarity to Froebel's, as Vygotsky states that after children become more confident, adults can then step back and reduce control and support (Shabani, 2016).

Vlach and Noll (2016) support Vygotsky's theory, as they highlight the importance of metacognitive talk to help support children's mathematics and scientific learning. As well as Vygotsky, metacognitive talk emphasises the importance of adults encouraging children and asking appropriate questions to expand learning opportunities (Vlach and Noll 2016) (Shabani, 2016). Questions such as "What do you think will happen next?" and "Why do you think that?" and "What could we try differently?" could be examples of how adults can use metacognitive talk to expand and develop children's ideas and learning opportunities. Metacognitive talk was demonstrated in my third activity, as we discussed why the leaves had changed colours, and by the children as they predicted which items would reach the bottom of the sloped tree first. Metacognitive talk supports child-led learning, as it is not used to give children answers but to question children and encourage them to reflect, explain their findings and test their ideas (Quigley, Muijs and Stringer, 2018, p. 10). However, Weinberger and Libman (2018) argue that although metacognitive talk develops children's learning, the adults involved must have the right skills to question them. Furthermore, children of a young age may have limited vocabulary and may struggle to explain themselves, which could lead to frustration.

Moreover, García-González and Schenetti (2022, p. 3) state that outdoor play enables children to solve problems, work with others, and encourage exploration. García-González and Schenetti (2022, p. 3) also highlight the importance of outdoor play environments created by adults in promoting children's curiosity as they encounter insects, plants and changes in the weather and seasons. These experiences may encourage children to ask questions, observe and develop conclusions, which are all key components of scientific enquiry. Therefore, adults have an important role in recognising children's curiosity and using these

opportunities to extend their mathematical and scientific knowledge through appropriate interactions. This demonstrates that the outdoor environment alone does not necessarily support learning, but the adult who observes and responds to the children's interests extends their learning opportunities.

Although outdoor learning provides many benefits, Parkin et al. (2026) argue the disadvantages and challenges that come alongside outdoor learning. Practitioners may value the importance of outdoor learning to support mathematical and scientific learning, but it may not always be achievable. Some settings may have limited outdoor space, meaning the opportunities for mathematical and science skills to be developed may be limited. Furthermore, children from disadvantaged backgrounds may have had limited opportunities for play outdoors and access to nature, which may restrict their opportunities and confidence to engage in the outdoor learning experiences (Parkin *et al.,* 2026).

To ensure children are comfortable in their environment to explore and engage in activities, adults must create an enabling environment filled with a variety of resources, accessibility to safe and stimulating opportunities, making adaptations for any children who may need it (Bento and Dias, 2017). It is crucial that practitioners adapt environments to ensure all children feel safe and want to explore. Children with additional learning needs may find some environments overwhelming, therefore, practitioners should ensure they follow a child-based approach and create an environment which is suitable and engaging for all (Brodzeller *et al.,* 2017). Practitioners could do this by ensuring all children have access to something that they are interested in to create a sense of safety and belonging, that according to Maslow's hierarchy of needs will then develop the children's self-esteem (Ahmad Dar and Sakthivel, 2022). If children feel a sense of belonging and are comfortable in their environment, it may enable them to explore and engage with activities so that their mathematical and scientific skills can develop.

Denmark's forest kindergarten follows an outdoor approach to promote holistic development. Children are free to roam the outdoor area, climb trees and use the natural resources around them as part of their play (Williams-Siegfredsen, 2017). They believe that children learn best through exploring the outdoors, free to take risks and learn independently. Adults play a key part in observing and responding to

the children but allowing children to take the lead (Dean, 2019). This freedom and independence allow for child-led play, which should develop children's independence, problem-solving and creativity. The outdoor learning in Denmark's forest kindergarten provides children with real-life mathematical and scientific experiences such as comparing, counting, sorting and measuring leaves and other loose parts (Williams-Siegfredsen,2017).

Similarly, the Reggio Emilia approach places importance on the environment and provides children with rich, meaningful learning experiences. The Reggio Emilia learning environment is created by both the children and adults, as the adults will adapt the environment to ensure optimal learning opportunities (Robson, 2017). Both the Reggio Emilia approach and Denmark's forest kindergarten believe that adults play a crucial role in providing an enabling outdoor environment, filled with resources and opportunities for children to explore and learn by doing so.

Current Welsh Government research shows that schools in Wales are increasingly using outdoor learning, highlighting the growing importance of providing children with opportunities to play and learn in outdoor environments (Welsh Government, 2026). The Welsh Government also states that schools have flexibility in designing their own curriculum, which may influence how much learning takes place outdoors within individual settings (Welsh Government, 2026). This flexibility may encourage practitioners to increase their use of outdoor learning and provide children with opportunities to explore the environment, although the extent to which outdoor learning is used may differ between settings. Therefore, unlike Denmark's Forest Kindergarten approach, where outdoor learning is central, settings in Wales have greater flexibility in how they would like to incorporate outdoor learning within their teaching.

To conclude, this assignment has demonstrated how outdoor environments can provide meaningful opportunities for children to develop their mathematical and scientific understanding through exploration, investigation and play. The natural environment and use of loose parts can encourage children to make choices, solve problems, compare, sort and investigate while supporting their holistic development. The role of the practitioner is important to promote child-led play by observing

children’s interests, providing appropriate resources and asking questions to extend children’s learning.

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