

Awe and Wonder - Science, Mathematics, and the Outdoors.



(Disney, K. 2019)

Feature one: The Balcony.

MA Education (2015) believes adding dressing up clothes can allow children to communicate and use their creative skills. Dressing up can help children to tell stories by using their imaginations and teaching each other different skills through play, which can encourage mathematical thinking and reasoning, such as how children go in pairs (Boy, Girl). They can learn to understand portion sizes for example, we need five apples and five pears, through counting children learn to use their thinking skills to solve mathematical concepts. Children can play around the balcony area whether it is on top or underneath the balcony children can use their imagination and play a child led game that supports their development.

Sue (2022) suggests Montessori believes practitioner can add loose parts in the area such as pots, pans, tables, and chairs, as when children use their imaginations it motivates them to play games such as school and restaurants where they learn, how much? How many? How we Montessori (No Date) when children use the pots and pans, they can make portions using the natural materials around them, they can use quantity amounts by mixing what they need together, and they can make different shapes with the portions to make pretend food they do this by using their creative and mathematical skills, when children use different natural materials through portion mixing it can lead to sustained shared think as children may become curious about the items they have found and have questions through their curiosity. Welsh Government (2020) suggests children can use their senses to learn about the different textures through touch when making portions which encourages them to learn about science.

Practitioners can add different sized fabrics, sticks, and pegs to the underneath of the balcony, the children can use their creative skills to build a den. This can be through self-directing themselves to build through their imaginations. When children build dens, they learn to use measurements, communication, and critical thinking skills through hands on learning.

Feature two: Space in the outdoors.

A practitioner can add cards in the area with different shapes and colours, when the children explore the area around them, they could use the cards to find different items which are similar to what is on the card, this can teach children about how different an item is but be the same shape or colour and helps enhance their abilities to learn mathematical skills.

Leaving pencils and paper in the surrounding areas for children to draw pictures or they can collect items and colour over them similar to using a stencil. For example, if a child stencils over a leaf it shows the veins within the leaf which can make children curious, and lead to sustained shared thinking with questions such as, what are the lines inside the leaf? This can make children curious about the life cycles of leaves and which encourages children to find out more about the scientific factors around the leaves and how they change colours in different seasons, when and why do the leaves fall from the trees, this can lead to sustained shared thinking and children using open-ended question and talking about the trees.

Practitioners can add a magnified glass to the area where children can explore, this can encourage children to look for bugs within the grass and trees. Encouraging them to discover different bugs that can include bugs they have never seen before. Bug hunting within the trees introduces children to metamorphosis at their own language level, such as how a caterpillars life cycle changes four times until it becomes a butterfly. Thornton and Brunton (2006) suggest when children learn about life cycles, they learn an understanding to science through shapes and sizes, they learn how things grow and where they grow in the world around them. Children learn through experiences and providing children with the right tools can encourage them to participate in hands on learning where they become curious and use open ended materials and ask questions.

Feature three: Sand pit.

Adding a metre stick or a ruler to the sand pit area helps children with the use of their mathematic learning skills as when children play in the sand they can, make footsteps in the sand encouraging them to count and recognise different shapes and sizes of the footprints. Running and jumping in the sand to see how far they can jump, can encourage children to measure how far they can jump using a ruler or metre stick. Welsh Government (2020) states mathematics is important to a child, as it encourages them to solve problems, however, it should be made exiting for them through play, when children play, they become more engaged in what they are participating in, and it teaches them the mathematical skills they need for later in life.

Using a bucket and spade to build sandcastles can encourage children to become critical thinkers and solve problems for themselves, when a child builds a sandcastle it may be too dry to stand up and it makes them think about how they can help it stand up, this can encourage them to use their scientific skills and experiment with water and sand by mixing them together to make it stronger and help it stand on its own. However, Mauro (2022) suggests building sandcastles can also encourage children to use their fine motor skills and gross motor skills by using their construction and measuring skills encourage children to learn science and mathematics through creativity. Gascoyne (2019) states sand and water are different textures and when children mix the sand and water, they would notice how the textures of the two mixed together feel different, this can lead them to be curious about what if I added more of something would it be different. The bucket could be filled with water and the children could use it to experiment with, will it sink, or will it float they can use the natural resources around them to experiment, while using their mathematical skills with the use of different sizes of the same item. This can lead to open-ended questions where they ask, how does this one float but this one sink?

RISK BENEFIT ASSESSMENT

Location/ Activity:	Outdoor play area	Date:	18/03/2022
Assessor:	Viki Walsh	Review date:	18/04/2022

ACTIVITY	How will young people BENEFIT from this activity?	Hazards and risks	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
Top of balcony area. Imaginary play.	Using their imagination, to learn about hot and cold items, how many items they may need. When making potions children learn mathematical skills through measures, such as how much.	Wooden posts can break, children can cut themselves on wood or get splinters from them. Climbing on to the posts could result in children falling off the balcony.	Children / Adult	Remove broken or lose wooden posts. Explain rules to the children and ensure they follow the rules of no climbing on the posts and explain what the dangers are. Adding an extra member of staff within the area to ensure the children follow the rules.	L

ACTIVITY	How will young people BENEFIT from this activity?	Hazards and risks	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
Under the Balcony play area. Den building.	Children will learn mathematical and science skills, through Measurements and communication skills, they can do this by using their imaginations and building through structures.	Items fall over and can hit someone. Items can break while the children put them together. Lose or broken parts can cut children or give them splinters.	Children / Adults	Extra staff member in the area can help the children build the den or watch from a distance to ensure the rules are being followed to reduce the risk of harm. If a child breaks and item remove it from the area and dispose of it appropriately. Remove any broken parts to reduce the risk of a child getting cut.	L

Exploring Area.	Bug Exploring can help children learn about the cycle of life. Learning about different colours and shapes by using shape and colour cards to teach them how things can be similar to each other but look different. Using paper and pencils can encourage children to draw or stencil over items they have found while exploring, this can lead to them asking questions and discussing with a practitioner the cycle of life. (Sustained shared thinking).	Children can get stung by bees. A child could have an allergic reaction to some bugs. Children can suffer with hay fever. Broken bits can be hidden amongst the grass.	Children / Adult	Children should wear the appropriate clothing when they are exploring, such as wellies to ensure their clothes don't get ruined. Clear the area from broken parts, this can help children explore without getting cut on sharp objects. If a child has an allergy to stings (Bees) ensure the parent has given you the right things to use in the event of a reaction (EpiPen). However, the practitioner should be trained in administering it to ensure the health and safety of the child. For minor stings antiseptic cream should be made available to reduce the swelling. Some children can suffer with hay fever, practitioners should discuss with parents/guardians if the child needs medication at home before they go to outdoor play area, to help prevent a child becoming ill.	L
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ACTIVITY	How will young people BENEFIT from this activity?	Hazards and risks	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
Steppingstones / wood and sand pit area.	Children can learn to count forward and backwards. Learn to use their fine motor and gross motor skills, through balancing and jumping. Learn about the different shapes and size. Learn science through making potions by mixing sand and water together and using mathematical skills on how much they should use for each item.	Falling off the steppingstones and wooden steppingstones can cause minor cuts and grazes. Splinters can come off the wooden steps. Broken parts within the sand. Broken buckets and spades are sharp and can cause a child to get a deep cut or a scratch.	Children / Adult	Practitioners should ensure there is a first aid kit and that everything is within their dates, remove and replace anything that has a use by date on it or looks like it might have been in the pack for too long. Clean out the sandpit check there are no hidden broken parts inside the sand. Check all the equipment used within the sand has no sharp and broken parts. An extra member of staff should be in the surrounding area to ensure children follow the rules. Such as, although water is for drinking it is also for mixing, and they should never put the mixture in their mouths, or it can make them ill.	L

Tree climbing	Climbing trees can teach children about the arts of the tree. Using they mathematical skills to see how high they can climb. How different branches are different shapes and have different strengths. They learn about the beauty within the tree. They learn how to use their fine motor and gross skills, by climbing.	Children can get splinters from climbing trees. There can be broken or split branches that children could cut themselves on or they could walk across the fallen branches and because they have split the child can fall through the branch cause them to break a leg or cut themselves. The children can fall of the tree. Large dead branches on top of tree are a sign that the branches may fall off when the children are climbing.	Children / Adult	Thoroughly check the surrounding of the tree to ensure there is no rot or decay around the bark area. If there are signs of decay or rot children should not climb the tree, practitioners should use warning signs, block the tree, and explain to the children the reasons why they should not climb the tree for their own safety. Check the tree has no dead branches inside of it, if they can be removed then a practitioner can move them if it is safe to do so, if not children should not climb the tree. A practitioner should remove dead branches from the ground. Ensure the children know the rules and the boundaries of tree climbing. Children should wear appropriate clothing for climbing trees, such as trousers, if the children wear shorts, they can get cuts and splinters as their legs are not covered appropriately. If it is raining children should wear protective clothing such as waterproof trousers, therefore the children should	L
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ACTIVITY	How will young people BENEFIT from this activity?	Hazards and risks	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
		Broken branches on the ground suggests there can be more broken ones in the tree. Fungus root decay and trunk rot are an indication that tree is dying and can cause the tree to fall if a child climbs on it. The weather can affect tree climbing, the rain can make the tree wet and slippery.		not climb trees as waterproof clothing can be slippery. Rain can make the branches wet which can make it difficult for a child to climb. Branches can break easily when they are wet. Children should not climb the trees in wet weather.	

How can practitioners support a child's Mathematics and Science development?

Bruce (2012) discusses how Froebel believes the outdoors gives children the opportunity to expand on their skills, when children experience the world around them, they can play child-led games, where they are given the experience of discovery, and expanding on their own abilities to learn science and mathematical skills. McLeod (2019) discuss how Brunner states children learn best from discovering on their own and not when they are told what to do by a practitioner. Children can discover through using their own knowledge within the outdoors, and practitioners should not teach them the old classroom learning using paper and pens, as when children play child-initiated games, they learn through sustained shared thinking and by asking practitioners questions about the world around them. Furthermore, Donaldson (2015) discusses within the curriculum child-led activities in the outdoors is important, children become independent and capable learners when they create their own games. When children create their own games, they become more interested in the activity which can encourage them to become better learners. Welsh Government (2020) states science is a part of modern-day life, which gives children opportunities to explore and become better learners as they grow through life. However, Woods (2017) believes children who play child-led activities, are more likely to participate in adventurous play as it is child led and unpredictable and they do not get told what they can or cannot do. King and Newstead (2020) discuss Sturrock and Else's play cycle where practitioners can support children through play through complex and medial intervention, play maintenance, and by being involved when the child invites them into play. Practitioners can be there to hand something to them that they may ask for, for example, a coloured pencil. Practitioners should support the play cycle and not interrupt it as when children are interrupted, they loss interest and may no longer wish to participate in the activity anymore which can interrupt them from learning and developing their mathematics and science skills.

Donaldson (2015) states the importance of children being encouraged to become independent learners, and practitioners should provide children with a choice in the outdoor environment to facilitate hands on learning. Mathias (2022) discusses Vygotsky who believes it is the practitioner's responsibility to support and encourage children with the activity they participate in, as they can support

the children who may struggle, as well as supporting the children who play self-directed and hands on, this can give practitioners the opportunity to facilitate in sustained shared thinking. Sargent (no date) discusses how Piaget and Brunner support hands on learning as it helps children develop concepts, meanings, and gain experience. However, Sargent (No date) states children can learn “mathematical senses” by doing, trying and using play ideas, of which are better within the outdoors as it allows for space to discover and explore. Furthermore, Welsh Government (2015) suggests practitioners should provide children with effective learning opportunities, as it is beneficial and essential for children to learn mathematics and science skills. Early Childhood (No date) agrees with Welsh Government (2015) however, they believe the outdoors is an important opportunity for children as they can discover and gain knowledge in the environment around them. Early Childhood (No date) states practitioners can draw children’s attention by using open-ended questions about the environment around them therefore, leading to sustained shared thinking and working together in a child led activity encouraging children to learn about the science around them.

Gascoyne (2019) discusses how messy play such as mixing sand and water is about a child’s engagement and thinking skills, how the texture is different when they are mixed this can lead to sustained shared thinking and a child having questions. Mauro (2022) suggests building can encourage children to use their fine motor skills and gross motor skills by using their imagination, communication and measuring skills encourage children to learn science and mathematics through creativity. Pentagon (2019) suggest practitioners should provide children with loss parts and giving children space in the outdoor area, to enable children to be constructive, encouraging them to participate in the activity and use their developmental skills. However, Pentagon (2019) believes a practitioner can encourage a child develop their fine and gross motor skills by adding for example a ball which can encourage children to score goals, when children kick a ball into a goal, they count how many goals they can score therefore building on their mathematical skills.

Brussoni, M. *et al.* (2012) suggests practitioners should always observe the children around them this can teach them about the child’s abilities and ensures a child plays safely follows rules and risks are kept to a minimum and a child does not get seriously hurt.

Welsh Government (2020) believes mathematics encourages children to solve problems, however, it should be fun for them when children play, they become more engaged in the activity they are participating, being hands on learners and can teach them the mathematical skills. Practitioners should be observing from a distance and allow for sustained shared thinking if a child approaches them with questions. Harcombe (2022) states observing children can distract them from the activity they are participating in if they know they are being observed, there for distracting them from learning mathematics and science. Practitioners should observe from a distance and prepare for distractions from other children who have open ended questions. However, Harcombe (2022) states children should be encouraged to continue to play self-directed when being observed as it can build on their own self-esteem, as it can help practitioners to understand a child ability and build on a child's development in mathematics and science skills.

Tovey (2017) suggest how Frobel believes children learn best through their own self activities, all activities should be child-led, and practitioners should be available to answer questions through sustained shared thinking and open-ended question. Brodie (2022) states sustained shared thinking is a powerful tool, which is used between a practitioner and a child, where they both ask questions and solve problems together, this can extend on a child's ability to learn mathematics and science skills, for example why the branch has fallen off the tree. As stated by Brodie (2014) curiosity and problem solving within a child led activity, suggests practitioners should be prepared for sustained shared thinking, so children can ask questions which can help them to solve problems for themselves. McMahon and Rose (2019) believe sustained shared thinking in the outdoors includes children being introduced to metamorphosis as children may not understand how a caterpillar changes four times. When practitioners talk to children, they must talk to them at their level of language such as the words pretty colours. Parenta (2017) discusses Vygotsky who believed children learn through the world around them. Vygotsky states it is about the social process, where practitioners, parents and others around a child play a role in the child's development. Vygotsky believed sustained shared thinking is when two or more people contribute to thinking and problem solve together.

Tovey (2020) states Froebel believes children should be encouraged to play in the outdoor environment as it can test their limits through actions and reactions through exploring. Omidvar, *et al.* (2019) discusses Reggio Emilia who states when children play in the outdoor environment it can enhance their physical and mental well-being building on their self-esteem and encourage them to become more creative and problem solve using their imaginations. Redford (2013) agrees with Omidvar, *et al.* Piaget believed children learn from the environment, within their cognitive development their thinking skills change, and they challenge their own thinking when they learn different skills through experience. Day Nurseries (2022) agrees with Omidvar *et al.* (2019) and Redford (2013) however, they state children who are curious become “better thinkers and doers” using natural materials, children can create their own games this can encourage them to use their own shapes and portions and helps them learn Mathematical and Science concepts. Dancer (2022) states practitioners should support children’s mathematical learning by giving them the opportunities to make activities messier and bigger with the use of natural materials. Using natural materials in an open space can encourage children to explore, investigate, and collect, therefore children will ask questions such as, why has the branch fallen of the tree? Leading to sustained shared thinking, encouraging children to develop science and mathematical skills.

Isaas (2022) discusses Montessori and how Montessori believes ‘the best way of invigorating a child is to immerse him in nature’. Wilson (2018) believes when children are immersed in nature it encourages them to become self-creative thinkers, they become adventurous, it can teach them Science and Mathematical skills through creating or building. Practitioners should explain the rules and the risks that need to be followed before, to ensure the child’s safety, so the children can have fun and use their development skills by self-directed play. Early Years Resources (2018) states risky play enables children to challenge their physical and mental development, encouraging children to be hand on and play self-directed activities, children experiment and solve problems for themselves, teaching them mathematics and science skills. Furthermore, practitioners should reduce the risks to prevent a child from serious harm. Practitioners can explain the risks to the children and state they must follow the rules, remove sharp and broken objects, and ensure there is additional supervision in higher risk areas.

Foundation Education (2018) suggests when children play self-directed it encourages them to participate and become more engaged in an activity, helping them to build on their Holistic development, encouraging them to learn mathematics and science skills. Practitioners can support a child's holistic development by asking open-ended questions and giving children a positive and inviting environment where they can feel comfortable and allow for sustained shared thinking between the practitioner and child. However, Brussoni, M. *et al.* (2012) states children should be able to play self-directed, when children play self-directed it allows them to discover and use their holistic skills to develop. Twinkl (2021) suggests a practitioner should make a safe and comfortable environment outdoors. Children should feel free to express and be themselves, the practitioner should ensure the environment is inviting and have space for children to be creative through play. Practitioners can support a child's holistic development by ensuring they have fun, and the activity is interesting and ensuring the activities are what the children like to play. Carter (2016) states practitioners should support a child's holistic development by asking open ended questions, ensure the outdoor environment is fun and interactive within a child's interests, when children enjoy the environment, they become engaged and participate in activities that intrust them, therefore they gain knowledge and understanding which builds on their mathematical and science skills. Eyc (2016) states child-initiated play supports a child's learning as they experience first-hand ideas and builds on their holistic development, practitioners can initiate the activity however, they should allow a child space to extend on their own ideas.

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