



Awe and Wonder: Science, Mathematics and the Outdoors

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ECEY5005



1 - (Source: J.K Conservation Projects, 2022)

The Photo shows a pond with stones, rocks and plants. A pond is significant outdoor learning area because it creates endless opportunities for children to experience and develop mathematical and scientific concepts. Resources that children can use could include having magnifying glasses and a mini beast hunt activity sheet. Children can be given the opportunity to go off with a magnifying glass and an activity sheet and go find as many insects and animals they may be able to see. This activity can enable children the chance to explore the free open space and investigate what creatures live in the natural world.

Ponds attract wildlife and children may come across frog spawn. This could ignite their curiosity and sense of wonder. Frog spawn is a great learning opportunity for children to learn about life cycles. Some children may be unaware of what frogspawn looks like, therefore they may have questions such as, "Why is there jelly in the pond?", "What is the black dot inside?" Adults can support the children's learning by explaining the black dot is a tadpole and the jelly is a protective layer, like an egg. From this discovery the adult can further the children's learning by exploring the life cycle of frogs. The children and adults could do some research on how long it takes for tadpoles to develop into frogs and then make a weekly log updating what they have found and how the tadpoles are changing and developing.



Other wildlife such as insects can be found around the pond, insects like spiders. Children can learn about the concept of the ecosystem and how spiders are beneficial to our ecosystem. They can do this by discovering what spiders eat, this can then provide children the opportunity to ask a variety of open-ended questions. Questions like "how do they catch the prey they eat?", "how do they make their webs?" and "why do they not get stuck to their webs if their prey does?". Adults can support children's learning by answering their questions and providing them with experiments and activities to deepen their understanding. The experiments could include the practitioner making a

web on cardboard using velcro and velcro balls to represent flies getting trapped in the web, the soft side of the velcro would be used for the web and the rough side would be used for the flies. A soft spider toy can represent the spider and will demonstrate how the spider does not get stuck to the web.



The Photo shows a pond with stones, rocks and plants. A pond is an outdoor learning area which can create endless opportunities for children to experience and develop mathematical and scientific concepts. Resources that children can use could include having magnifying glasses and a mini beast hunt activity sheet. Children can be given the opportunity to go off with a magnifying glass and an activity sheet and go find as many insects and animals they may be able to see. This activity can enable children the chance to explore the area and environment and ask questions. Ponds attract wildlife and children may come across frog spawn. This could ignite their curiosity and sense of wonder. Frog spawn is a great learning opportunity for children to learn about life cycles.

With Stones being around the pond children might throw them into the water. This could ignite their curiosity and see if they can make a bigger splash and look at the ripples the splash creates. Mathematical concepts can be introduced such as distance and force. They can investigate how much of a splash they can create by throwing the stone with greater force. Less force and distance typically results in a smaller splash, more force and distance typically result in a bigger splash unless the children use a heavy rock, then they could start to explore different weights of stones. Their learning can be supported by adults asking the children open-ended questions such as 'how do we know it is lighter/heavier? They could then explore and experiment with other materials to compare weights. For example, leaves, sticks or feathers could be used. This learning could also be supported by using weighing scales. The scales will allow for children to have a greater understanding of the concept of weight by having a visual of the difference.



2 - (Source: tts, no date)

RISK BENEFIT ASSESSMENT

Location / Activity:	Pond	Date:	26.9.22
Assessor:	Shaniece Jacobs	Review date:	17.10.22

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.

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
Wildlife Hunt The aim of this activity is for children to have freedom to explore the area, take notice of the outdoor space and find some creatures.	- Children are in an outdoor environment with fresh air, learning about our world's inhabitants. - Exercise - purposeful walk - Ignites an interest in science - Social skills - children working together talking about what they can see and what they have found	- Animal faeces around the pond area. Children may pick up to investigate however, faeces pose the risk of diseases and could cause blindness if faeces gets into someone's eyes. - Wild animals such as foxes could have their den nearby. The risk being foxes may attack if they feel scared or threatened. - Uneven ground. Risks could be tripping and falling over potentially injuring themselves.	Children and adults	- Adults perform a perimeter check of the area before letting the children go out first to ensure the area is clear of animal faeces. - Adults take a pack of wet wipes in case of children coming into contact with faeces. - Adults are to talk to the children about what they should do if they see foxes. They should stay still and be quiet whilst they are passing or having a drink and the dangers if a fox feels scared or threatened. - Adults are to remind children the ground towards and surrounding the pond is uneven so to "be careful" when walking or running. - Have a member of staff who is first aid trained to accompany on outdoor learning experiences in case of injuries.	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
Splash! The aim of this activity is for children to explore and experiment scientific and mathematical concepts like weight, force, distance and lengths. They can do this by finding different materials such as rocks, sticks and leaves.	- Children can develop their understanding of mathematical and scientific concepts - Social skills - children are talking to their peers and the adults about what they are doing and - Learning in an outdoor environment with natural materials and fresh air where children can make connections with the world they live in.	- Stones could be thrown and accidentally hit others around them causing injuries. - Uneven ground surrounding the pond. The risk children may trip and fall into the pond and potentially drown. - Children may lose their balance and fall into the pond. A child might panic, not be able to swim and drown.	Children and adults	- Adults are to talk to children about being mindful of others around them when throwing stones. - Adults are to remind children to take care around the pond due to uneven ground. - A first aider to accompany on outdoor learning experiences to manage injuries if they occur. - Adults are to be present and supervise children around the water.	M

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
Frog updates The aim of this activity is for children to have opportunities to visit the pond and to observe and record the changes and developmental stages of a frog's life on a weekly basis.	Children will develop an understanding of a life cycle.	Children may be crouched down near the edge of the pond whilst documenting the frogs, they may lose balance and fall into the pond.	Children	Adults are to supervise children whilst they are around the pond.	M

The Welsh curriculum states, play forms an important role in the development of learners mathematics and numeracy. Through play mathematics can be more exciting and engaging for learners. Play also allows for learners to build on their problem solving skills, explore and develop ideas whilst also collaborating with others (Welsh Government, 2022). Piaget emphasises, by children playing they are actively discovering, they are researching and exploring the environment around them. He believed this is how children learn best. He also believed problem solving is not something children are able to learn but it is something that is discovered in order for children to truly understand (Mutindi, Omwenga and Wadende, 2020, p. 24)

According to Robertson (2017, p. 1) learning through play children are able to be in control of their learning, which means the activity they are doing has more meaning and purpose. The outside environments provide and offer learners an endless supply of patterns, colours, shapes, quantities and much more in early maths experiences. They also state that for children to gain an understanding of a concept they need to experience it.

Learning experiences outside of a classroom in the outdoor environment helps learners to reach their full potential. Outdoor learning allows for children and adults to connect with the world they live in, connect with nature and all life. Outdoor learning helps children to develop and nurture their self-confidence and a sense of self-agency (Von Au and Jucker, 2022, p. 10)

The outdoors provides children opportunities to inspire their awe and wonder, it enables them to have rich and authentic experiences where the children are able to explore practice and enhance their skills (Welsh Government, 2022, p. 16). The outdoor environment is a versatile place, there are many learning opportunities children can experience across all learning areas. It provides a holistic approach to children's learning where they can engage and take the lead in their learning. A holistic approach does not just mean academically but also spiritually and mentally. A holistic approach

allows practitioners to pay attention to children's physical, social and emotional, personal and spiritual well-being (Scottish Social Services Council, no date).

According to Mutindi, K.Z. Omwenga, E.N. and Wadende, P. (2020, p. 25) Vygotsky said play forms children's sense of the world they live in. It is an essential part of their language acquisition and their understanding of the world. Vygotsky's theory includes three key elements: play, social-cultural aspects and language. Vygotsky also created the theory zones of proximal development. This can be defined as the level where children are at and it is determined by their own individual problem solving. It is also determined by their potential level of problem solving under the guidance and support of adults and collaborating with peers of a higher level (Puntambekar, 2021, p. 453). This theory allows for practitioners to assess and observe what children are capable of doing independently, what they are able to do with the support from adults and their peers and again what they can do independently after they have received support.

It is the adult's role to ensure that children are safe in the outdoor environment. It is important that adults manage risk effectively whilst still allowing the children to take risks to build their skills and confidence. It is also the adult's role to support the children's learning and development.

This can be done through planning for children to have learning experiences in stimulating environments, both indoors and outdoors. Activities can be planned by the adult but also be child-led. This allows for children to build on their cognitive skills, think about the environment they are in and create their own learning. This will also allow children to develop sustained shared thinking. Sustained shared thinking is where children are working together with peers and adults to extend their thinking and understanding (Early Education, No Date). As well as planning it is the adult's role to observe and assess children and their progress. There are a variety of ways adults can do this without interrupting children's play and assessing them on activity sheets. Adults can observe children during their learning through play and monitor children's progress by checking overtime. According to the Froebel Trust (2020, p. 4) observing and documenting children's learning is central to an educators practice. Observations allow adults to gain an understanding of the children in their care, understanding what their interests are, what they like to do, which toys they like to play with and who they interact with. These observations allow adults to plan their children's interests to make learning fun and engaging for them.

They can record and document children's progression with photos, videos and by having a learning journey journal. Observing, assessment and planning are an essential part of an adult's role in the early years. By undertaking observations practitioners can build relationships with children, find out what their interests are, what they enjoy doing. This provides practitioners a window to see what is the best way to provide support for the children and their learning, this is part of the next step on the cycle which is assessment. Practitioners can decide from analysing their observations about what they say about children. Following the assessment is planning. Planning involves practitioners taking into consideration what learning environment is best suited, what resources could be used to support children's learning, what opportunities and experiences practitioners can provide for the children which will ignite their curiosity and allow them to explore and become independent learners (Birth to Five Matters, 2021).



3 - (Source: Birth to Five Matters, 2021)

The Reggio Emilia approach believes children are active learners and researchers through working with their peers and teachers during explorations in a rich learning environment. In the Reggio Emilia approach it is the adults role to provide opportunities for children to participate in activities that will stretch their understanding, their knowledge and skills. The adults also have the role of providing children with opportunities that will allow them to observe, explore their environment, discover new things, ask questions in a stimulating learning environment Teachers have the important role of providing children with opportunities to observe, question, explore, discover, and share their discoveries in the world around them through the provision of a stimulating learning environment (Westerberg and Vandermaas-Peeler, 2021, p. 1260).

Adults can also support children's learning by providing children with loose parts.

Simon Nicholson developed the Theory of Loose Parts, he believed loose parts create infinitely more opportunities for people to experience creative engagement (Lyons Early Childhood School, no date). According to Daly, Beloglovsky and Daly (2015, p. 14) loose parts are objects or materials children can use to change, manipulate and move during their play. These loose parts can be whatever the children want them to be through their imagination and through interacting and collaborating with their peers. They go on to say loose parts are open-ended materials, they can be used in an infinite amount of ways. By adding loose parts to children's play they allow and promote more critical and creative thinking. Through critical thinking the children are investigating, analysing and questioning the loose parts. Their creative thinking is using their imagination and problem solving.

By collaborating with their peers children are participating in sustained shared thinking. According to Learning Journals (2022) sustained shared thinking is when children engage with their peers or adults in conversation to build on their existing knowledge, thinking about ideas and solving problems. They go on to say that sustained shared thinking happens when children are thinking deeply and critically about different topics. The key roles of sustained shared thinking in children's development are it allows for children to work together, have effective conversations, build on their knowledge together, develop confidence and become critical thinking and be able to analyse something and problem solve.

In conclusion, the outdoor environment plays an important role in child development and their learning as it can provide them with more learning opportunities that they can not experience from an indoor environment. The outdoor environment is versatile, open-ended and stimulating for children. However it is important to note that not all children will have the same opportunities to

have outdoor learning experiences, this could be because of the area they live in. Schools in a more urban area are less likely to have fields or a woodland area as opposed on the outskirts of a town or near the countryside they are more likely to have a more natural environment around them. That is not to say though that children are not able to find awe and wonder in a more urban environment. Practitioners could still use the outdoor environment but take a variety of loose parts with them from the classroom and use the environment they have to their best advantage.

As well as the environment adults play an important role in children's development and learning. As previously discussed there are many ways adults support children, from observing, assessing and planning, to being available to the children to support them when they need help. It is important for adults to remember in child-led learning to take a step back and let them assess and analyse for themselves, allow them to ask their peers for help, to develop their skills and build on their knowledge. Adults can then support the children by asking them open ended questions.

There are many theorists who have similar beliefs when it comes to children learning through play, for example Piaget and Vygotsky both believe in children learning through play though they do differ slightly. Piaget believed more in children learning through their own experiences. Whereas Vygotsky believed children learn through their social interaction and working with others. As well as Vygotsky, Reggio Emilia also believed in children learning through social interaction with others. Reggio Emilia also has similarities with Piaget as they both believed in children having the opportunity to explore their environments as this will help them to learn.

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