

ECEY5005/C – Awe and Wonder: science, mathematics and the outdoors.

Part One: The Location; a woodland area on a slight slope with some area dense with tree and other areas cleared.



Part 2; The ways that this location can support mathematics and science learning.

Feature One: Leaves on the trees.

In this location there are many trees of differing varieties, giving an opportunity to be able to encourage the children in their scientific learning through studying the leaves of the trees. As part of the session, I would get the children to sit down and I would lead some simple breathing exercises with them. This would bring a holistic, cross-curriculum element at the start of the time together, focusing on the health and well-being of the child in accordance with the new National Curriculum for Wales. This would help to calm them down and prepare them for the task ahead. This might give those children from more difficult socioeconomical backgrounds an opportunity to sit in nature where they might not have had that experience before.

With the trees in this space I would want the children to go and look at the trees, in particular their leaves, giving them autonomy in finding the trees that they want to study. I would ask them a broad open question which would be for them to explore the area and hunt for different types of leaves. I would encourage them to look for different shaped and sized leaves, ones that are rounded, ones that have points or more than one point thus allowing the children to be in control of their environment and learning.

The loose parts that I would introduce into this section would be paper and crayons. Once the leaves were collected, the children would place the piece of paper over the leaves and rub the crayon over the top to create a leaf print. This would once again be cross-curricular using art in science as well as promoting their motor skills on holding and using a crayon. With these prints, we would then study the leaves, their shapes and the veins in order to determine what the role of the leaf was. This would be done through questioning the children about what they thought the functions were and why they thought that, encouraging them to be curious in their learning environment. This could be taken from the outdoor classroom into the indoor classroom for further information collecting through research in books.

Feature Two: Den Building.

Once again, due to the density of the trees and the presence on many branches of varying sizes, this makes an ideal location to create dens. Loose parts would once again be required to assist the child in creating their dens; ropes, tarp, string, tree licks, extra pieces of wood.

I would have the children in teams with a teacher/ assistant in the group to assist with potentially difficult tasks, but to only get involved if the child were in danger or if asked to help. With the added loose parts for this task, there is potential for affordance as the children might see the use of the objects in creating their den differently to how adults might view them. Affordance would need to be allowed by the teacher/ assistant so that the child can develop an understanding of what the function of the loose parts could be.

This would bring in both mathematics and science due to the fact that they would need to measure and count whilst planning and making the den, as well as discovering what the loose parts properties are in order to use them to make the den. Another cross-curriculum aspect of this would be trial and error, in accordance with the new curriculum in Wales, 'I can be inquisitive in my learning'. It also gives opportunities for the children to use their communication skills with one another as well as learning how to take turns and to work as a team, learning what skill sets they each have and how they can be used in this project, bringing in positive reinforcement that they can do something, helping towards the development of their health and well-being. It would also help to develop their language skills, communicating with one another.

To test their dens, we would have small amounts of water to throw over the dens once the children were in them to see the effectiveness of the dens. This will add an element of fun, but will also help them to develop their evaluating skills; was their den waterproof enough? What could have been done differently? Evaluation skills are part of science, questioning and researching.

Feature 3: North, South, East, West.

This activity would help the children to learn the directions on the compass. This is an activity that would require loose parts of the four directions printed up on paper to be put in their right locations on trees in the area as well as having some compasses, paper and pens for them to use later on. Research shows that children learn through movement as it helps their vestibular system develop the concept of knowing where their body is in the space.

To facilitate the children learning and experiencing the directions, the task would start with the children being gathered in the centre of the space and being shown from where they stood where the four directions were. I would shout out a direction and the children would then run to that direction. This is another cross curriculum activity, bringing in movement and a sense of play in the learning. This in turn helps their motor skills in movement develop as well as helping their overall mental health and wellbeing.

Once this part of the activity was played a few times, the children would be split into smaller groups and given a compass. The loose parts of the directions on the tree would be taken down. The task I would set would be to try and use the compass, having already experienced with their bodies where the four directions were. In reaching the furthest point in the area with the compass, I would then ask the children to take in what they saw in that area and either write it down or draw it. This would give the children a very basic trial at creating a map of the environment in which they have been exploring, putting into practise their skills of direction from their earlier experience.

RISK BENEFIT ASSESSMENT

Location / Activity:	Cunnigar Farm, Fern Hill, Haverfordwest.	Date:	26.9.21
Assessor:	Rachel Settatree.	Review date:	

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?	Possible hazards	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
Walking around the woods looking at trees and collecting leaves, which would ten be used to make Leaf rubbings on paper with crayons.	- Walking in nature is known to be of benefit to children's mental health and wellbeing. - The children are given autonomy to explore the different trees and their leaves focusing on the role of a leaf on the tree through studying the leaf and working out its functions. - This is science in an outdoor learning space, encouraging them to be inquisitive and getting them to research for themselves about the functionality of the leaf. - The leaf rubbing activity would give the children an opportunity to develop their motor skills in holding and using a crayon, and would bring cross-curriculum activity of art and science.	- Walking across uneven ground could cause them to trip. - They might come across leaves on plants that are poisonous and shouldn't be touched. - We're asking the children to go and hunt for things on their own and therefore they might run off into different areas and locations where you might lose sight of them.	Children and adults.	- Boundaries will be marked out in the woods, pre session, using colourful ribbons and at the beginning on the session this will be explained to the children and the adults. - Pre session, any plants that are poisonous to be identified, if possible cut back or clearly marked with a separate coloured ribbon and once again explained to the children and the adults at the beginning of the session. - Explanation to the children for them to not put anything in their mouths during the session. - Children and adults to wear suitable shoes for walking, wellies or walking boots. - Practise walking on the uneven ground at the start of the event so as to get everyone use to the unevenness. - Encourage children and adults not to rush around but to take their time as they collect their leaves to bring down the risk of tripping up or falling down.	L

Den building.	• The children learn to create using materials at hand developing their creative side and developing their abstract thinking of linking up a planned task to actually creating it. • Development of science skills – what materials work best for den building and how the materials work together. • Development of mathematic skills – what angles work best to create the desired space in the den for the team, measurements of the branches used, sizes and shapes and how they can work together.	• Heavy branches that are being propped up against trees could fall down and hurt someone. • Splinters off branches. • Uneven ground, could fall or trip over. • Exploring of the area might mean that the children are spread out over a wide area, might lose them. • Might come into contact with potential dangerous or	Children and adults.	• Teacher at the start to explain the hazards of the branches in den building so that the children know to be careful as they lift them and use them. • Get the group to plan out beforehand how they are going to build their den, what's needed to make it safe i.e. long branches and what materials they plan on using. • Teacher/ assistant to be put with each den building group so as to watch any hazards that might occur and help lift and put things in place in a safe way. • Children and adults encouraged to not run or rush around so as to reduce the risk of trips and falls. • Boundaries marked out with colourful ribbon of where the children can explore and these boundaries to be made clear through explanation at the start of the time together. • Poisonous or dangerous plants to be identified before the session by the practitioner and if possible cut back, or marked out clearly by a boundary ribbon and explained clearly to the children not to go near it. Try and choose the Den building area away from these plants if possible.	L
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ACTIVITY	How will young people BENEFIT from this activity?	Possible hazards	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
		poisonous plants.			

ACTIVITY	How will young people BENEFIT from this activity?	Possible hazards	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk RATING: L/M/H
Running around to help learn about the four directions and using a compass to help map out the area of exploration.	- Helps children to develop their vestibular system. - Understanding of how their body functions through movement and how that helps them to learn their directions and where they are. - Learning where they are on a map, very basic mapping skills to be brought out through understanding how to use a compass and describing what they see around them.	- Running over uneven ground could case them to trip or fall. - Bump into each other and fall down. - Dangerous or poisonous plants in the area. - We're asking the children to use the compass to explore, could go off and out of site from practitioner.	Children and adults.	- Good footwear to be worn by all. - Area marked out clearly of where to run around with colourful ribbons for both the running around task as well as the compass task and mapping. - Practitioner to choose as flat an area as possible to reduce risk. - Do some balancing activities with the children beforehand to get them use to the uneven ground. - Spread children and adults out so that they have space to run, if not enough space break the children up into smaller groups to take it in turn. - Have a teacher/assistant with each group during the compass and mapping session to make sure that they stay within the marked out boundaries.	L

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Part 4.

With reference to theory and research consider how the adults working with children can support and encourage children to have an opportunity to engage with mathematical and scientific concepts in an outdoor space such as the one in your photograph.

Vygotsky's sociocultural theory around the cognitive development of children concluded that a child's development is influenced by conversations with more knowledgeable members of society around beliefs, values, problem solving and cultural values. His theories also stressed the importance of social interaction for cognitive development, that community played a part in helping the development of "making meaning" (Dr Saul Mcleod, updated 2020). With this theory in mind and putting the child in the centre of their society, influenced by more knowledgeable members, concluded in Vygotsky's mind that cognitive development varied across cultures. If Vygotsky's theory was to be taken and applied in the outdoor learning space, this would mean that the adults in this setting play the role of those knowledgeable members, offering insight and information on the learning tasks of mathematics and science in this context, and that each child's cognitive understanding on the subject matter would vary as a result of the learning environment that they were in.

The Education Act of 1918 (UK) stated that all 3 – 5 year olds have the right to receive education through a setting, although not compulsory until the term after the turn 5 years old. Provision of early years learning environments and settings can differ in their approach and practise, including their provision of an outdoors setting for children to learn. An independent review into the 'Early Years Qualification' brought out recommendations for the government to consider in the early years practise in England and Wales, with the focus being on ensuring the provision of high quality learning settings for all children in the early years through providing highly qualified early years practitioners who can set up excellent learning environments for children to develop their cognition further (Nutbrown review, June 2012). This aligns with Vygotsky's theory of ZPD (zone of proximal development) scaffolding, where a task might be too difficult or beyond their current cognitive development stage, but by having a more knowledgeable adult there to help assist in the task, helps the child to learn and succeed in the task itself. Early Years settings need to be able to provide some outdoor space for children to be able to engage with their learning. In the outdoor setting like the one in the picture, the practitioners would use the ZPD scaffolding to help the children learn for themselves. This could be done through loose parts which are alluring objects that the child can use to help them in their learning. These loose parts come with no specific directions and can be combined with other loose parts (Lisa Daly and Miriam Beloglovsky June 2nd, 2015). These loose parts could be used in the scaffolding to help the child accomplish a task, allowing the child to have autonomy in their learning but providing the support that they might need.

Jean Piaget was also developing theory around children's cognitive development around the same time as Vygotsky, and as part of his research he suggested that there were four key stages of a child's cognitive development, and in contrast to Vygotsky's theory, believed that each child would need to go through these stages at specific times in their lives (Dr Saul Mcleod, December 7th, 2020). These stages were; sensorimotor stage birth to 18-24 months, preoperational stage 2 – 7 years, concrete operational stage 7 to 11 years, formal operational stage ages 12 and up. Piaget's theory concluded that all stages were universal across cultures and that all children go through the same stages, but that there could be a difference in the rate. This contrasts with Vygotsky's theory that the rate of cognitive development differed across cultures. If Piaget's theory was taken and applied to the outdoor learning setting, in an Early Years setting the children would be at the preoperational stage of his theory meaning that their thinking is done symbolically and that they are

starting to mature in their language development. (Rick Ansorge 2020). Their memory and imagination are developing, therefore experiencing learning in an outdoor environment gives the child experiential learning that will help them to not only process their learning but remember their learning too.

Where Piaget and Vygotsky's theories do align is that both theories concluded that children are active learners, gradually learning and as they get older their cognitive development and the complexities of learning and understanding grows. Both theories are based on a sequential stages of cognitive development and both theories recognised the importance of nature and nurture coexisting in learning (Tom Taylor, August 23rd 2018 – updated January 27, 2019). However, their theories differed on the how these sequential stages of cognitive development came about. Piaget believed that children played a vital role in their own learning and discovery in developing their knowledge on a subject whereas in contrast Vygotsky believed that children needed constructed guidance in their learning (Tom Taylor, August 23rd, 2018 – updated January 27th, 2019).

Both these aspects of their theories, though different, can be helpful when developing an outdoor learning setting. Both can be applied to the setting, whereby the adult can be the knowledgeable person in the setting helping to guide the learning through preparation of the task and deciding what the task might look like, but also allowing the child the opportunity to be active in their learning, allowing flexibility on the task so that the child feels that they have actively learnt for themselves.

Froebel said; 'play is the highest expression of human development in childhood, for it alone is the free expression of what is in a child's soul.' (Louisa Penfold, 27th February 2019).

Froebel's theory was based on the belief that children were naturally creative beings and that giving them space to play allowed for the whole of the child to be educated. Froebel believed that children, those who were of pre – school age, needed a learning environment of their own which was both indoors and outdoors, for them to be able to develop autonomy in their learning. His key ideas were interconnectedness with all living things; to be able to live and learn in harmony with nature. The learning would be open ended, with creative play and exploration at the centre, with the role of the adult being to observe, support and extend play and learning (Helen Tovey). Froebel created the first Kindergarten gardens where children were actively encouraged to plant, grow and nurture their plants as a way of engaging with the outdoors and learning through that.

Froebel also developed the idea of 'Gifts' which were a range of 6 objects which included 3d shaped wooden blocks, spheres and cylinders, wool and clay. These objects were designed to allow for the child to use them in all subjects of learning and to help form and develop abstract learning. For example the wooden blocks could be used in numeracy and counting, but then could be used to stack up and build something to learn about height, it could then be turned into something else that could be used to tell a story for language and literacy development (Louisa Penfold, 15th April 2020). In the outdoor space considered in this portfolio, Froebel's Gifts would act like loose parts, being able to use them to help them understand the task at hand. For example, the wooden blocks and cylinders could be taken into the outdoor space to allow the child to pre plan their build for a den, thinking through the concepts of angles, dimensions etc, before going and actually creating the den for themselves. Both of these tasks, the pre-build with the gifts and then the actual build with loose parts, helps to develop the child's abstract learning through creativity. It also gives the child the experience of autonomy in their learning and also

allows for trial and error in both. In this example it also draws in Vygotsky's theory of ZPD scaffolding, the adult in this scenario provides the 'gift' and the 'lose parts' and sets the task, but also draws on Piaget's theory, allowing the child to trial and error and be active learners in their own development.

Malaguzzi's theory of '100 languages' was based on his belief that children learnt in many different ways. The 100 languages are described as being expressive, communicative, cognitive, symbolic, ethical, logical, relational and imaginative. (Reggio Emilia Australia) Malaguzzi had an instrumental role in creating and developing the Reggio Emilia approach, believing that children were curious about the world that they lived in and therefore were able to learn from that world around them (Alisa Stoudt, 2021). It could be said that Malaguzzi was influenced by both Vygotsky's theory and Piaget's theory in the development of the Reggio Emilia schools with the belief that children were autonomous in their learning and the environment around them allowed for opportunities for the child to learn and develop their cognition. Another similarity to Vygotsky's theory is the understanding of where community played a part in the development of the child, Vygotsky emphasising the importance of having more knowledgeable adults in the environment to help the cognitive development of the child (Tom Taylor, August 23rd, 2018 – updated January 27th, 2019). However, Malaguzzi took this approach one step further by bringing the whole community into the child's learning and development, pedagogy of relationships, making connections between things, experiences and interactions with the wider community. This approach could be brought into our outdoor learning space through inviting people from the community in to help with the learning. If we continue with the den building example, a member of the wider community who has knowledge in building or architecture could be brought in to help the children plan in their learning. The role of the practitioner in these settings is one of planning and advising and completely focused on the child's decision of what they want to learn about (Alisa Stoudt, 2021). In this context the adult brought in to share would not tell the children how to make their den, but would be there to advise and to be someone for the children to ask questions to. In this, the autonomy is still in the child's hands, but they are developing their learning through questioning someone who has the knowledge on that subject.

As a new curriculum is being brought into effect in Wales, there are aspects of the Reggio Emilia approach that could be used to help promote a child's learning. One of the statements of the new curriculum is that children should be 'ambitious, capable learners who are ready to learn throughout their lives' (Jane Gatley, 31st January 2020). The Reggio Emilia approach to learning would give children in Wales the opportunity to develop their ambition through learning about things that they enjoy, as well as helping them to be capable learners through giving them experiences outside of the classroom to develop their abstract learning and cognitive development.

The Reggio Emilia approach also differs in the way that the teachers evaluate the child's learning and their knowledge. This is done through creative ways such as discussions with the child about the learning including them in the evaluation, taking video recordings, taking photographs, the children making drawings and writing of notes (National Learning Hub, Scotland, 16th February, 2021). The evaluation of the work happens alongside the learning, and is not done after the project has ended, which can differ to other educational settings forms of evaluating a child's learning. Again, with the example of den building, the practitioner would be able to ask the children questions on their work, and see what skills and knowledge on mathematics and science they have learnt. Photographs and video could be used to document the process as well as including drawings from the children on the project. When thinking about the new Welsh curriculum, the Reggio Emilia approach of documenting learning might be a good one to trial, although legislation and time would

need to be given to the practitioners in order to do this well. With the projects of the children in Reggio Emilia settings, there is not particular end to the projects, they run as long as the child is learning from them. In contrast current main stream educational settings have themes set out for them in the curriculum with time scales and the key outcomes of the learning for the children, which would make this approach a difficult one for practitioners to use in their early years settings without it being embedded within the curriculum.

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