

Awe and **Wonder –** **Science,** **Mathematics** **and the** **outdoors**

Section 1



(Source: Wallpaper, no date)

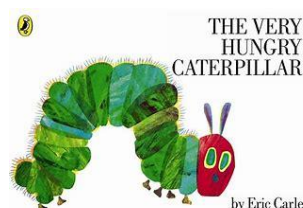
Section 2

Feature 1: Other living things

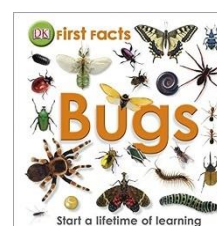
The outdoor space provided draws on the scientific factors of living things all around us which allows children to explore and experiment nature enhancing their knowledge and understanding of the world. The photograph pictured is a beautiful summer's day, it would be beneficial to revisit this site during other seasons, for example - in the Autumn when the leaves are falling off the trees. Explaining and illustrating life cycles and other living things can be an important milestone for children, helping them to learn how better to respect and care for those around them while also keeping it fun. Given the space and time, children are given the opportunity to explore and discover other living things in the world.

Adding materials to this site would be beneficial and widen the opportunity to explore and discover, materials will include magnifying glasses, clear box and books such as 'The Very Hungry Caterpillar' and 'First Facts Bugs'. Using a magnifying glass along with a clear box the children will be allowed to go on a bug hunt, start the session with a discussion about what the children perceive to be 'minibeasts' and why are they important to us? The adult is encouraged to ask open ended questions which will allow the children to develop communication skills along with sustain shared thinking and metacognitive skills, for example – both children and adults discuss or explain what they have seen or found in conversations or adults talk out loud about their ideas to encourage children to think and consider new ideas.

The children will have the opportunity to explore and discover the woodland in search for minibeasts and other living things, encouraging curiosity and independence. There will be many things that the children may want to photograph, allow the children the use of a device to capture anything they may find interesting, this may also lead to further discovery and research on a computer using search engines, by doing this supports the four purposes and learning progressions of science and technology. Once the children have collected what they found, whether it be a bug or a flower, they will then be given an opportunity to investigate and explore their findings, this is where mathematic and scientific skills can be used, use phrases such as - how many legs does the woodlouse have? How many petals does that flower have? What colour is it? Why do we think that? Does the flower sink or float? Let's find out! Keep the children interested, listen to their thoughts as they process and discover what they have found. Using the books provided the children are welcome to try and search for what they have found through the pages and discover facts about it.



(Source: Penguin, no date)



(Source: Amazon, 2021)

Feature 2: Gradients and uneven ground

Enabling the children to participate in appropriate risk is considered a fundamental part to outdoor learning, it will be important for the adult in charge to carry out a risk assessment and appropriate supervision and health and safety procedures are followed at all times. Individual capabilities and mobility skills or level of understanding differ, in this case it potentially becomes a greater risk or challenge to the individual child, knowledge of each individual be crucial for this activity. Before the activity begins, the adult in charge must ensure the children are wearing appropriate footwear along with appropriate clothing.

The children will have the opportunity to walk, run, jump, and slide on uneven ground and gradients, using their co-ordination skills to concentrate on navigating themselves safely. Allow the children to roll down the hill, from top to bottom. Using phrases such as 'what did you see?', 'what happened to our voices when we were going down the hill?', 'how did the grass feel as we were rolling on it?'.

Adding materials such as footballs, different sized balls, corks, rubber ducks, feathers, push along cars, water, guttering and general loose parts to this activity would be beneficial and widen the opportunity to discover and problem solve, using a football or a car the children will be given the opportunity to roll them up and down the hill using forcers and gravity, similarly you can use the guttering, water and loose parts to see how the items float down the gutter. These activities are another great opportunity for metacognitive skills to be used, use phrases such as 'What happens to the ball/car when we roll it up the hill?' 'Did you see how fast that went down the hill?' 'What would happen if we pushed it harder?'.

Their brain, eyes, hands, and feet will work together in synchronicity, by doing this develops sensory-motor integration while also improving on their vestibular skills (balance) and co-ordination skills.

This activity will also encourage the children to be active and physical which recent studies such as The Child Measurement Programme Wales (2019) show that children today are not as active as they need to be.

In the early years learning through play is considered fundamental, participating in a variety of play experiences the children will develop their mathematics, and numeracy skills as-well as learn to solve problems.



(Source: iStock, 2021)

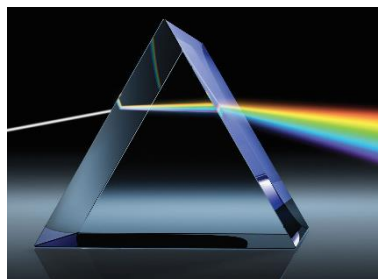
Feature 3: Light, shadows and patterns

Exploring light, pattern and reflection or shadows will create fascinating and intriguing experiences for children however the challenge of risk and challenge can also be explored. Providing the opportunity for the children to explore light and shadow enables children to appreciate awe and wonder while developing their natural curiosity of themselves and the world around them. Using pattern will teach children about sequencing and allow the children to become creative contributors. Numbers and patterns emphasis the role of pattern identification, counting and number skills while also using all the children's senses in the process.

As the children adventure and explore through the forestry, allow them the opportunity to acknowledge and discover the patterns and light that shines through the tree's, ask the children 'why do we think that happens?', 'What is a shadow and how is it formed?' 'I wonder why it is forming that particular pattern?'. Using a variety of shadow activities using transparent materials, allow the children to let light pass through in straight lines, translucent materials to let some light in scattering there light in different directions or use opaque materials as they do not let any light pass through. Sustained shared thinking would be beneficial during these activities 'What if we turned it that way?' 'Shall we hold it there?'. Using their own bodies, they could create a shadow theatre or shadow puppets and participate in role play opportunities. Adding material to the forestry will be beneficial to the children's learning through play, materials such as blocks, beads or dinosaurs to create shadow art, cardboard, colours and translucent paper to create shadow frames which will be a great opportunity to experiment different shapes and types of materials. Other beneficial materials could include water, paper, pens, chalk, mirrors, prisms. Using the prism and a white piece of paper allow the children to hold the prism towards direct sunlight creating a light colour spectrum on the piece of paper.



(Source: Simplemost, 2021)



(Source: Illusionpedia, no date)



(Source: Zastavki.com, no date)

RISK BENEFIT ASSESSMENT

Location / Activity:	Carmarthen woodland	Date:	15/09/2021
Assessor:	Emily Rosina Jennison-Mason	Review date:	15/01/2022

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
Children exploring the grounds and other living things such as bugs, flowers and insects	Teach the children about other living things and life cycles while also allowing the children the opportunity to explore their habitats. - Physical development - Gross-motor skills - Fine-motor skills - Communication skills Becoming aware of other living things and becoming ethical citizens.	- Children may step in animal feces - Trip over causing bruising, cuts or abrasions - Low level branches which may cause injury to the head or face - Allergies - Insect bites - Irritant plants such as stinging nettles - Children may wander off	Children and adults	Children must be wearing appropriate clothing such as long sleeve clothing and wellies The adult in charge must discuss boundaries to the children – make them aware of where the boundary line is Nothing to enter the children's mouths Discuss the dangers of strangers	L

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
Children discovering uneven grounds and gradient, exploring different material	- Physical education - Sensory motor - Supporting children's vestibular sense (balance) - Co-ordination skills - Communication skills - Curiosity - Discovery - Problem solving - Supports children's understanding of forces and energy while also allowing the children to become aware of their own bodies - Allows children to become familiar with slopes and uneven ground	Children may cause injury or fall over causing cuts, bruising and abrasions	Children and adults	Discuss with the children about the ground being uneven, allow them to walk slowly at first until they find their balance. Remember this surface may be a new experience for the children, play a fun game to help them become more confident Long sleeves clothing and appropriate footwear must be worn	L

Allowing the children to explore the forestry discovering patterns, light and shadows	- Allow the children to explore and light and energy - Teach children about sequencing - Creative contributors - Number skills - Promotes, curiosity discovery, problem solving and exploration - Pattern identification - Experimenting - Allows children to use all their senses	- Children may fall over causing bruising, cuts and abrasions - Low branches may cause injury to the head or face area - Irritant plants such as stinging nettles - Insect bites	Children and adults	Explain to the children the golden rule of nothing in their mouth, long sleeved clothing and appropriate shoes must be worn Make the children aware of the branches Discuss boundaries about no wandering off	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
Outdoor environment in different weather conditions	- Allows the children to become aware of the different temperatures, using words such as – hot, cold, wet, windy, dry - Communication skills - Children will discover and identify potential harmful things in the environment which will make them more aware in the future and reduce risk - Self care - Physical education	- The wet floor may become a slip hazard - High winds causing branches to fall - Children may feel too hot or too cold (extreme cases may cause hyperthermia) - Children may become wet and muddy causing discomfort - Sun exposure causing sun burn	Children and adults	- Monitor weather conditions on Met Office - Do not go if its over 30 degrees or stormy weather - Appropriate clothing must be worn - Drinking water to be available for all children - Sun hats and sunscreen if weather permits - Wellington boots and waterproofs if weather is raining	L

Section 4

According to Piaget (2021) self-discovery and active learning among children is essential, however Vygotsky (2021) believed that children need constructed guidance to learn and develop, all though both Piaget and Vygotsky recognised the importance of nature for childhood development. Similarly, Froebel (no date) believed that the outdoors is an ideal environment for children to develop and understand the natural world around them. According to Froebel (no date) the outdoors offers a range of meaningful, adventurous, risk and challenge learning opportunities such as first-hand experience which is considered essential for growing minds. The outdoors can be the source of curiosity and adventure for young children, sadly recent research has suggested that the adults involved within settings for young children turn their focus to rather mundane domestic matters such as organising turns on the equipment or telling children to stop doing something (Bilton 2012). The role of the adult has a powerful impact on either nurturing children's curiosity and engagement outdoors or crushing it (Froebel, no date). Young children need practitioners who value the importance to enjoy the outdoor environment, the attitude, understanding and positive thinking as well as the skills and knowledge to make the best out of what the outdoor space has to offer while effectively supporting child-led learning (Waller, 2011, p35). The attitude and behaviour of practitioners is considered vital to the impact on children's learning, children must receive the support of attentive and engaged adults who is enthusiastic about the outdoors while also understanding the importance outdoor learning has on children's development (Munoz, 2009). The Welsh Assembly Government (2009) suggests that better learning outcomes comes from frequent experiences in the outdoors, children that are allowed the opportunity to free flow between the indoor and outdoor learning environment is considered the most effective way to provide play-based learning, this allows the children to be free to go wherever their imagination and curiosity takes them. Practitioners can support outdoor learning by providing and enabling experiences in a rich, natural environment using open ended questions to develop and encourage children's communication skills. Ofsted (2006) recognised good practise in the outdoors in terms of health and safety, the guidance does not state that all risk and challenge should be removed from children's experiences, it in fact highlights examples on how adults should allow children to participate in risk or challenging play while controlling and supporting the safety measures. The report highlighted that the main strategy was that the adult's role is to effectively keep the children safe and emphasized on how helping and teaching children to learn how to keep themselves safe in situations. Accidents will happen outdoors despite all efforts, but it is considered important to remember that incidents will help to shape and develop children's understanding of their surroundings while also enabling them to form judgment on safety measures (Welsh Assembly Government, 2009). While exploring the outdoors practitioners may take the opportunity to observe the children, observations play a key role in everyday practice at any setting. The main purpose of observing individual children is to determine where on the learning continuum the child is and to identify if the child has any learning needs, the observation collected will provide help and support to an individual (Welsh Assembly Government, 2009). Early Years Careers (2015) suggests that within an early years setting it is vital that practitioners ensure all children are meeting their personal developments goals while receiving the highest standards of learning.

One of the key aspects of the role of the adult is to provide a stimulating environment with enriched areas of learning, the practitioners must identify opportunities for mathematical and scientific concept learning and enhance provision (Teach Early Years 2021). According to Early Years Careers (2015) any subject can be adapted to the outdoors, the outdoor will provide exciting and meaningful opportunities for children which will heighten their motivation to learn. It is suggested by First Discoverers (no date) that children experiencing outdoor play and learning consistently contributes to their development, practitioners must adopt a professional role and positively contribute to the aim. Observing children during activities allows room for practitioners to evaluate and reflect, whilst it is true that the majority of outdoor play activities is child-led, it has been noted that a majority of provisions are female-dominant, this being the case experiences in the outdoors should never be gender bias, offer a broad range of opportunities and experiences for children. The New Curriculum for Wales focuses on 6 areas of learning and experiences, each area is important and contributes to the four purposes. The four purposes should underpin all teaching and learning in Wales providing a holistic structure and understanding for all learners to navigate life's opportunities and challenges. The curriculum provides guidance on how practitioners must allow purposeful and enjoyable opportunities for children to develop a confidence within the mathematical language to develop depth of knowledge, numerical and analytical skills where appropriate (Welsh Government 2017). The National Literacy and Numeracy Framework (LNF) has been designed to support practitioners and teaching staff within settings to embed literacy and numeracy across the curriculum while focusing on the learners to develop the skills and concepts they will need to complete realistic tasks (Welsh Government 2015). Reggio (2018) supports the use of natural materials within childhood development as they encourage children to interact and explore the world through material while also providing the opportunity to explore their senses in the process for example, sight will encourage the child to see how tall or small things such as trees. The loose parts theory was developed in 1971 by Simon Nicholson, loose parts are natural transferrable resource materials which provides endless open-ended opportunities for children's imagination, experiment, and discovery play (Altitude Learning no date). Further Wilding (2021) supports the use of loose parts and recognises the importance of using loose-parts and subitizing patterns for children's mathematical and scientific learning as this offers the opportunity to recognise differences between materials and focus on the properties rather than the appearance. Many settings are now encouraging the use of natural resources within a modern pedagogy which is inspired by the Reggio Emilia Approach for children's development (Early Years Careers 2021). During activities where loose parts are used the adults must ensure there is an abundance of loose parts available, this is allow further opportunity for discovery and creativity. The environment in which loose parts are used must be carefully assessed and prepared, this role is linked to mitigation of injury, and it will be the adult's responsibility to assess the physical space for hazards. Depending on the age of the child will determine how close or far away the adults can place them selves to serve the role of an observer. Following the child's lead without taking over will be important for example, it is often said that adults interrupt children's play to early so knowledge on when to intervene is vital as adults play a major part in mapping a child's brain, when real life requires it adults should only interrupt play in order to direct the child towards the requirements of the environment and the world around them. Providing communication and open-ended questions often leads to further inquiry and

discovery along with the length of time children are provided to encounter loose-part play will lead to deeper exploration and problem solving (Play Outside NS, 2019). It is suggested by Ritchie (no date) that the use of open-ended questions during children's development is highly beneficial and help children develop problem solving skills, instead of providing children with the right way to do something open-ended questions encourage independent thinking and provide opportunity to try, fail, hypothesise, experiment and succeed on their own while also stimulating language use, help to encourage creative thinkers, affirm children's self confidence and show that there is many solutions to one problem. Sustained shared thinking is considered fundamental to effective practice and is used in the ground-breaking Effective Provision of Pre-School Education (EPPE) project and is also mentioned in Development Matters under the characteristics of effective learning, research has shown that sustained shared thinking improves outcomes for children by supporting holistic development. Sustained shared thinking can be achieved by practitioners who have the knowledge and understanding of what sustained shared thinking is and how the practitioner can support young children's learning effectively and have knowledge on how to combine theory with practice, using sustained shared thinking within the environment and/or setting is a powerful way for practitioners to model to children how to think about thinking or metacognition (Brodie, 2014 p2). Bandura (1925) Social Cognitive Theory is based on research that contributes to children's behaviour, it is said that children mimic and are influenced by adults modelling behaviour. Bandura (1925) claimed that children learn and develop at a quicker pace by observing adult's behaviour. A high-quality environment and effective adult-child relationships are essential when it comes to sustained shared thinking which is defined by Siraj-Blatchford et al as an episode in which two or more individuals work together in an intellectual way to solve problems, both parties must contribute to the thinking for it to develop and extend (REPEY, 2002). It is said by Parenta (2017) that the role of the adult is to support, extend and engage in the children's learning, the practitioner is to use their knowledge and children's interests to assist and support. Sustained shared thinking is notably similar to Vygotsky's zone of proximal development theory where it is defined as a child moves forward in their learning through interacting with a more knowledgeable child or adult, and Bruner's ideas about scaffolding children's learning. Outdoor Heuristic play is a great example of where sustained shared thinking and metacognition skills can be developed, engaging in heuristic play provides the opportunity to develop their imagination and creativity while providing excitement and challenge. Through Heuristic play children have the opportunity to experiment through problem solving, the practitioner should explicitly support pupils to develop independent learning skills which will be a useful tool throughout the life of child into adulthood alongside carefully designed guided practice, choice, and time (Education Endowment Foundation, no date). Time outdoors is a crucial part of healthy growth and development according to National Centre for Physical Development and Outdoor Play. Marion Dowling (2014) referenced Tina Bruce's (1987) wise suggestion: "Children who are given choice and real opportunities to take responsibility for their actions are more likely to understand that adults are there as a resource to support their enterprise. Their confidence as decision makers is strengthened as they begin to understand how they can have a stake in their own lives". During the outdoors practitioners should allow the children to make their own choices, choice making will provide the opportunity for learners to become confident individuals, support the child's decision, encourage them but don't force them and respect their decision, practitioners need to be patient and

encouraging towards children's learning new skills and ensure they are given praise for what they achieve (Early Years Careers 2016). Allowing children a voice through choice is considered important in early years and is reflected throughout the EYFS documents, by allowing decision making supports effective practice and meets Article 12 of the United Nations Convention on the Rights of the Child (UNCRC) (no date) which highlights the importance of giving children a voice. Promoting and providing the opportunity for children to be heard develops and promotes children's self-esteem and self-worth. In order for children to play and explore, actively learn, and critically think while feeling confident in their environment, ensure the children feel valued, allow choice and decision-making during feelings, emotions, choice, and opinion (Early Years Careers, 2015). Every child has the right to be heard, and that their thoughts are valued. Children with additional learning needs (ALN) may require additional tools or aids to communicate, practitioners must be knowledgeable on each child's need and not discriminate which is inline with UNCRC article 2 (Carmarthenshire County Council, 2021).

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