

1.



(Source: Williams, 2021)

2.

The selected image displays a suburban environment, typical of many gardens across the United Kingdom, with elements of nature provided by the surrounding trees, bushes and shrubbery. The three areas of focus highlighted for discussion are firstly the opportunities

to explore animal lifecycles and seasonal changes, secondly the large pallet and smaller bits of wood incorporating loose parts theory and finally the overall involvement, tactile application and initially overlooked versatility of the small yellow stones.

The area is flanked on two sides with lush green bushes, a product of the ample British summertime. As a result of the current seasonal sunny weather, two of the bushes, Himalayan Honey-Suckle and Rosehip bear small, berry-like fruit completely safe to be handled and non-toxic or harmless if accidentally ingested. The berries potential applied benefits are twofold, firstly with the surrounding fauna drawn to the area. Small songbirds constantly flitting down for a snack provide the opportunity to discuss and identify the abundant and varying bird species. This allows for a closeup introduction and potentiating further learning opportunities with expansions aided with informational books and guides such as *The RSPB Book of British Birds* (Holden and Gregory, 2021). The number of ornithological visitors during this process can be increased with the simple implementation of one or more bird houses and feeders. The second benefit the berries provide is the opportunity to increase the potency of a potion created in a mud kitchen. A mud kitchen area does not have to cost hundreds of pounds or take excessive amounts of time to construct and can be created easily in any soil bed, alongside plants and beneath the greenery. Simply adding water to dirt and donating an unused large spoon and bowl from a domestic kitchen cupboard can extend play parameters to incorporate messy play. Mud paints can be created and used to decorate stones or a larger collaborative piece could be created on the fence at the rear of the scene. Benefits of the mud paint are the non-permanency and essentially there is no cleaning required as all artworks will be removed by next rainfall. Further opportunities to explore insect lifecycles can be encouraged with magnifying glasses, butterfly nets and bug catching sets creating chances to look underneath leaves, overturn rocks and dig in wet dirt in search of tiny creatures. Returning to this space at various points throughout the year will yield a varied selection of encounters, discoveries and potential learning opportunities. Discussions around the passing seasons, the different physical characteristics and how the changes in the weather patterns affect plant growth and animal lifecycles are all supportive of the contingency to enhance scientific concept comprehension.

In the centre of the scene is a large wooden pallet and a selection of various sized smaller bits of wood. These allow opportunities for discussion around construction such as building a bridge over the path from one lawn to the other. A more advanced session could

introduce screws, screwdrivers, hammers and nails. This implements an element of risk and can be instrumental in supporting development of both fine and gross motor skills. In addition, the proprioception system has the potential to be activated through heavy lifting of the pallet. This incremental increase in risk is considered to herald an increase in attentiveness and the ability to focus on a given task further supporting the potential learning experience. The pallet and large log could create a seesaw balancing apparatus to explore the impacts of gravity and opposing forces. With the introduction of a tarpaulin sheet the chance to create a den arises. All these objects can be manipulated, pushed or pulled and their form can be altered, broken, snapped or added to another item to facilitate opportunities to explore and understand forces and support the natural curiosity of developing young minds. Additional buckets and containers further support loose parts play. Building upon Nicholsons (1972) theory, older or more daring children may use the large barrel in a rolling game. Rolling has been suggested to stimulate both children's kinesthetic and vestibular system with a higher degree of efficacy when compared with swinging back and forth movements. Smaller children brave enough to want to roll can be afforded an element of protection from blankets and pillows that can be used to fill large spaces within the barrel. This limits the amount of movement and potential violent impacts when being rolled.

Running through the garden scene and in plentiful supply are the small yellow stones, also referred to as golden chippings. Their importance could be overlooked from an adult perspective and perhaps their tactile functional adaptability omitted from involvement in various aspects of play. However these abundant loose parts are integral to a plethora of games and activities and support development in both scientific and mathematical concepts, drawing upon these disciplines to enhance a finite understanding of the world. The stones can be used in potions and mixtures aiding creativity. They can also be decanted into various sized containers supporting mathematical concepts such as numbers, counting, size and weight. At first glance all the stones are one colour, all the same shape but upon closer inspection their true allure becomes apparent with all colours being represented and a multitude of shapes and textures presented. Levels of intrigue and excitement can escalate when specific colours or shapes are searched for and found. In addition, flowing along the path are a series of flagstones which can be used as temporary outdoor art canvases. Using mud paints, chalks, water and the stones to make patterns, pictures and collages. These can be simple painted letters or more elaborate artistic installations with stones, sticks and leaves

creating a sophisticated three-dimensional effect. Including elements of sound and music dropping stones in containers with different levels of water can create different pitches, echoes and reverberations to encourage conversations about sound waves. Furthermore, musical shakers can be created using stones, water and two similarly sized cups sellotaped together. Sometimes just filling a pocket with stones can offer the potential for learning opportunities, exploring size, weight, volume and forces.

The Curriculum for Wales places design for current school curriculum within each individual school or educational setting. This allows for a broad and balanced education and the acquisition of a range of experiences, knowledge and skills. Teachers and educational professionals are being encouraged to ‘think outside the box’ to promote these learning opportunities. Science and technology has always driven societal change through innovation, whilst mathematics underpins these developments and every aspect of life, culture and the surrounding environment. To ensure the progression of learners both are crucial considerations for schools when designing their curriculum and contribute to the realisation of the four purposes.

3.

RISK BENEFIT ASSESSMENT

Location / Activity:	Outdoor Garden / Building and Exploration	Date:	15/09/2021
Assessor:	L Williams	Review date:	14/09/2021

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 surrounding bushes and greenery. Collecting berries, leaves, petals and other natural items from soil beds and plants. Children searching for bugs, spiders and insects.	Offers children an opportunity to examine the outdoor environment. Children have a hands-on learning experience discovering plants and insects, promoting discussions around nature, life cycles and seasonal changes.	Berries accidentally ingested. Potential reactions or skin irritations. Clothes could get dirty or stained. Bites or stings from insects. Unexpected animal deposits (faeces or deceased animals). Sharp twigs or sticks in surrounding bushes.	Children and adults.	An initial inspection of the area by the adult prior to the activity beginning could identify any hazards or larger issues. Adult to ensure all plants are safe and non-toxic and to be aware of any allergies, keeping any hypoallergenic medicines at hand. Children should be dressed in weather appropriate outdoor clothing that can get mud or dirt on without fear of reprimand. Adults and children can discuss the proposed activity and any predicted outcomes to prepare expectations and establish boundaries. Before the activity commences all children will wash their hands and adults can establish a nothing in mouths policy. Handwashing will also commence at the end of the activity.	L

Building, constructing with loose parts. Wooden pallet and smaller pieces of wood. Lifting pallet as a team.	Providing opportunity for both gross and fine motor skills. Potential activation of the proprioception system through heavy lifting of the pallet activating inhibitory nerves and having a calming effect along with aiding overall focus.	Sharp edges and uneven sawn wood pieces. Splinters. Heavy pallet could be dropped on toes, fingers, hands or feet. Sharp nails sticking out from the pallet.	Children and adults	Discuss with children about the nature of the items and how an element of precaution should be upheld throughout the handling of offcuts of wood. Explain splinters can be painful but are often easily removed by reversal of the action. Gloves could offer further protection but often restrict the experience. Adults to remain vigilant and present if heavy items are being lifted and transported aiding and supporting when necessary. Adults are to check pallet for any obviously dangerous sharp edges or loose protruding nails or screws.	L
Travelling along the path or balancing along path edging.	Improving balance, gross motor skills and supporting children's vestibular system. Spatial awareness, children becoming aware of their bodies and the limits of what they can do. Developing acute awareness and understanding of slopes and gradients. Supports understanding of scientific concepts, forces such as gravity.	Protruding edging along pathway, children may trip or fall causing cuts, bruises or sprains.	Children and adults	A discussion with the children prior to commencement of the activity around the various surfaces within the area, any harder, rougher surfaces or protrusions to be highlighted. Emphasise the importance of walking slowly until familiarised with the various surfaces. Balancing games can establish ability along with supporting development of the vestibular system. Appropriate clothing to be worn throughout. Correct shoes for the time of year.	L

Barrel rolling Children creating a mud kitchen or mud paints.	When compared with swinging back and forth movements, rolling has been suggested to better strengthen children's kinesthetic and vestibular systems. Potentially activating both inhibitory and activation nerves in the brain. Especially affecting muscle tone in the core back muscles and helping improve and regulate sensory motor health.	Uneven ground Loose gravel underfoot Slippery grass when raining with potential mud	Children and adults	Monitor weather conditions via the Met Office and only commence with activity during appropriate conditions. Adults to discuss with children the varying grip levels on the surfaces and highlight any potential slippery areas where extra precautions should be upheld. Correct clothing and footwear appropriate for the current weather and season. Barrel to be additionally padded with blankets or pillows to fill any expansive voids when used by smaller children. This limits the potential for heavier, damage causing impacts.	L
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The Welsh Government (2020) is currently in the process of beginning implementation of The New Curriculum and subsequently introducing the Curriculum for Wales Framework. The Framework is not an exhaustive list of specific topics and activities to complete but rather guidance for all practitioners, underpinning the key knowledge and skills required for all learners to realise the four purposes. The six areas of learning that support the four purposes are interlinked with practitioners drawing on guidance and resources to create learning experiences that promote curiosity, discovery and encourage children to engage with activities that develop understanding of mathematical and scientific concepts through open-ended, child-led play.

As Bruce (2012) explains, the benefits of outdoor learning was recognised in 1826, with Froebel creating the term 'Kindergarten' which translates as 'Children's Garden'. Currently, Forest Schools are an increasing phenomenon, growing in popularity globally and

becoming more readily accepted as a viable learning route. Initially conceptualised in Denmark 1952, the first known Forest School or ‘Naturbørnehaven’ was created by Ella Flautau (Waller et al. 2017). These community driven initiatives multiplied in number throughout that decade and spread across the country, incentivising child-led play and considering adults as ‘facilitators’ opposed to the former title of ‘teachers’. Presently the diversity of Forest School programmes can be found in many nations across the world. The idea was introduced to the U.K in 1995 after a group of British educational practitioners visited one of the Danish Forest School settings and took some of the teachings, ideals and pedagogies back with them to Somerset. Upon their return they implemented activities, such as wood carving techniques in an outdoor environment, into their own settings (Williams-Siegefredson, 2012). This experiential learning has been suggested to support children’s development by assisting in the attainment of practical skills which transfer to activities outside of school. This is supported by Diaz (2017) that reported preliminary research by Coates and Pimlott-Wilson. Studies conducted in two primary schools in Nottinghamshire, suggested working with others outdoor, on challenging activities, contributes to development of collaborative learning skills. Furthermore as Hemery et al. (2019) indicates, forest schools have been recognised as beneficial by head teachers and group leaders, shifting away from the unnecessary pressures of attainment of numbers and achievement of figures. Again, this provides an inclusive educational experience that develops children holistically beyond basic academic skills.

However, contrary to the growth in popularity of Forest Schools and despite the known benefits, outdoor play and time outdoors overall is in decline. Lee et al. (2021) confirms that, as a main source of moderate to vigorous intensity, physical activity, outdoor play or simply spending time outdoors, supports healthy growth and development among children. Opportunities for children to engage with the natural outdoor environment continues to decrease for a multitude of reasons. Lifestyle changes due to the urbanisation of natural living spaces, parental concerns for safety and perhaps most pertinently technological advancements. Furthermore, the use of outdoor spaces and play among children has been directly affected negatively by the COVID-19 pandemic on a global scale (Dunton, Do, and Wang, 2020) (Mitra et al. 2020).

The additional health benefits of replacing indoor time with outdoor time was studied by McCormick (2017) with research suggesting a correlation between time outdoors and overall health benefits. Associatively, mental health and behavioural problems are increasing corresponding with children spending more time indoors and less time outdoors. Evidence suggests the benefits of children spending more time outdoors in nature are improved behaviour, better overall health and mental well-being along with increased cognitive development and advancements in social skills. Results in a study by Taylor, et al. (2001) revealed reduced symptoms of ADHD in children after exposure to nature compared with children that stayed indoors. Addressing the concerns raised about the increasing levels of sedentary behaviour in young children, Ouvry and Furtado (2020) suggest a Forest School setting can significantly impact on the levels of physical activity children engage in, with increased levels of intensity activating both the kinesthetic and proprioceptive systems. Our muscles house the kinesthetic nerves and our joints house the nerves of the proprioception system with both being stimulated by intense physical exercise and both potentially activating both inhibitory and activation nerves in the brain. Activation of these nerves filters unnecessary information that usually bombards the brain and nervous system, allowing some of the irrelevant stimuli to be ignored and for attentions to remained focussed on desired intentions. However, Wainwright (2021) argues that for children's full movement vocabulary to be realised then play alone is not sufficient. Children learn about their physical limitations primarily through play, understanding their movement capabilities and developing fine and gross motor skills. However, some phylogenetic skills may require an assortment of opportunities in a variety of environments, locomotor skills specifically require appropriate instruction, adequate modelling and ample opportunities for practice to develop pertinently, suggesting a balance between outdoor and indoor learning should be combined to impact positively on children's holistic development.

Further opportunities to expand learning through outdoor activities are not solely limited to physical advancements, as development of both mathematical and scientific concepts are not limited to the classroom. The outdoor environment affords a wealth of opportunities to children in an early years setting, facilitating the implementation of mathematical and scientific concepts through language and discussion. Children extend their knowledge through active exploration of the outdoor environment, making sense of their experiences and encounters via discussion and argument, forming new ideas and eventually becoming capable of independent creative and logical

thought (Brown, 2013). As Kozulin (2003) explains, the underpinnings of Russian psychologist Lev Vygotsky's theory holds that cognitive development is extended through play, the leading source of development in an early years setting, and thinking is facilitated through discussion with the more knowledgeable other. Furthermore, children practice already established skills as well as developing new ones through play, developing higher cognitive function through dramatic and make-believe play. Interestingly, in contrast to Vygotsky's theory, Piaget believed the only benefit derived from play was pleasure. Piagetian theory presents the argument that play does not result in the creation of new cognitive structures and merely provides children the opportunity to practice previously learned skills and ideas (Piaget, 2001).

Nicholson (1972) presented the theory of loose parts whilst simultaneously questioning the predetermined cultural conditioning and entrenched, misplaced belief systems that creativity belongs only to a select group of individuals. Nicholson argued that the gifted few or academic elite that achieve degree status and learning certificates were no different or any better than their counterparts but were perhaps merely afforded the correct opportunities during the childhood developmental stage. Offering many possibilities for open-ended learning, loose parts play can include anything from pebbles and leaves to bottle tops and sticks. As Daly et al. (2015) explains, loose parts play can be anything that promotes problem-solving thinking and theoretical reasoning. As the child interacts with the loose parts they enter a world of 'what if', enhancing their ability to see solutions through imaginative thinking and instilling a sense of adventure, discovery and excitement to their play experience. Building on Nicholson's initial theory, Robertson (2017) explains the suggested benefits of learning outdoors and states that through the experiential process of messy play children can better make sense of abstract mathematical concepts. The world and all aspects of the surrounding environment is filled with numbers (Pitici, 2014). Mathematical theory and concept is an innate part of human existence. The outdoor environment enables cognitive processes to flourish whilst supporting the social, emotional and physical experiences developing children require. Being outside allows children to discover an endless supply of numbers, quantities, shapes, patterns, weights, textures and colours. Specifically, understanding the concept of weight is implemented through repeatedly lifting and moving a range of variously weighted objects. Furthermore, outdoor learning provides an element of tangibility and real-world application to an otherwise disconnected learning experience. As (Haylock and Cockburn, 2017)

state, mathematical concept can be regarded as an interconnected network of cognitive processes, linking symbols, language, pictures and experiences. Through outdoor learning children are afforded adequate development time. Through the experiential process children can make sense of the concepts introduced. Initial involvement, overall enjoyment and further discussion promotes sustained shared thinking around mathematical concepts (Polechova, 2017). Correspondingly, Hejny (2018) holds a similar understanding to Nicholson, believing that mathematical thinking holds the potential for development in all learners and is not reserved solely for a small fraction of the mathematically inclined. Furthermore, Hejny suggests children need to construct a network of cognitive processes based upon real-life experiences and that learning and understanding a new idea relies on the ability to connect that idea to a previous experience. These memory structures, or schemes, incorporate clusters of information underpinning the theory that comprehension is not a series of isolated facts and that understanding is developed through gathering meaningful and functional experiences via a range of stimuli.

The outdoor environment also facilitates the implementation of scientific concepts. As Sargent (2015) explains, children require first-hand experiences of scientific phenomena. Outdoor learning encourages the physical exploration of the world which develops a secure understanding of how the world works. Moreover, learning outdoors promotes scientific enquiry where children can investigate a range of natural occurrences, observe living things and explore a myriad of textures and materials. Discussions can be facilitated around freezing and melting, growth and decay, encouraging children to make sense of their experiences and progress the development of logical and critical thought. The exploration of an unrestricted space promotes questions, discussions and sustained shared thinking allowing new ideas to form and cognitive processes to develop. As Watts (2020) indicates, children need sensory experiences and the outdoor learning environment offers a wide range of potential learning opportunities throughout the year. This allows children to interact with the elements and their natural world, strengthening the meaning of their interactions and subsequently supporting learning development. Furthermore, Watts continues, outdoor learning encapsulates a sense of freedom regarding adult-child observation, allowing children to respond to situations in a stimulating environment and for practitioners to observe these interactions and to expand upon these learning experiences throughout the year. Most children display a natural excitement when outdoors. Finding a frog, seeing a bird catch a worm or discovering an icy puddle can intensify an experience and solidify it to memory. However, as Tiplady and Mentor

(2021) state, some children may display signs of nervousness or anxiety especially around interactions with small animals or insects while others may struggle with impulse control and a destructive element. Through repetition of positive engagement and promoting understanding, the enthusiastic adult can facilitate the abolition of fears to create a positive outdoor learning experience, with both adult and child sharing the excitement of discovery. As Waite-Stupiansky and Cohen (2020) explain, scientific discovery and research is a collaborative undertaking, with adults carefully designing experiences within stimulating environments, providing the opportunity to develop learning. All children deserve the personal fulfilment associated with understanding the natural world. Furthermore, the necessity for scientific literacy is pertinent with scientific activities and subsequent inquiry acting as a vehicle in support of the development of literacy and mathematical concept.

In conclusion, the current emphasis from Welsh Government is supporting schools to tailor their own curriculum based on the resources at their disposal. Furthermore, a growing popularity in outdoor learning and Forest School settings are facilitating the implementation of mathematical and scientific concepts with improvements in physicality, emotional well-being, cognitive processes and social interactions noted. This holistic approach to learning and development holds the potential to advance all learners through education and the curriculum due to the abundance of potential learning opportunities and experiences afforded by the outdoor environment.

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