

I have not used any AI tools during this assignment.

2107308
Tiegan Dickeson

Awe and Wonder- Science, Mathematics and the outdoors ECEY5005

Part 1



Image; Parry (2022)

Part 2.

Mud kitchens, as seen in the above image, are set up with water and recycled flowers, providing young children with an engaging and fascinating setting in which to explore fundamental mathematics and ideas related to science. In addition to participating in sensory investigation, children may experiment with the properties of materials in this environment by mixing water and mud, observing changes and discovering texture. Measuring, pouring and combining substances naturally exercises fundamental mathematical abilities including volume counting and spatial awareness. In addition to encouraging a love of learning, this fun activity lays the groundwork for future academic success by fostering critical thinking and problem-solving abilities for the future. Education Corner (2024) supports this theory.

Curricular outdoor learning is the practice of teaching curriculum topics in the school's outside space. Children can get encouraged and assisted in learning about language, art, physics, biology and mathematics by doing this. This is supported by the fact that the image above has a variety of natural elements, like water, sticks and flowers, all of which may be modified on a daily basis to heighten the sense of wonder in learning. For example, flowers may be counted and sticks could be used for measurement. As children work together to make discoveries, using these materials helps them develop their social skills in addition to their creativity. As a way to engage with other people in

I have not used any AI tools
during this assignment.

2107308
Tiegan Dickeson

Awe and Wonder- Science, Mathematics and the outdoors ECEY5005

the future, they learn how to share resources, arrange responsibilities and express their opinions. Children are also encouraged to engage with nature with outdoor learning, which increases their curiosity about the world and experiencing environmental responsibility. According to Alfresco Learning (2024), this holistic approach to education generates well-rounded people who are prepared for lifelong learning.

Using mud kitchens, children would have access to a variety of materials. These materials might either be discovered in the outside environment or set up ready for children to undertake their own outdoor learning. For instance, children might choose their own grass for the mud kitchen, while pre-cut flowers and water may be set up there. Young children would be particularly interested in this since they could use and create a wide range of things with these items, such as "potions," and experiment with various textures. The child's interest would be stimulated throughout these sessions, leading them to enquire and wonder about their environment. Naturally, questions like "why does the mud feel different?" "why does the water change colour when mixing the flowers?" "why do the flowers not sink?" and "why does the mud go hard?" but also questions can adapt and progress, for example, "Why is the mud still a little hard with only one scoop of water?" and "Will it change again with three scoops?" are examples of scientific questions that children might also include mathematical parts in.

Furthermore, as it can be seen in the above image, an assisting adult has set up this space outside and included a range of natural items, including vegetables, mud, pinecones, old flowers and fresh flowers. Children may discover and pick up insects and worms from the bark on the ground, which will increase their curiosity about the diverse species that live in different habitats. They could wonder, "Where are worms from?" "What makes them different from ants?" and "How come I can see a hundred ants but only find one worm?" This turns into advancing scientific understanding. These investigations develop critical thinking skills in children by allowing them to link ideas and solve problems while interacting with their natural environment. S. Louis (2016) believes that schemas are recurrent patterns observed in children's behaviour, which are intimately associated with the formation and reinforcement of cognitive structures in the brain. The modified Early Years Foundation Stage (EYFS, 2012) mandates practitioners to observe, listen and document children's interests as an essential stage in understanding each new child. These schemes are essential for children since they aid in their

I have not used any AI tools during this assignment.

2107308
Tiegan Dickeson

Awe and Wonder- Science, Mathematics and the outdoors ECEY5005

understanding of the world and playing a crucial role in their play and development. Athey (2007) states that some children will also have schemas, which are repeated patterns of behaviour through which children make sense of the world. The mud kitchen provides rich opportunities for schema play that assists in the learning of mathematics and science such as a trajectory schema, children would pour water from jugs or sprinkling petals into pots supports understanding of gravity and flow, also an enclosure and containment schema which would be filling containers with mud, petals, or pinecones demonstrates early capacity and conservation concepts, another schema is rotation schema children could be stirring mixtures with sticks or turning pinecones develops awareness of circular motion and transformation and also a transforming schema children would mixing substances and observing changes (colour, texture, solidity) provides foundations for scientific inquiry into material properties.

Part 3

Risk benefit assessment (activity)

Activity / Hazard	Benefit	Risks		Risk Level	Elimination / Control Level	Who	Progress
The children have contact with mud and soil	Healthy bacteria Exploring different textures.	Could be digested.		LOW	This could be eliminated by children thoroughly washing their hands.	Educators and assisting adults.	
Children playing with flowers and plants.	Experimenting difference in weight and why some float. Exploring different textures.	Could be ingested. Allergic reaction.		medium	Having an assisting adult present to help. Speaking to parents in advance about any reactions or hayfever.	Educators and assisting adults.	

I have not used any AI tools
during this assignment.

2107308
Tiegan Dickeson

Awe and Wonder- Science, Mathematics and the outdoors ECEY5005

Children could slip on wet surfaces.	Children could investigate the science of friction and gravity.	Children could fall and become hurt.		Medium		Educators and assisting adults.	
Mud could be contaminated.	Children could be checking the area with the assisting adult.	Children could fall ill. Contaminated mud could be ingested.		High	Check all areas before children play. Remind children that they must wash their hands after play. Remind children that mud does not go into their mouths.	Educators and assisting adults.	
Children playing with Water.	Children using science and mathematical concepts through play. Children creating potions.	Children could drink contaminated water. The area could become slippery. Clothes could become wet. Stagnant water.		Medium	Encouraging children to be careful and changing water to fresh when needed.	Educators and assisting adults.	

I have not used any AI tools during this assignment.

2107308
Tiegan Dickeson

Awe and Wonder- Science, Mathematics and the outdoors ECEY5005

Dirty and wet clothes and shoes.	Children are responsible for their belongings. Children learn to be careful and use aprons.	Children could begin feeling cold and upset.		Low	Having parents bring children into their old clothes. Bringing spare clothes.	Educators and assisting adults.	
Playing with insects and animals.	Exploring scientific elements and supporting questioning. Learning to be gentle with animals and	Insects could bite, sting and hurt children. Children could have an allergic reaction. Children putting insects near their mouths.		High	Encouraging children not to pick up or disturb the insects.	Educators and assisting adults.	

Part 4

The purpose of Wales' new curriculum is to promote a child-centered pedagogy, which is a teaching approach that is dynamic, sensitive and founded on solid relationships. Even while the curriculum includes the fundamentals of good pedagogy, it is especially crucial to make sure that the learning environment consistently offers opportunity for play and play-based learning, intentional learning experiences and the outdoors and literacy in physical terms (Protheroe, 2022).

Welsh Government (2015) suggests by using the new curriculum, In Wales, the Foundation Phase, which was implemented in September 2010, it is beneficial for the children and learning experience. This is the statutory curriculum for all children aged

I have not used any AI tools during this assignment.

2107308
Tiegan Dickeson

Awe and Wonder- Science, Mathematics and the outdoors ECEY5005

three to seven. It stimulates children's imagination and creativity and improves the effectiveness and enjoyment of learning. By children using the outdoor learning and play-based learning they are having a sense of Awe and Wonder to which they then try and resolve problems using different skills. The Welsh Government (2015) and Protheroe (2022) emphasise that the Curriculum for Wales positions the child as an active learner, emphasising that learning should be experiential, play-based and rooted in meaningful contexts, such as the outdoors. The mud kitchen presented in the image above offers a context that enables children to develop mathematical knowledge and scientific reasoning through the investigation of natural and recycled resources, such as pinecones, wildlife, soil and water. There are many mathematical concepts that are important to early childhood education that are organically stimulated by engaging in play in the mud kitchen.

Early Excellence (no date) describes the importance of the Reggio Emilia approach, which was developed in the following war Italian city and was advocated for by Loris Malaguzzi, this is a child-centered pedagogy that recognises children as capable, inquisitive learners and cherishes their countless language of expression. The approach is fundamentally based on the conviction that the environment itself serves as a teacher. Spaces, both interior and outdoor, are intentionally designed to encourage exploration, prompt enquiries and maintain the interest of children. Reggio practice does not include aesthetic accessories such as awe and wonder but rather, they are used as learning fuel. The conditions for what researchers refer to as "sticky" moments of awe are established by meticulously curated environments, which include natural light, purposeful materials and many opportunities to handle, measure and also revisit things. These experiences are designed to foster sustained curiosity, memory and also deeper engagement. In the Reggio frame, children calm down, ask questions, test ideas and construct representations when they encounter something unexpected such as an insect, a shifting shadow, or a puddle reflecting sky. These are all core learning movements. Reggio principles are a natural extension of outdoor learning. Variability, scale, sensorial richness and random events that are impossible to replicate indoors are provided by the outdoors. These include seasonal changes, weather effects, living plants and animals and spatial challenges that facilitate motor development and

I have not used any AI tools
during this assignment.

2107308
Tiegan Dickeson

Awe and Wonder- Science, Mathematics and the outdoors ECEY5005

problem-solving. It is crucial to note that outdoor Reggio experiences are both pedagogically beneficial and health-supportive as they have been robustly linked to cognitive, emotional and physical advantages for children, including improved attention, richer spatial reasoning and improved wellbeing.

Reggio educators utilise outdoor spaces to promote astonishment in a practical and deliberate manner. Teachers document and observe the interests of children and subsequently collaborate to create provocations such as a loose-parts, a magnifying glass table and reflective surfaces that encourage experimentation and the development of multiple expressive languages such as drawing, sculpting, photographing, storytelling. The outdoor environment serves as a dynamic third teacher promoting the expansion of children's ideas through the use of time and materials, rather than the immediate suppression of them by adult responses. This open, inquiry-rich stance changes ordinary outdoor moments into generative learning strands. Therefore, blending Reggio principles with powerful outdoor programmes provides a research-supported, rigorous and thoroughly human learning experience for educators who aspire to promote enduring curiosity and respect for the environment.

When children pour water from larger vessels into smaller containers, they are demonstrating their exploration of conservation and capacity. Piaget (1952) indicated that children frequently evaluate in terms of height or length rather than actual volume. Through repeated play that involves pouring, filling and unloading, children develop the ability to reason about proportions by observing the amounts remain consistent despite changes in container shape (Worthington & Carruthers, 2021). Additionally, opportunities for understanding numbers and counting arise. such as when a child declares, "I need five petals for my food " adults can assist the children by moving their learning forward by responding to this like; 'I can only find three petals, but let's look to see if we can find some more'. Children's early relational number skills and estimation abilities are enhanced by the natural variation in objects, such as large and small pinecones, which encourages them to compare groups (Haylock & Cockburn, 2017). Also supporting the investigation of gravity and promotion is the weighing scale depicted in the mud kitchen image above, balancing soil against pinecones offers a tangible

Awe and Wonder- Science, Mathematics and the outdoors ECEY5005

experience of comparison, a principle Bruner (1960) refers to as representation. This principle posits that mathematical concepts are initially comprehended through physical manipulation. Furthermore, children's actions are influenced by their understanding of geometry and spatial awareness such as balancing sticks across containers or arranging blossoms in patterns, they are introduced to the concepts of orientation, position and shape. Early spatial reasoning is acknowledged as an accurate indicator of succeeding mathematical success (Mix & Cheng, 2012). Additionally, adult scaffolding facilitates this type of play, educators can encourage children to answer queries such as "Which pot do you think will hold more water?" to correspond with Vygotsky's (1978) Zone of Proximal Development (ZPD). or could ask "How many scoops do you need to fill this pan?" These interactions not only facilitate mathematical reasoning but also encourage metacognition, which involves children evaluating, monitoring and planning their strategies (Whitebread et al., 2009).

in addition to children learning mathematics concepts in outdoor play, The mud kitchen also offers an appropriate setting for the development of scientific knowledge and skills through direct investigation, such as combining soil and water, children are exposed to the material properties and states of matter. Children will observe the transformation of dried soil into sticky clay, thereby investigating the concepts of texture, saturation and reversibility (Harlen, 2018). many children may additionally place flowers to water results in colour changes, which introduce concepts of pigment transfer and dissolution. Johnston (2005) suggest that children will also further investigate experiments that involve floating and sinking and combining predictions such as "Will this flower float or sink? are prompted by the fact that pinecones and petals float, while soil and stones sink. This demonstrates the formulation of theories and sets the initial conceptual underpinnings for buoyancy and density. The mud kitchen's natural products are directly linked to the natural world, pinecones enable conversation regarding spreading seeds, while withering flowers educate children discussing plant requirements and life cycles such as why it is important to water plants, why do flowers need sun. (Siraj-Blatchford et al., 2002). Allen and Whalley (2010) also would state that soil play often ends up in relationships between insects or worms, which raises questions about the environment such as, "Why are worms in the mud but not in the water?" "why are there so many ants?" This curiosity is a function of the early scientific classification and understanding of habitats (Allen & Whalley, 2010). These important experiences are suggestive of Bruner's (1960) concept of a spiral curriculum, in which children re-examine concepts, such as change, development or conservation at continually higher levels of difficulty. They also embody the awe and wonder that are

I have not used any AI tools
during this assignment.

2107308
Tiegna Dickeson

Awe and Wonder- Science, Mathematics and the outdoors ECEY5005

emphasised in the Foundation Phase, where inquiry leads to critical thinking and problem-solving (Protheroe, 2022).

In summary, the mud kitchen serves as a great example of how the principles of mathematics and science can be implemented in outdoor play-based learning environments in accordance with the Curriculum for Wales. The use of schema play and material exploration enables children to develop capacity, measuring, quantity and spatial awareness. Furthermore, these developmental activities may facilitate the exploration of scientific concepts, including density, states of matter, lifecycle and ecology, by children. The mud kitchen in the picture above is used as demonstration of the ways in which cognitive development and metacognitive awareness are fostered by playful, hands-on inquiry. This concept is supported by the theories of Piaget, Vygotsky, Bruner, Athey and Reggio Emilia. This, in addition to the enhancement of early learning abilities, promotes the development of a lifetime curiosity, endurance and problem-solving skills.

References

(Alfresco Learning, 2024)

<https://www.alfrescolearning.co.uk/blog/the-power-of-curriculum-outdoor-learning-enhancing-education-beyond-the-classroom#:~:text=Definition%3A,effectively%20in%20an%20outdoor%20setting.>

Allen, S. & Whalley, M. (2010). Supporting Pedagogy and Practice in Early Years Settings

https://api.pageplace.de/preview/DT0400.9781844457052_A24167988/preview-9781844457052_A24167988.pdf

Athey, C. (2007). Extending Thought in Young Children: A Parent–Teacher Partnership

https://api.pageplace.de/preview/DT0400.9780857026668_A23729434/preview-9780857026668_A23729434.pdf

Bruner, J. (1960). The Process of Education

http://edci770.pbworks.com/w/file/attach/45494576/Bruner_Processes_of_Education.pdf

Clements, D. & Sarama, J. (2014). Learning and Teaching Early Math

<https://www.scribd.com/document/482879400/Learning-and-Teaching-Early-Math-pdf>

I have not used any AI tools
during this assignment.

2107308
Tiegan Dickeson

Awe and Wonder- Science, Mathematics and the outdoors ECEY5005

Early excellence (no date)

<https://earlyexcellence.com/practice-and-pedagogy/reggio-emilia-approach/>

Edwards, C., Gandini, L., & Forman, G. (2012). The Hundred Languages of Children: The Reggio Emilia Experience in Transformation.

<https://www.scribd.com/document/645615336/The-Hundred-Languages-of-Children-the-Reggio-Emilia-Experience-in-Transformation-3rd-Edition-Carolyn-P-Edwards-Lella-Gandini-Etc>

Harlen, W. (2018). Teaching Science in the Primary School

https://api.pageplace.de/preview/DT0400.9781315398891_A34371555/preview-9781315398891_A34371555.pdf

Haylock, D. & Cockburn, A. (2017). Understanding Mathematics for Young Children.

<https://www.froebel.org.uk/uploads/documents/FT-Outdoor-Play-Pamphlet.pdf>

Johnston, J. (2005). Early Explorations in Science

Learning corner (2024) <https://learningcorner.co/activity/141297>

Mix, K. & Cheng, Y. (2012). The Relation Between Space and Math: Developmental and Educational Implications. *Advances in Child Development and Behavior*, 42, 197–243.

Parry (2022) <https://www.cosydirect.com/blog/choosing-a-mud-kitchen/>

Piaget, J. (1952). The Child's Conception of Number

Protheroe (2022)

<https://kinderly.co.uk/2022/06/07/a-new-curriculum-for-wales-2022-all-you-need-to-know/>

Protheroe, L (2022). Curriculum for Wales: A Child-Centred Approach

S.Louis(2016)<https://www.communityplaythings.co.uk/learning-library/articles/schemas-by-stella-louis?srsId=AfmBOopmSS9NEeTqgNsCW2J4Ba8pl7hfAhscb4OsCefr34BjXCRpl1mG>

Siraj-Blatchford, I., Sylva, K., Muttock, S., Gilden, R. & Bell, D. (2002). Researching Effective Pedagogy in the Early Years <https://dera.ioe.ac.uk/id/eprint/4650/1/RR356.pdf>

Vygotsky, L. (1978). Mind in Society

https://w.pauldowling.me/rtf/2021.1/readings/LSVygotsky_1978_MindinSocietyDevelopmentofHigherPsycholo.pdf

I have not used any AI tools
during this assignment.

2107308
Tiegan Dickeson

Awe and Wonder- Science, Mathematics and the outdoors ECEY5005

Welsh government (2015)

<https://hwb.gov.wales/storage/d5d8e39c-b534-40cb-a3f5-7e2e126d8077/foundation-phase-framework.pdf>

Welsh Government. (2015). Foundation Phase Framework

<https://hwb.gov.wales/storage/d5d8e39c-b534-40cb-a3f5-7e2e126d8077/foundation-phase-framework.pdf>

Whitebread, D., Coltman, P., Pasternak, D., et al. (2009). The Development of Metacognition in Young Children: Implications for Education. Cited

<https://link.springer.com/article/10.1007/s11409-008-9033-1>

Worthington, M. & Carruthers, E. (2021). Children's Mathematics: Making Marks, Making Meaning