

ECEY5005 Portfolio**Contents**

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Basic Acknowledgement format of AI tool use

I confirm that I have not used any AI tools in the research and creation of this assignment. I confirm that I have not presented any AI generated materials as my own work. I confirm I have copies of my drafts, notes, and other resources I used, which I may be asked to provide in evidence

Part 1: Photograph



(Source: Preece, 2026a)

Part 2: Learning Story

This learning story takes part in a garden connected to the school. The garden has a greenhouse, a tree, plants, rocks, and a pond at the back. Loose parts are also available, such as sticks, pebbles, and leaves. A group of 5 reception children, aged 4-5, were taken to the garden to explore and discover what they can find in a natural environment. The class teaching assistant, Miss Preece, joined the children, to observe them and support their curiosity. They put on their coats and wellies as it was lightly raining and muddy. They brought additional resources along with them, such as clipboards, and pencils.



The children started to explore the garden. They looked at the tree and expressed awe in how tall it was. Some tried to climb the tree and felt how rough the bark was, while others were balancing on rocks nearby. Child C and Child D investigated logs near the pond. They work together to lift a log and exclaimed how heavy it was. They exclaimed “Miss Preece! We’ve found insects! A big one and little one!” Miss Preece came over and gasped

(Source: Preece, 2026b)

enthusiastically. “Well done! You’ve found some woodlice. Why do you think they are under the log?” The children answered “They live there! They must like the dark and cold.” Miss Preece was curious to test the children’s mathematical skills, so asked, “I wonder how many there?” “1... 2!” Both children shouted. “Da lawn!” Miss Preece praised.

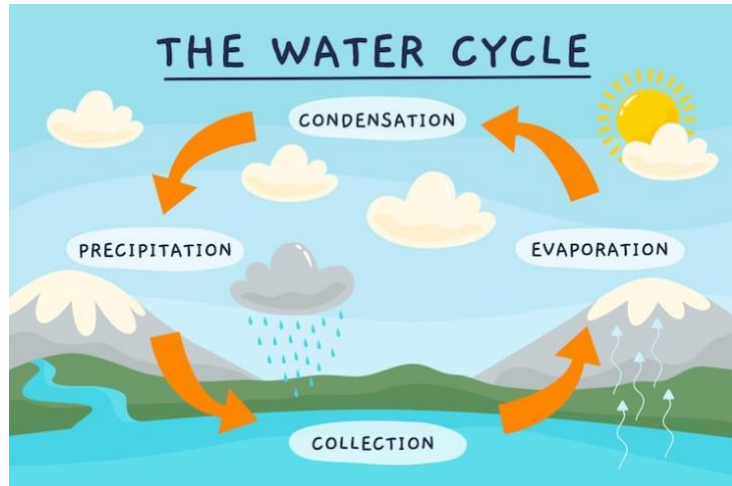
The other children ran over to ask what they were doing. “We’re counting insects! Come play with us” exclaimed Child D. Miss Preece passed the clipboards. The children ran off find more insects. The children were writing down how many insects they found. Within the curriculum are the descriptions for learning. Progression step 1 states that children need to be able to investigate, collect and record data found in their environment (Welsh Government, 2020a). The children reached this step by investigated how many insects they could find and recorded the data on their clipboards. In total, the children found 5 woodlice, 2 snails and 3 worms. The children worked together to add all the numbers of the insects they found. This means the children have reached progression step 2, by being able to add whole numbers using a variety of written and mental methods (Welsh Government, 2020a).



(Source: Preece, 2026c)

The children continued exploring. Some were looking at the flowers and admiring their beauty. The children noticed that there were rain drops sitting on the daffodils, near the pond. The children were looking in the pond and looking back at the rain drops on the daffodil. Child A said “Wow! Where did the water come from?”. This links to curriculum. Progression step 1 states that children need to show curiosity and question how things work (Welsh Government, 2020c). Child A shows this curiosity by questioning where rain comes from. Miss Preece noticed that this was a teachable moment and decided to act on the children’s curiosity.

Miss Preece explained that water on earth moves between the lakes, rivers, seas, the atmosphere and the land, in an ongoing cycle called the water cycle. It is a continuous system, and the water on earth is being recycled over and over again. Child B asked, "What happens next?". Child B showed curiosity by questioning what happens next, reaching progression step 1 (Welsh Government, 2020c).



(Source: Freepik, n.d.)

Miss Preece carried on by explaining that the sun heats the surface of the earth, causing the temperature of the water in the rivers, lakes and sea to rise. When this happens, the water 'evaporates' into the air, turning into 'vapour'. This is called evaporation. Then, as the water vapour rises up into the sky, it cools down and turns back into a liquid, which forms the clouds. This process is called condensation, and the wind high up in the sky move these clouds around the world. Child C exclaims "Wow! Water goes all around the world!" Miss Preece responded "Yes! Isn't that amazing!" She continued by explaining the water cycle. When the water has condensed, the water droplets in the clouds become too heavy for the air to hold them. So, they fall back onto the earth in the form of rain, snow, or hail. This is called precipitation. The fallen rain is then collected in bodies of water such as rivers, lakes and oceans, and eventually evaporate back into the air, beginning the cycle all over again. The children expressed awe and wonder.

Miss Preece asked the children to explain what she just said. Child C answered, "water on the ground goes up in the sky and turns into rain clouds! It moves around the world, getting heavy and then it rains." Child A adds "this happens over and over again!". Miss Preece praised the children then asked, "What do we use water for?" Child D responded, "to drink." Child E answered, "to wash our hands." Child A said, "to have a bath." Then, Child B stated, "to water flowers, so they can grow!". Child A

showed that they have reached progression step 1, recognising that plants are living things and grow (Welsh Government, 2020c). Child C sadly said, “there are not many flowers in the garden.” Child D suggested that they could plant flowers. Miss Preece proposed that they could grow sunflowers in the greenhouse. The children cheered excitedly.

The children made their way to the greenhouse, followed by Miss Preece. Child E asked, “what do we need to plant a sunflower?” Child C responded, “Mud and Pots!” Child B shouted, “Seeds!” The children have reached progression step 1 in the curriculum by being able to explore the environment, make observations and communicate their ideas (Welsh Government, 2020c). Child A asked, “Miss Preece, what else does the sunflower need?” The children once again showed progression step 1, by being curious and questioning how things work (Welsh Government, 2020c).

Miss Preece explained that plants need just the right amount of water to grow. When it rains or we water the plant, the water is soaked into the soil, and the plant takes up the water through its roots. It then travels up through the stems to the leaves. Without enough water, the plant will not be able to stay alive. Child D said “Wow! The sunflowers need water just like us!” Then Miss Preece stated that plant’s need just the right amount of light to grow into a healthy plant. They need light to grow and if the plant does not have enough light, they are not able to make food and will die. Miss



(Source: Preece, 2026d)

Preece asked, “where does light come from?” The children shouted, “the sun!”. Miss Preece praised the children, “Da iawn! Plants need the sun to get light.” The children have reached progression step 1, by understanding and communicating that the world around us is full of living things which depend on each other for survival (Welsh Government, 2020c). They were able to explore living things, their habitats and what they need for survival (Welsh Government, 2020c).

Miss Preece explained that plants need the right temperature to grow into a healthy plant. It can’t be too cold, or the plant cannot survive. She added “that’s what we can

use the greenhouse for, it's warmer in the greenhouse than it is outside." The children responded by nodding and stating that it was warmer inside the greenhouse. Miss Preece finished by saying that plants need time to grow into a healthy plant, just like children do.

The children started planting their sunflowers. They filled the pots with soil, then placed a little seed inside of the soil. They were amazed that a little seed could turn into a big yellow flower. They each watered their flower using a watering can and Miss Preece stated that they can come back every day to water it. After the children finished planting their seeds, they expressed that they were ready for snack time. Miss Preece thanked the children for their enthusiasm and interest in learning through outdoors. The children ran inside excited to tell their friends what they have discovered, over the snack table.

Part 3: RISK BENEFIT ASSESSMENT

Location / Activity:	Garden	Date:	March 26 th , 2026
Assessor:	Caitlyn Preece	Review date:	September 26 th 2026

Experience exploring outdoor space in photograph	How will young people BENEFIT from this activity?	Hazards and associated risks	Who is at risk?	PRECAUTIONS in place to reduce the risk of injury	Overall risk after precautions RATING: L/M/H
Walking on uneven ground	By walking on uneven ground, adults are supporting the children's vestibular sense. Children are beginning to become aware of their own bodies and of scientific concepts such as slopes and gradients.	Children may fall over, which can cause grazes, bruises or other injuries.	Adults and children	Adults will discuss with the children that the floor is not level. Adults will advise the children to try walking slowly until they are familiar with balancing on the ground. Appropriate clothing must be worn, such as long trousers, waterproofs and appropriate footwear.	L

Going outdoors in different weather conditions	Children can become aware of different weather related vocabulary such as cold, wet, dry, warm, hot, etc. This is benefiting the children's understanding of scientific concepts. Children have the opportunity to have messy play if it is raining, for example, being able to play in mud, thus allowing child-led play.	High winds can cause branches to fall causing head injuries including life changing injuries or death. Participants may be too cold, which could cause hypothermia. Participants may become too hot if there is a heatwave, which can cause heatstroke and hyperthermia. Children may become upset or uncomfortable due to becoming wet.	Adults and children	Adults must monitor the weather and not go out in stormy weather, high winds. Additionally, if there is a heatwave, children and adults must not to take part in this activity Adult must ensure that children and adults are dressed appropriate for different weather conditions: • If there's cold or wet weather, children and adults must wear waterproofs, warm layers and wellington boots. • If there's hot weather, children and adults must wear hats, suncream and appropriate warm weather clothing.	L
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Children investigating the things they see such as the pond, rocks, trees, flowers and insects.	Children will have the opportunity to learn about living things and explore the water lifecycles, benefiting the children's understanding of scientific concepts. Children have the opportunity to develop their physical development such as gross and fine motor skills, when bending down, picking up small items such as sticks, and more. By developing their physical development, in turn children are improving their mental health by being in the outdoors. Children are becoming aware of living things and becoming	Children may receive injuries such as eye injuries, head injuries, grazes from sticks. Children may become get stung by insects, or plants such as stinging nettles.	Adults and children	Adults need to discuss with the children that while things may be new and exciting, they need to think before they act. Children will be made aware of irritant plants nearby and told not to go near without an adult. Children must be made aware not to put anything in their mouths and to wash their hands at the end of the activity, which is aiding the children's understanding of personal hygiene.	L
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	ethical citizens, in tune with the Curriculum for Wales.				
Children playing near a pond	Children can observe the insects and plants that live nearby. Children can place loose parts in the pond to see if they float.	Children could slip on the mud nearby and fall into the pond, which can result in minor injuries such as cuts or grazes. Children may fall into the pond may also cause life changing injuries or death. Children may get hypothermia if they fall into the pond.	Adults and children	Ensure that the children are supervised near the pond. Adults must check that the pond is not deep enough for the children to drown in. Discuss with the children that it is slippery near the pond and to be careful near it. Make the children aware that it could be dangerous if they fall into it. Ensure children are wearing appropriate clothing such as waterproofs, wellingtons and warm layers.	M

Children exploring independently in the environment	Children will be able to explore the environment surround them. Children will be able to make their own observations and communicate their thoughts among each other. Children will achieve Curriculum for Wales four purposes: • Ambitious, capable learners • Enterprising, creative contributors • Ethical, informed citizens • Healthy, confident individuals	Children could engage with risky play such as climbing and running. This could result in minor injuries such as cuts and grazes.	Children	Adults should make children aware of the risks of the environment as previously mentioned, such as the risk of falling over or scratching themselves on tree trunks or nettles.	L
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Part 4: Evaluate how adults working with early years children support and encourage children engage with mathematical and scientific concepts in an outdoor environment

According to the Welsh Government (2022), the role of the adult is to set the expectation for learning by creating an emotionally safe environment that supports learning, as well as a child's natural curiosity. Therefore, the role of the adult in supporting children's engagement, with mathematical and scientific concepts in an outdoor environment, is to create an environment that allows children to engage in play and allows the adult to naturally create teachable moments. Therefore, this paper will explore Froebel's ideas of the learning in the outdoors and how the loose parts, provided by the adult, can aid a child's understanding of mathematical and scientific concepts. The Reggio Emilia approach will be looked at to see how relationships between children and adults can impact learning. Additionally, the role of the adult as the observer, as well as the curriculum will be researched to understand the role of the adult in educating in the outdoors.

Piaget refers to children as 'little scientists', who learn through exploring and experimenting in their environment (Rochat, 2024; Tinney, 2022; Halpenny and Petterson, 2014). This is built upon by the pioneer of the kindergarten approach, Friedrich Froebel, who believed children needed to be nurtured by the adults around them in a highly enriching environment (Murphy, 2022; Clement, 2022). Tovey (2013) adds to this, stating that a Froebelian garden is seen as a rich learning environment which can offer a unique learning experience which cannot be provided indoors. Furthermore, Froebel saw the natural world as an influential means for learning about the world (Murphy, 2022). Froebel saw the outdoors as not a playtime area, but as another learning environment which children can freely access throughout the day, no matter the weather (Tovey, 2013). Therefore, Froebel believed that learning within the outdoors was vital for children learning science, such as weather conditions. While Froebel maintained the belief that children learn best through self-chosen activities in the outdoors, a part of his principles emphasise the importance of an adults role during learning (Murphy, 2022; Tovey, 2013). Froebel saw adults as nurturers of ideas who support children to develop their own confidence and skills (Murphy, 2022). This is built upon by Rekers and McCree

(2022), who suggest that an adults role in learning through play is to set up an environment which children can nurture their own learning, such as adding resources to the environment with specific intentions. Moreover, the Curriculum for Wales states that practitioners should give learners the opportunities to explore mathematics in an outdoors environment (Welsh Government, 2020b) Adding on to this, the Curriculum for Wales progression steps states that children must explore numbers in outdoors environments (Welsh Government, 2020a) Therefore, it is the role of the adult to maintain rich mathematical and scientific spaces in the outdoors for the children to be able to develop their own skills, independently chosen.

Ray-Kaeser *et al.* (2018) maintain the idea that an adults role within education is to observe children in a natural play environment. This is important as by practitioners observing children through self-chosen play, it allows them to understand a child's development and know when a teachable moment has emerged (Welsh Government, 2024; Smidt, 2015; Drummond, 1998, cited in Smidt, 2015).

Furthermore, Howe and Davies (2010) give the example of observing children learning scientific concepts. By observing a holistic overview of children's scientific skills through play, children are fully engaged and therefore, will display their own understanding of scientific matters (Howe and Davies, 2010). This is built upon by the Welsh Government (2022), in the curriculum for non-maintained nursery settings, which state that practitioners should carefully observe children to be able to plan for future learning experiences. Adults must take notes of patterns of behaviour as children begin to explore the world around them (Welsh Government, 2022). This can be interpreted as an adults role in supporting children learning mathematics and science in the outdoors is to step back and allow the children to choose what they would like to explore, and only step in when necessary to aid further learning.

According to Macdonald (2022), most children in the early years find that playing with loose parts such as rocks, sticks and stones is very appealing. The loose parts theory was originally developed by Simon Nicholson, who highlighted that loose parts support a child's curiosity, discovery and allow children to develop their problem solving skills (Tinney, 2022). This is built upon by Macdonald (2022), who states that loose parts allow children to have open-ended resources which provide endless opportunities for exploration and curiosity, thus aiding a child's

understanding of mathematical and scientific concepts. This can be done by children having access to an outdoor environment, which can allow them to explore different life cycles or types of living things, thus aiding their understanding of scientific concepts.

According to the Welsh Government (2022), an adults role in educating children is to develop an enabling outdoor environment that is appealing to young children and provides holistic and meaningful learning. This is built upon by Tinney (2022), who states that a practitioner needs to consider the value of children engaging with the natural world, as well as adding loose parts to support children's learning. The Welsh Government (2022) state, in the curriculum for funded non-maintained nursery settings, that children need to be encouraged to use simple mathematical vocabulary when exploring numbers and quantities. Therefore, adults need to set up enabling environments where the children can explore this vocabulary. This can be done through providing loose parts in the outdoors. Additionally, the Welsh Government (2022) believe that practitioners need to be able to support children's cognitive development by providing opportunities for classifying living and non-living things. Therefore, this can be interpreted as adult's must be able to provide an outdoor environment where children can explore the natural world and investigate living creatures such as insects and non-living items such as rocks. This is built upon by Tinney (2022), who states that practitioners, who have taken the time to develop an outdoor environment, are an integral part of a child's experiences in learning scientific and mathematical concepts. Children are able to play without adults suggesting they should be careful or not get messy (Tinney, 2022). By practitioners doing this, children are seen as competent and able to make choices that influence their own experiences, thus allowing children to take learning into their own hands.

This can relate to the Reggio Emilia approach. The approach originated in Italy after the Second World War, where Loris Malguzzi strived for an education where children's different opinions mattered and were valued (Chicken and Whitehouse, 2022; Moss, 2019). According to the Reggio Emilia approach, an adult's role is not to teach a specific series of formulas that can be easily taught and replicated (Rinaldi, 2021). Instead, their role is to be competent in terms more of understandings than pure knowledge, and to possess familiarity in what is important for individual learners

in each situation (Rinaldi, 2021). Therefore, within the Reggio Emilia approach, a practitioners role in supporting children's engagement with mathematical and scientific concepts is to understand what is helpful for the learner in that particular situation, such as if a child is playing with loose parts in the outdoors, the adult could introduce scientific concepts such as weight or size into the play.

Additionally, in the Reggio Emilia approach, the importance of the relationships between the children and adults is seen as central to education, as it allows the learning process to take place, in which several languages or disciplines interact together (Moss, 2019; Vecchi, 2010, cited in Moss, 2019). Vecchi, an educator within Reggio Emilia, emphasises the importance of relationships within education and that without strengthening the relationship between children and adults, there is a danger of education becoming less effective (Moss, 2019). Vecchi (2004, cited in Moss, 2019) adds to this, stating that the damage to social relationships being caused by the culture in education needs to be looked at. Therefore, this can be interpreted that it is vital that a practitioner builds their relationship with the children in their class, as without it, education cannot take place to the highest standard. Furthermore, mathematical and scientific concepts cannot be understood unless there is a strong relationship between the practitioner and children. This need for strong relationships in education is shown in the curriculum for funded non-maintained nursery settings. The Welsh Government (2022), believe that strong relationships must be embedded in child-centred pedagogy. Additionally, the curriculum adds that it is a practitioners responsibility to nurture relationships within settings and to give children the sense of belonging, which is a part of the developmental pathways (Welsh Government, 2022). Therefore, the Welsh curriculum, similarly to the Reggio Emilia approach, values the importance that relationships can have on a child's education. Without this, scientific and mathematical concepts cannot be explored by children in the outdoors until this relationship is built and secure.

However, Krishna and Chetry (2024) would argue that that it is beneficial for children to have a more formal education, within mathematics and science, rather than an informal, child-led education in the outdoors. Krishna and Chetry (2024) point out various studies highlight the importance of formal education in the classroom for the development of cognition during childhood. They use the example of Ariella and

Avner (2010, cited in Krishna and Chetry, 2024), who's study reveals the importance of controlled methods of teaching in education, and that learning in a controlled environment shows better results than informal learning, such as child-led in an outdoors environment. However, it is important to note that this study is outdated as it is over 15 years old and there are more studies now showing this is not the case and that child-led learning in the outdoors is more beneficial, so much so that it is now embedded in the Curriculum for Wales.

In conclusion, adults play a vital role in supporting children to engage with scientific and mathematical concepts. Practitioners must set up enabling environments, with loose parts to allow the children to take part in self-chosen play, thus developing their own mathematical and scientific skills (Welsh Government, 2022; Tinney, 2022). Froebel believed that the best way that children can learn is through play in the outdoors, while being nurtured and supported by the practitioner (Murphy, 2022). This is supported by the Curriculum for Wales, which state that practitioners need to allow children the opportunities to learn mathematical concepts in an outdoor environment (Welsh Government, 2020b; Welsh Government, 2020a). Additionally, the curriculum for funded non-maintained nursery settings state that practitioners must observe children through self-chosen play, and step in once they see that a teachable moment has emerged (Welsh Government, 2024; Welsh Government, 2022). Therefore, an adult's role in supporting children exploring mathematical and scientific concepts, especially in the outdoors, is to step back and allow the children to explore, and only step in when it is necessary to further learning progressions.

Reference List

Chicken, S. and Whitehouse, S. (2022) 'Playful Learning around the World' in Waters-Davies, J. (eds) *Introduction to Play*. London: Sage Publications, pp. 239-251.

Freepik (n.d.) *The Water Cycle* [Image]. Available at: https://www.freepik.com/free-vector/hand-drawn-water-cycle_18895308.htm#fromView=keyword&page=1&position=1&uuid=c049bcac-0c4c-4e80-b111-c59b7c13c8f8&query=Water+cycle+kids (Accessed: 08 March 2026).

Halpenny, A.M. and Pettersen, J. (2014) *Introducing Piaget: A Guide for Practitioners and Students in Early Years Education*. Oxon: Routledge.

Howe, A. and Davies, D. (2010) 'Science and Play' in Moyles, J. (eds) *The excellence of play*. Maidenhead: Open University Press, pp. 154-168.

Krishna, K. and Chetry, K.K. (2024) 'Formal vs. Informal Education: Impacts on Cognitive Development and Learning Outcomes', *International Journal of Research and Analytical Reviews*, 11(1), pp. 659-667. Available at: https://www.researchgate.net/publication/379927823_Formal_vs_Informal_Education_Impacts_on_Cognitive_Development_and_Learning_Outcomes (Accessed: 10 April 2026).

Macdonald, N. (2022) 'What is Play', in Waters-Davies, J. (eds) *Introduction to Play*. London: Sage, pp. 3-12.

Moss, P. (2019) *Alternative Narratives in Early Childhood*. Oxon: Routledge.

Murphy, A. (2022) 'Play Pioneers and their Legacy', in Waters-Davies, J. (eds) *Introduction to Play*. London: Sage, pp. 40-52.

Preece, C. (2026a) *Garden* [Photograph].

Preece, C. (2026b) *Woodlice* [Photograph].

Preece, C. (2026c) *Daffodil* [Photograph].

Preece, C. (2026d) *Plant* [Photograph].

Ray-Kaesler, S., Châtelain, S., Kindler, V. and Schneider, E. (2018) 'The evaluation of play from occupational therapy and psychology perspectives', in Besio, S., Bulgarelli, D. and Stancheva-Popkostadinova, V. (eds) *Evaluation of children's play: tools and methods*. Berlin: Sciendo, pp. 19-57.

Rekers, A. and McCree, M. (2022) 'The Role of the Adult in Supporting Play', in Waters-Davies, J. (eds) *Introduction to Play*. London: Sage, pp. 169-181.

Rinaldi, C. (2021) *In Dialogue with Reggio Emilia*. 2nd edn. Oxon: Routledge.

Rochat, P. (2024) 'The Evolution of Developmental Theories Since Piaget: A Metaview', *Perspectives on Psychological Science*, 19(6), pp. 921-930. Available at: <https://doi.org/10.1177/17456916231186611>

Smidt, S. (2015) *Observing young children: the role of observation and assessment in early childhood settings*. 2nd edn. Oxon: Routledge.

Tinney, G. (2022) 'Outdoor Play', in Waters-Davies, J. (eds) *Introduction to Play*. London: Sage, pp. 108-120.

Tovey, H. (2013) *Bringing the Froebel approach to your early years practice*. Oxon: Routledge.

Welsh Government (2020a) *Mathematics and Numeracy: Descriptions of learning*. Available at: <https://hwb.gov.wales/curriculum-for-wales/mathematics-and-numeracy/descriptions-of-learning/> (Accessed: 08 March 2026).

Welsh Government (2020b) *Mathematics and Numeracy: Designing your Curriculum*. Available at: <https://hwb.gov.wales/curriculum-for-wales/mathematics-and-numeracy/designing-your-curriculum/> (Accessed: 09 April 2026).

Welsh Government (2020c) *Science and Technology: Descriptions of Learning*. Available at: <https://hwb.gov.wales/curriculum-for-wales/science-and-technology/descriptions-of-learning/> (Accessed: 08 March 2026).

Welsh Government (2022) *Curriculum for funded non-maintained nursery settings*.

Available at: <https://hwb.gov.wales/api/storage/b1801d78-38c3-4320-9818-d9996c21aef8/220914-a-curriculum-for-funded-non-maintained-nursery-settings.pdf>

(Accessed: 10 April 2026).

Welsh Government (2024) *Supporting learner progression: assessment*

guidance. Available at: <https://hwb.gov.wales/curriculum-for-wales/assessment-arrangements/supporting-learner-progression-assessment-guidance>

(Accessed: 09 April 2026).