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Cynllun Gweithgaredd <i>Activity Plan</i>		
Gweithgaredd: Activity: Understanding and creating patterns and shapes with natural resources and loose parts.		
Nifer o blant: Number of children: 6	Oed y plant: Age of children: 3	Nifer o oedolion: Number of adults: 3
Lleoliad: Location: Circle time area inside the classroom.	Amser paratoi: Preparation time: 30 minutes.	Amser gweithgaredd: Activity time: 45 minutes.
Adnoddau: Resources: Adults will collect natural resources from the woodland area near the playgroup prior to and in preparation for the activity. These resources will be brought back to the classroom and sorted into groups so the children can easily identify different items. Resources will include sticks, pinecones, soil, and stones, but also loose parts such as buttons and plastic blocks.		
Amcan/ion y weithgaredd: Aim/s of activity: The aim of the activity is to support children's understanding of the many different mathematical skills and concepts. Adults will aim to encourage the learning of different shapes, as well as aiding children to understanding different patterns. This will include counting, as well as exploring different shapes and understanding different sizes. In addition, children will be encouraged to identify patterns and explore their natural instincts to sort and organize items. Finally, the activity will aim to promote the understanding of what needing 'more' or 'less' and 'big' and 'small' means.		
Cysylltiadau â deilliannau: Links to outcomes: By completing this activity, the children will have covered the foundation phase outcomes for mathematical development outlined by the Welsh Government (2015). These outcomes outline a child's ability to count items or objects, understand weights and lengths and identify different shapes and select different materials.		

In addition to this, the activity will support the children's understanding of 2D shapes and how to recreate simple patterns. By using different resources, children will also begin to understand that anything can be counted, and all different things can be different sizes.

This activity also supports the wider curriculum projected for 2022 in Wales by the Welsh Government (2019). This activity allows the children to engage and learn by being hands on and experiencing the different mathematical concepts, rather than just being expected to learn and know them. For children to progress in their mathematical understanding, Welsh Government (2019) states that children need to experience multi-sensory experimental opportunities to understand the 'how's' and 'why's' of different mathematical concepts.

Gwahaniaethu:

Differentiation: The activity is thoroughly planned and is simple, so it is inclusive for all children involved in the activity. Adults must make sure that the activity meets the individual needs of the children, for example providing one to one time with an individual child, who may be struggling with their understanding.

The activity is tailored so that all it meets the individual interests of the child. Children learn best when at play, where they can experiment and be creative. By carrying out this activity, the children will be learning through what they feel is play and it will be a fun experience for them.

Iechyd a diogelwch:

Health and safety: Before commencing the activity with the children, a full risk assessment will be carried out. Inside the classroom, the activity will take place in the circle time area on the carpet. This area will be checked and prepared so that it is suitable for the children to carry out the activity. For example, tables and chairs will be moved out of the way so that children have more space to move around and explore the different resources.

Secondly, adults will supervise children for the entirety of the activity, including tidying the activity away to ensure there are minimal opportunities for any incidents. As well as this, all 3 adults supervising the activity will be qualified in first aid. This is because an accident may still happen, regardless of how well a risk assessment is carried out.

Finally, children will be asked to wash their hands before and after the activity and wear protective aprons. The loose parts available to create mathematical shapes and patterns will be washed and sterilized prior to handling. This would not normally be too much of a concern, however due to the current global pandemic of COVID-19, hygiene and hand washing must be made a top priority regarding health and safety.

Rôl yr oedolyn/oedolion:

Role of adult/adults: To meet the aims of the activity, adults should facilitate and encourage the children to explore the different shapes and resources. However, effort should be made to take a step back and allow them to explore the resources on their own. Adults should observe children playing with the resources freely to allow the child to use their own initiatives, creativity, and be given the chance to reach their own potential without influence. It is also important that the adults create an enabling and explorative environment for the children so that they have the best chance at understanding the different mathematical concepts.

Adults should approach the activity with encouragement and enthusiasm to help make it as engaging as possible. By doing this, children will view the activity as fun and will voluntarily begin learning. As the activity moves along, the children will be encouraged to ask questions and point out the things they notice, thus, they will be unlocking their natural need to know 'how' and 'why'.

Y weithgaredd:

The activity: To begin, the children will be supervised while they wash their hands with warm, soapy water in the sink in preparation for the activity. During this time, another member of staff will put three shapes (a triangle, square and a circle) on the board so that the children can re-create them with the resources provided.

Children will then put aprons on to protect their clothes from potential dirt. Next, the children will proceed to the circle time area where they will see the resources on top of the protective sheet that is laid out on floor. They will then be shown the shapes on the board and it will be explained that they can use any of the resources to create these shapes on the floor.

Next, the children will have a chance to become familiar with the resources available and learn about what the resources are. For the next 20 minutes the children can work together or individually to create the shapes on the board whilst being supervised by the three adults present.

They can use any of the resources for any of the shapes, even using more than one resource for a single shape. With minimal guidance from the adults, the children will be asked open questions such as 'how are you going to create that shape?' 'what is your next move?' and 'what else could you use to create patterns?'

For the final 20 minutes the children can use the resources freely. For example, they may decide to put the sticks in size order or spread the soil out and use their fingers (or the sticks) to draw. They may even decide that they want to sort the materials back into their piles after mixing them all up. By carrying out this activity, the children will be openly exposed to different developmental and learning areas of the current curriculum, and Donaldson's ideas in the wider curriculum for 2022 in Wales.

Evaluation

Upon reviewing the activity plan, there are some limitations to the planning of the activity. Firstly, the activity could have taken place in the woodland area near the playgroup, allowing the children leave the classroom and carry out the activity surrounded by nature. This would have provided the children with the opportunity to collect their own natural resources and explore the natural mathematical environment for themselves.

The Montessori Centre (2020) explains that when children are exposed to the outdoor environment, they naturally begin to use mathematical thinking and skills. As well as mathematical development opportunities, the outdoor environment also provides holistic opportunities for learning such as physical, social, and emotional development. Children will explore a vast range of different patterns and shapes in the outdoors; they will count the many different things they can see and use their imagination to play creatively. Therefore, the Montessori Centre (2020) supports the idea that if the activity were to take place outdoors rather than in the classroom, the children would be exposed to even more opportunities to develop their understanding of mathematical concepts.

A further limitation is that the children would be limited in what resources are available for them to use. It would be more beneficial for children to have access to a wider range of natural materials so that they would be more motivated to engage in mathematical learning. As a result, they would develop their understanding in other learning areas such as science, language, and creativity.

Tucker (2014) supports this by suggesting using natural resources encourages children to ask questions, identify the similarities and differences, and comment on the textures and sizes, even if they look the same. If the children were able to carry out this activity in the woodland, they would be exposed to many more natural resources such as flowers, leaves, trees, and even insects. This would kick-start that natural curiosity within the children, allowing them to widen their knowledge and deepen their understanding of different mathematical concepts. This idea is supported by the new curriculum proposed for Wales for 2022 by Welsh Government (2019), as it states children need to discover, explore and experiment more to create that natural curiosity to learn.

Another limitation is that there is high potential for the adults supervising the activity to become too involved in directing the children, which would result in the activity becoming adult-led. Due to the set shapes on the board for the children to copy for the first half of the activity, it would be easy for the adults to start guiding and directing the children to create those shapes only. Therefore, the children may become disengaged and consider the activity to be unenjoyable. Howard and McInnes (2012) states that children learn best while at play. This supports the idea that the adults should take a step back from the whole activity and observe the children's creations, as sometimes adult guidance can make an activity feel like it is not play. If they do not create the shapes on the board, they may create another shape they have learned, or maybe they may start to sort and count the loose parts. By being left to conduct their own ideas, this keeps the activity child led and they are more likely to engage in the activity fully.

A strength of the activity plan is that for the last 20 minutes, the children would be free to use the resources in whichever way interests them. Therefore, for this part of the activity the children will be carrying out self-directed exploration. McLeod (2020) agrees with Howard and McInnes (2012) by explaining Piaget's theory that children learn best when they are experiencing hands on experimentation. Piaget believed that children must have the opportunity to explore different concepts without adult guidance so that they are encouraged to make decisions and problem solve on their own. This would also support the ideas of the 'what matters' statements of Donaldson's new curriculum for Wales (Welsh Government, 2019).

A further strength of the activity plan is the extent of thought towards health and safety. Due to the COVID-19 pandemic, extra precautions have been considered to protect children from potential contamination. According to Welsh government (2021) hand hygiene in this current time is essential within early years settings as this is how the virus is easily passed on to others. They further state that equipment should be sanitized and washed in order to keep children safe from the virus.

Discussion

There are multiple different resources available in settings which aim to promote and develop the mathematical thinking and understanding of a child. For example, some settings have specific areas inside and outside the classroom that helps support children develop their mathematical skills. A role play area such as a café or a mud kitchen is mathematically

beneficial for children. Jade (2018) suggests that role play areas such as these aids children in their problem-solving skills, organization, numeracy, and communication skills. For example, she states that children may openly count plates and the food items they need, weigh their ingredients, play with toy tills and money, or decide the length of time a meal needs to be in the oven. As well as mathematical thinking, this teaches children real life scenarios and life skills. In addition, according to Jade (2018) suggests they may communicate with other children, explaining that they need two cups of tea and not just one, prompting them to understand needing 'one more', which shows initiative to problem solve and think about quantity and numbers. Tucker (2014) agrees with Jade (2018) by stating that zones such as a role play area is a good way to target different areas of learning.

Besides role play, children may also have access to sensory resources such as water, sand and tuff trays in their settings. These areas support a variety of mathematical learning opportunities. Tucker (2014) shows that tuff trays can be filled with any items that are loose. She suggests these items could include pinecones, buttons, gravel, dried pasta, or even corn flour. Tuff trays such as this allows children to explore the idea of creating patterns, sorting, and counting. Furthermore, children will be given the opportunity to understand mathematical concepts such as differing shapes, sizes, sequencing and measuring (Pacey 2019). Furthermore, children could bring the weighing scales from the kitchen into the tuff tray area so that they can weigh different resources. By doing this, they will understand that different items weight different amounts, and some will weigh the same. Therefore, this will develop their understanding of another mathematical concept (Pacey 2019). Finally, as children will have access to these loose parts, Pacey (2019) explains that children are able to develop not just mathematically, but also sensorily, socially, and emotionally.

The Montessori Math Curriculum shows how children should be given the opportunity to play with natural resources such as wooden blocks and abstract materials. Educational Video Publishing (2009) portrays children doing this, and shows that they are able to carry out mathematical activities with very little interference from adults.

Tops Day Nurseries (2016) states that many early years settings today are changing from heavily merchandised resources involving plastic, to natural resources. They also explain importance of natural resources within settings as they have a much more developmental learning opportunities, especially when thinking about mathematical concepts and problem solving. For example, they say that if children have access to wooden resources, or natural

outdoor areas, children can build dens with logs, count the spots on a ladybirds' back, or even climb trees. This allows them to look at mathematical concepts such as counting, lengths and widths, and height. In addition to this, it also allows children to see what a real tree looks like rather than a small, plastic one, it teaches them about the real mathematics that is naturally all around them.

Explanation

According to Welsh Government (2014), the Foundation Phase pedagogy highlights that the areas of learning should complement each other, therefore providing opportunity for holistic development. For example, playing in a water tray supports sensory development, however, it also supports mathematical development and science. This is because children can see and feel the water, but they can also use a measuring jug to measure it to understand quantity. Therefore, this supports the idea that adults should provide enabling opportunities for children to access such resources, as it promotes the holistic development of skills.

Adults support the mathematical development of children by creating stimulating and enabling environments for them to learn in. Nursery resources (2018) says that an enabling, stimulating environment (indoors or outdoors) allows children to play, explore and learn about mathematical concepts. West Sussex County Council (2020) agrees with Nursery resources (2018) by saying that mathematically rich environments and resources need to be made available to children by adults, indoors and outdoors. In addition, adults need to plan activities so that children are continually provided with support to develop their mathematical thinking and problem solving.

Furthermore, West Sussex County Council (2020) also suggests that singing songs and reading stories that have mathematical links also enables the child to develop their understanding of mathematical concepts. Therefore, this supports the idea that adults must provide mathematically rich and stimulating environments for children, but also provide varied resources inside and outside the classroom to help support their understanding also. An example of providing such an environment and resources can be seen in the Nest Nursery in Birmingham (Starbuck Education, 2017). Vygotsky's Zone of proximal development and Bruner's scaffolding theory as explained by McLeod (2019), supports the idea that adults play an important role in encouraging children's development. McLeod (2019) states that both Bruner and Vygotsky's theories shows that children need scaffolding support from adults to help them reach their full developmental potential. Once a child has reached a level of

understanding and they are confident, adults can start to remove this scaffolding to allow children to flourish independently.

The Foundation Phase framework set out by the Welsh Government (2015) will help adults plan learning opportunities appropriately and create stimulating environments to support children's learning and development. The Foundation Phase framework from the Welsh Government (2015) sets out the aims and expected outcomes for all areas of learning, including mathematical development and numeracy skills. Therefore, adults can use this information to provide children with the best chance of developing mathematical concepts and numeracy skills confidently. In addition, Donaldson's wider curriculum from Welsh Government (2019) projected for 2022, shows that he wants more children to become critical thinkers by experimenting and discovering mathematical skills through self-led activities. By allowing this, Donaldson believes children are more likely to understand how and why things happen.

Welsh Government (2017) states that adults carry out formative assessments of children to determine where they are in their development. The foundation phase profile form shows that mathematical skill ladders are referred to in order to observe children. This focusses on the ability to identify shapes, counting, patterns and the ability to recite and sequence numbers. From following this assessment, adults can determine whether children are developing to the expected standard. Early Years Matters (2021) supports this by saying that all children have different abilities and therefore adults should observe what the interests of the child are and what they can do rather than focus on what they are expected to do. Lewis (No Date) explains the practice of Scandinavian countries in settings seems to be more minimal, with natural resources being always accessible to children. They also have a large area in which they can build and be creative. Lewis (No Date) shows that the environment is heavily influenced by the children, and the pedagogues are there to mostly listen to the children while they learn during play and under no pressure. Therefore, Lewis (No Date) shows that there is a less formal approach in Scandinavian countries, which would explain why their children do well in education there. Therefore, it could be argued that adults should take less formal approach to mathematical and holistic development in Wales, so that children can reach their best potentials without the pressure to meet Government expectations.

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