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Cynllun Gweithgaredd Activity Plan		
Activity: Using Childrens footprints to measure their own outline		
Number of children: 4	Age of children: 3-4 years	Number of adults: 2
Location: Art room	Preparation time: 20 minutes	Activity time: morning session
Resources: Aprons, paper, crayons, a selection of paint, chalk, pencils, flower stems, paintbrushes, paint trays, bowl of water, towels, sellotape, large paper		
Aim/s of activity: To support Childrens mathematical development and concepts through a play based activity to support a Childs understanding of measurement, size, counting, length and how all children are individual.		
Links to outcomes: • An understanding of counting to five with a comprehension of counting different items, in this case steps and how these steps represent a measurement. • Using mark making to demonstrate a number, to record and to be able to order and compare those numbers. • To understand one more/less as well as first/second/third and being able to compare size/ measurement by observation in pairs. • Being able to follow instruction within the activity. (Foundation Phase, 2015) • Questioning and communicating whilst interpreting data. • Using mathematical skills and concepts, • Forming positive relationships by working together. • Taking part in activities with confidence. • Building upon knowledge gained. (Donaldson, 2015)		

Differentiation:

Ratio: four children to two adults to ensure enough child-adult interaction and assistance. Activity floor based to ensure inclusivity. Instead of footprints handprints, blocks or sticks can be used to measure body outline.

Health and safety:

A risk-benefit analysis has been completed in line with settings policy and procedures. The area will be checked before use and all equipment is safe, clean and appropriate for children with enough space to engage in activity safely.

Role of adult/adults:

Adult will explain activity to children in pairs, who will then engage in sustained shared thinking regarding different materials and method to be used. Adult to then scaffold and extend learning and communication including that of mathematical language whilst observing and reviewing activity for future planning.

The activity:

- Activity set up in art room, with aprons supplied to children and adults to wear, large sheets of paper taped to floor and materials readily available for children to choose.
- Children to work in pairs to promote teamwork, potentially one child with one adult at start of activity if not much interest shown.
- One adult to work with a pair of children explaining idea of activity, potentially through demonstration depending on understanding.
- During discussion children to source their materials they would like to use, such as paint, pens, crayons, chalk.
- In turn each child lays on separate large paper whilst other child draws outline of body around them. Papers to be next to each other to allow comparison by children with some extending/scaffolding language from adult.
- Discussion to be encouraged with regards to speculating/estimating footprints needed to measure length of outline.
- Using Childs chosen paint, children use own painted footprints to measure outline of their body shape, ensuring mathematical language such as one more or less is used and counting is shared aloud.
- Children can mark make their 'nuber of feet' needed for their outline.

- Encourage conversation about estimations and outcomes and the differences between the two pictures.
- Children can use water and a towel provided to clean their feet.
- Activity can be extended by coloring, cutting out or sticking onto outline as well as mark making numbers on individual feet.
- Childrens individual activity can be displayed or taken home.

Activity Evaluation

Welsh Government (2015) state that children learn through firsthand experiences in a play-based curriculum which is supported by Moyles (2013) who stresses that a Childs learning is deeper, and understanding is improved when children partake in these firsthand contextual experiences. Furthermore, Aubrey and Riley (2019) research how Montessori and Piaget agree with the importance of learning through firsthand, trial and error, experiential experiences as Children are sensory and need these hands-on contextual experiences to fully understand these complex mathematical concepts and bridge the gap between meaningful and abstract. The activity discussed in the plan is a creative, hands on, play-based, experimental learning experience which encourages mathematical language and cognitive and problem-solving skills which supports this thinking. This plan also aligns with Piaget thoughts, as discussed by Gray and MacBlain (2015) who explain that hands on experiential learning is optimum for a Childs mathematical development, which also aligns with Donaldsons (2015) views who implores that children be afforded these hands-on experiential experiences to understand the, why and how things work.

Tucker (2014) also examines the importance of play in supporting a Childs development of mathematical concepts, as Children are intrinsically motivated to play and during this play mathematical skills are naturally displayed by children who problem solve, investigate, explore and build. Botrill (2018) states that play is crucial in the development of a child as it offers rich experiences, which is wholly agreed on by UNICEF (2018) who agree play to be a vital tool for a child gaining the necessary skills and knowledge for life.

Although the activity offers autonomy of resources, the activity could be considered too adult led. To ensure this is not a limitation of the activity the plan should demonstrate that a child must choose the activity that is available, and it not be a set activity. As discussed by Bruce (2018), Froebel declares that an adult and a Childs perception of play is very different and that children do not consider adult led or adult chosen activities as play. Isaacs (2013) considers how a Childs true potential isn't shown when in this adult-led activity as Children are not truly immersed in their play.

Howard and McInnes (2012) agree that when a Child is directed towards an activity, although they are actively participating, they will not be fully immersed in that activity and will

demonstrate negative behaviors such as a lack of concentration and motivation. Pacey (2016) agrees that more will be observed from a Child in free play rather than a set activity.

Howard and McInnes (2012) further suggest that whether an adult is present during play, determines if that child considers themselves at play or not, and state that superior development only occurs when a child is in that deep intrinsic state of play. However, Tucker (2014) implore adult involvement is necessary to fully support mathematical thinking and development and furthermore suggest a balance of child initiated and adult initiated play is desirable.

Brunner, as discussed by Gray and Macblain (2015), suggests that play is a vehicle for socialization and that children should be afforded the time to revisit and review their work. The activity plan states that work should be displayed for children to be able to revisit and review, supporting this approach. This is agreed upon by Reggio, as discussed by Thornton and Brunton (2014), and their reflective approach.

Another potential limitation for the activity plan could potentially be the location which is set indoors. This location has been chosen as The Art room offers a variety of resources to be chosen and used by the children. However, The Welsh Government (2015) state that a greater emphasis should be placed on the outdoors as it promotes further discovery, creativity and independence. As discussed by Machan (2016), Macmillan agrees that children benefit from being outdoors as to children is a blank slate with particular benefits to health and wellbeing. Furthermore, Froebel as stated by Tovey (2016) implores outdoor play being intrinsic to a Childs holistic learning and development. Moyles (2005) also propose that the outdoors be a richer learning experience offering deeper learning and a knowledge and understanding of the world.

Another benefit of being outdoors would be the offering of loose parts as resources which could be collected by the children, adding another dimension to the activity plan. Smith-Gilman (2018) argues that loose parts in play add significantly to learning whilst activating creative thinking and thought filled conversations. Furthermore, Beloglovsky and Daly (2014) suggest that when children are afforded loose parts their imagination and curiosity are ignited which promotes mathematical skills such as problem solving.

The activity plan enables all children to succeed as it is about building a foundation of knowledge for them based on their experiences of the mathematical concept of measuring. This will build confidence, boost self-esteem, build relations and encourage teamwork, which aligns with Maslow's Hierarchy of Needs as discussed by McLeod (2018) which demands a Childs psychological needs such as these are met, for the Child to reach their level of self-actualization and further suggests an unhappy Child is one who is unable to learn. Furthermore McGrath (2010) states that mathematics expose a range of emotions including satisfaction, fear and dread and it is a practitioner's duty to ensure children experience success as these early mathematical experiences will resonate with children in later life.

The activity plan states a two adult to four children ratio, this aligns to Vygotsky's thoughts on his Zone of Proximal Development, as discussed by Bruce (2018), where the adults are ready to support and extend the activity through explanation, open questioning and suggestions which will assist children in extended learning of mathematical language as well as challenging children to increasingly higher levels of functioning. The activity plan also encourages team working with the children working in pair which also aligns with Vygotsky's (1978) thoughts

on learning being a social process where children learn from each other, or peer-learning which also encourages childrens metacognition allowing the activity to be extended with sustained shared thinking.

Smilansky and Shefatya, as discussed by Tucker (2014) suggests enriched learning for children derives from adults working alongside children who are encouraged to make predictions, test out ideas, make mistakes and trial and error to test out ideas and concepts. Play allows the child to assimilate situations and prepare for new situations, aligning with this activity plan as it will allow children to build up an awareness of specific mathematical concepts in this case the use of measuring, which when given further information will be able to be used more accurately, as aligned to Bruners spiral curriculum as discussed by Johnston (2012).

Resources

Drews and Hansen (2007) state that resources are a connection which link mathematical development to Childrens own experiences and that all children benefit from an extensive range of resources to develop their mathematical thinking. Montague et al. (2018) consider how mathematics is one way we make sense of the world around us and note that babies demonstrate mathematical skills by noticing and recognizing a number of objects, their shape and pattern. Skills that are not taught but come natural to them. This aligns with Goldschmeid thoughts as researched by Matthewpavel (2012) who implore that treasure baskets consisting of loose parts can offer children mathematical skills in the form of sorting, matching and ordering. Beckley et al. (2010) describes how research has shown that an understanding of number in babies is innate and these early years experiences lay the foundation for later years.

The National Strategies (2009) insist that settings must be rich in resources with potential for mathematics, giving children the opportunities to explore and investigate with such materials as bricks, dens, small world, cardboard boxes as well as an array of mark making resources to support mathematical development. Brodie (2013) declares that The Montessori Approach improves a childs development by providing appropriate resources in an appropriate environment.

McGrath (2010) suggest that how a setting is presented is key with a less being more approach being optimal with such resources as buttons and boxes being the main focus. Beloglovsky and Daly (2016) suggest that children are born mathematicians, with an intrinsic desire to explore

and investigate the world around them, and loose parts afford a Childs curiosity and sense of wonder as they explore these open-ended captivating objects.

Tucker (2014) suggests mathematical evidence and environmental props need to be available for children to see and make use of all around the setting as agreed by Wing (2016) who state that children need to see structured apparatus and imagery at child level which they can involve into their play and help stimulate Childrens play in these firsthand experiences, helping build on these mathematical skills.

Tucker (2014) suggests the environment to be a crucial resource to a child as the environment stimulates curiosity and that an environment which encourages risk taking, independent learning and discovery whilst supporting autonomy and trial and error will be more beneficial to that Childs mathematical development. Tucker (2014) states the environment must include appropriate resources with space for free flow interaction with time afforded for children to enjoy activities. This aligns to Montessori ideas of how a Childs setting should be displayed to maximize a Childs curiosity and independence as discussed by Lillard (2017).

Tucker (2014) suggest resources are best when they are natural with potential for manipulating in whichever way the child wishes to take them in all areas of learning. As discussed by Drews and Hansen (2007) Piaget and Bruner agree that objects need to be felt, touched, molded and manipulated for a child to make sense of and to develop their mathematical thinking. Furthermore, Montessori agrees, as stated by The Welsh Government (2008), that children learn best when they are able to independently touch, feel and manipulate objects to understand that object before mastering its capabilities.

Mr Starbuck Education (2017) who researched the Curiosity Approach implore that natural authentic open-ended resources create magical moments for children, and affords them the opportunity to be curious, take risks and be creative, enhancing their mathematical development, offering contextual real-life experiences as opposed to plastic manufactured materials.

Displays of work can promote self-esteem in children as discussed by Bruce (2018) who discusses how adult dominant displays underestimate children, however child-initiated work displayed by adults shows the child that their work is 'good enough', without an adult 'improving' it. This aligns to Vygotsky zone of proximal development as discussed by Gray and MacBlain (2015) who acknowledge that adults are an important factor in a Childs development by supporting them to progress.

Role of Adult

Tucker (2014) suggests mathematics and play go hand in hand as the processes used in play such as being curious, experimenting and making predictions are essential for mathematical thinking. McGrath (2010) states that mathematics is a complex area which practitioners must master to ensure these mathematical concepts are grasped. Welsh Government (2019) further agree that mathematics is a vital part of everyday life as well as the economy, and implore that experiences for children must be engaging, challenging, accessible and exciting which focus on the understanding of how and why.

Mind Research Institute (2015) implore it crucial for educators to empower children with math knowledge, as research has found a strong correlation between math proficiency and improving executive functions through everyday math activities such as problem solving. Furthermore Reid (2016) suggests that family members as well as practitioners can support early numeracy development agreed by Matthewpavel (2012) who state that even from birth through heuristic play children can use everyday objects to support their mathematical thinking and further their knowledge with a primary carer to encourage and extend.

McGrath (2010) suggest that children are born mathematicians but lose that passion and as practitioners it is our responsibility to retain our passion and to revive that positive attitude in children. McGrath (2010) further suggests practitioners should ensure parents and carers attitude to mathematics is a positive influence on children and that they are able to support and guide their Childrens mathematical development, boosting self-esteem and motivation. Welsh Government (2016) suggest that families play an important role in supporting a Childs mathematical development and agree that settings should support family engagement in their Childs learning.

As discussed by McLeod (2018), Piaget states that practitioners should be enthusiastic, invested, curious and engaged, offering and facilitating mathematical opportunities. Siraj-Blatchford agrees, as McGrath (2010) researched, practitioners cannot just facilitate children, and practitioners just facilitating, are letting children down. Hansen and Vaukins (2012) state that educators should be knowledgeable, and confident in that knowledge of mathematics, who inspire, motivate and challenge children by building on their prior knowledge and experience and promote a love of learning as mathematical skills are a vital component of life. Rogers (2004) agrees that mathematics is pivotal to future industries and the skills we gain are vital to compete in the global world, furthermore Donaldson (2015) states that informed, creative critical thinkers are needed to compete in this modern technological world.

The National Strategies (2009) insist practitioners must be knowledgeable and positive regarding mathematics, have a high expectation and acknowledge that children learn through play and observations which are necessary to observe and extend Childrens mathematical learning. Welsh Government (2008) agrees that practitioners should have a knowledge and understanding of individual children and how they develop as well as a comprehension of the curriculum, the outcomes and how they are planned to be met and the theory behind that curriculum. Pacey (2017) agrees that observations be a pivotal component of a Childs development and understanding and observing a Childs interests will provide the practitioner with a strong base to support mathematical thinking. Dunst, Raab and Trivette (2014) agree that children who engage in activities that are based on their interests will learn more efficiently with better learning outcomes. Furthermore PACEY (2017) states that practitioners understanding child development as well as a Childs interests will assist planning which will in turn enhance provision and allow children to reach their full potential.

Welsh Government (2014) deems play essential to a Childs learning and development as they master the world around them and with an ethos of a play-based curriculum in Wales children should be afforded this. However, Donaldson (2015) suggests that this is not happening, and these assessment driven outcomes are damaging to children and implore we must empower children by allowing them to understand the how, the why and the process involved and to show their understanding which is based on their experiences. Furthermore, The Welsh

Government (2019) agree that the current curriculum does not offer enough understanding as they are too reliant on 'procedural fluency'. However Welsh Government (2016) suggest that tests are an integral tool in understanding where children are in their development based on the 'same national measures' to support teaching and learning.

Welsh Government (2008) suggest practitioners must afford children the time to revisit, review and practice their work, as agreed by Bruner (1960) who's spiral curriculum demonstrates that by allowing children time to review and revisit and then adding further information they can comprehend and extend their knowledge and understand more complex forms. Brodie (2013) states that the Montessori Approach promotes independence, freedom and respect for children with uninterrupted blocks of time afforded to the children whilst following Childrens interests.

The Every Child a Chance Trust (2009) implores attainment rates in mathematics must be improved as it is having a detrimental effect on future employability and health. Furthermore McGrath (2010) suggests that it has become socially acceptable to dislike mathematics and states that this attitude needs to change as it hinders employability and contributes to poor mental health and low self-esteem in later life. This aligns to Donaldson (2015) who states the curriculum empower ambitious, capable learners who can confidentially engage with future challenges in life. Maths is everywhere in everyday life for children and adults alike and it is up to practitioners to present the idea of mathematics to children in a positive way and encourage children to feel confident in it.

Yelland (2014) states that mathematics is an integral part of everyday life, which is needed for everyday tasks. The technological world has changed over the last ten years and Yelland (2014) suggests that educators have not kept up with this new technology in this digital era.

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