

The Young Mathematician: Exploration and Problem Solving

EAEE4005

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<u>ACTIVITY PLAN</u>
<u>Activity:</u> To collect and transfer data into a pictogram.
<u>Number of children:</u> The whole class (26 children).
<u>Age of children:</u> 5-6 years.
<u>Number of adults:</u> 2.
<u>Location:</u> Outdoors- School forest area.
<u>Preparation time:</u> 15 minutes.
<u>Activity time:</u> 45 minutes.
<u>Resources:</u> • Natural resources from the outdoors. • Chalk for marking on the ground.
<u>Aims of activity:</u> • To introduce children to data handling. • Collect, sort and count data. • Begin to record data in the form of a pictogram.
<u>Links to outcomes:</u>

According to the Welsh Government (2017), children are supported to achieve their outcomes by handling data. This aids children to:

- Count sets of objects accurately.
- Gather and record their data by using marks, numbers or pictures. This can be done in the form of lists, tables, diagrams, block graphs and pictograms.
- Analyse the data found.

As suggested by the Welsh Government (2015), the four purposes of the curriculum for Wales creates learners who will become ambitious and capable, promoting their understanding of interpreting data, mathematical concepts and the ability to describe the concepts taught. As outlined by the Welsh Government (2020), the Mathematics and Numeracy: Statements of what matters suggests that children develop the practice of testing a hypothesis by handling and illustrating data effectively.

Differentiation:

- Through questioning more able children, by using challenge question cards to analyse the data collected, for example, 'how many more sticks are there than stones?'.
- ALN- support the child to find natural materials and to count their findings.

Health and safety:

- Complete a risk assessment.
- Suitable outdoor clothing and footwear to be worn.
- First aid kit.
- Medication- asthma pumps and epileptic medication.

Role of adult/adults:

- Collect resources and set up for the activity.
- Ensure suitable clothing is worn.
- To be visible to the children during the activity.
- To observe the children during the activity, ensuring health and safety procedures are adhered to.
- Provide children with support when required during the activity.

- Use specific language- less than, more than, the same as, groups, shorter, longer, lighter, heavier.
- Be a role model.

The Activity:

This outdoor activity will take part in the forest area. The first part of this activity is child led. In their classroom groups, the children will freely and independently explore in a safe environment to find natural materials, such as sticks, stones, feathers and leaves. Once the relevant amount of time has passed and enough materials have been collected, the groups of children will join. The second part of the activity requires the children to work together as a class to group, count and record the natural objects. With the support of an adult, the children will use chalk to draw a pictogram on the floor to record their findings.

Evaluation

As explained in the activity plan, natural outdoor materials were used for this activity and it is evident that the resources listed in the activity plan were all that was required to undertake the activity. According to Skinner and Stevens (2012), when children take part in a mathematical activity, such as counting, sorting, or measuring, they should be encouraged to use natural materials. Community Playthings (2021) agrees and suggests that natural loose parts are an ideal material for children to learn about mathematics in a playful way. It is suggested that this is because natural materials are free, accessible in every outdoor area and can be used in many ways to explore mathematics, for example, stones can be used to compare weight or size. Community Playthings (2021) suggests that children are curious about natural loose parts by showing an interest in the material, which strengthens a child's understanding of their natural outdoor environment. According to Teach Early Years (2021), natural resources enhance the child's mathematical learning through encouraging the use of all their senses, including their touch, smell, sound and taste. However, although it is suggested that natural material benefit children in many ways, Teach Early Years (2021) suggests that plastic materials are also beneficial in developing the child's mathematical learning and understanding. It is suggested that children should be provided with a variety of resources, such as scoops, measuring spoons, egg cups, plastic sand combs, sand buckets and plastic fish for water activities, in order to develop their measuring, digging, counting and shape making skills, as well as their pattern making skills.

Having evaluated this activity plan, it is apparent that the outdoors was a suitable environment for this activity to take place, as children were free to move around and explore the outdoors. Nidirect (no date) suggests that children are naturally encouraged to be physically active by experiencing outdoor learning. It is suggested that the outdoor space promotes the child's well-being and recognises that the outdoors gives the child a sense of freedom and opportunities for unrestricted physical movements. The Welsh Assembly Government (2009) agrees and suggests that when the outdoors is used as a learning resource, children are benefited in many ways. It is

suggested that the child's development is enhanced, as the outdoors provides the child with an environment overflowing with stimuli such as weather, sounds, smell and textures, allowing the child to attain first-hand experience of nature, as well as supporting problem solving skills and acquiring a pleasure for the outdoors. Howard and McInnes (2013) have the same view and suggest that when learning outdoors, a child's development is strengthened, as children are able to gain experience from learning in their natural environment. Froebel Trust (no date), supports this, suggesting that Froebel acknowledges the outdoors as an environment where a child of any age can learn and generate an understanding of their natural outdoor world. As suggested by Learning in the Leaves (2018), the outdoors is an appropriate environment to support a child's holistic development, as the outdoors enhances the progression of each aspect of a child's development, be it some aspects developing together, or one at a time.

According to Stem Learning (no date) it is beneficial for children with additional learning needs to take part in activities outdoors, with small group sizes, as this improves the child's self-esteem and confidence and allows the child to develop a stronger pupil teacher relationship. This supports the choice of environment to be suitable, however, the number of children taking part in the activity at one time could be reduced, in order to support the child with additional learning needs to reach their full potential.

On evaluation, it is evident that the health and safety of pupils and staff had been considered, as the health and safety section of the activity plan suggests that a risk assessment was completed prior to the activity taking place. However, it is evident that the health and safety plan was not sufficient, as further information regarding health and safety could have been included in the activity plan, such as the school's health and safety policy and statutory requirements. According to Buckton Vale Primary School (2016), school's policies concerning Health and Safety should be regarded prior to an activity taking place, as well as a risk assessment. Play England (2020) recognises a risk-benefit assessment to be a valuable tool for allowing adults to gain awareness of risk, while being able to acknowledge the benefits a particular

activity can provide the child. Empty classroom day (2016) agrees and suggests that in order to create a balance between the risks and benefits of an environment or an activity, carrying out a risk-benefit assessment is beneficial. Play England (2015) suggests that a risk-benefit assessment focuses on the hazards that could cause harm to the child, therefore a comparison of the risks and benefits of an activity can be gained from carrying out this assessment. As suggested by Play England (2020), although it cannot be guaranteed that a risk-free environment can be provided, an environment that allows the child to independently take and judge risk safely is attainable.

As suggested in the activity plan, to undertake this activity, it is essential for children to wear appropriate clothing. Although the need for suitable clothing has been identified, more information regarding suitable clothing could have been included in this section, as the activity plan does not indicate which season the activity takes place. Nest in the Woods (no date) recognises the requirement for suitable clothing and suggests that if adequate, comfortable and seasonable clothing are worn, children are able to take part and enjoy their experience of outdoor learning throughout the years, regardless of the weather.

Under the differentiation section of the activity plan, it is evident that ways in which the activity can be adapted to suit more able children has been planned prior to the activity taking place. The activity plan identifies that more able children are provided with challenging questions to extend their learning and development. Landau Forte Academy (2014) supports this and suggests that more able children should be given opportunities to take part in activities that challenge and stretch their ability to the highest point attainable.

However, having evaluated the activity plan, it is apparent that additional information should have been provided in this section. The information relating to a child with additional learning needs is not sufficient, as the activity plan does not provide

information on how the task could be differentiated to meet their needs. In hindsight, the activity could have been differentiated by the task being simplified. According to the Welsh Assembly Government (2008), many children benefit from visual stimulus, therefore, providing picture cards of natural materials could be beneficial for the child to visualise the materials they were to collect or being instructed to look for a certain number of materials, such as 1 leaf, 1 stone and 1 stick, making the activity clearer for the child. In order to meet their needs, Swansea Council (2019) suggests that a child with an additional learning need or a disability can be supported by differentiating an activity. It is suggested that this would be gained by customising tasks to suit the child's ability or making the task simpler so that it can be understood easily. It is identified in the activity plan for a child with additional learning needs to receive support during the activity. It is recognised by Swansea Council (2019) that although children are encouraged to work independently, a child with an additional learning need may work alongside an adult during an activity, therefore, it would have been beneficial for an additional adult to have been included in the activity plan.

Resources

As acknowledged in section 2, the activity plan lists the small number of resources required for the activity, suggesting all that was needed could be found in the outdoors. Natural outdoor materials were selected to undertake this activity, as natural materials promote the child's mathematical learning in a playful way. Karen Wilding Education (2020) suggests that natural loose parts are a key resource in teaching within the Early Years and are regularly used by young mathematicians.

Community Playthings (2015) acknowledges that a young child's mathematical skills are initially obtained using loose parts, such as building blocks. At a young age, through sorting and categorising loose parts, children gain a one-to-one correspondence by counting each object one by one and matching with the correct number word or symbol. It is suggested that mathematics is developed further when children begin to merge loose parts into their games by independently counting and sorting objects into their specific categories, such as colours and patterns.

Petit Early Learning Journey (2020) suggests that Nature-play allows the child to explore nature and its materials to gain new experiences and promote their problem-solving skills as they build, sort, stack and count objects in different ways. It is recognised that natural loose parts, such as leaves, twigs and sand, stimulate a child's creativity and imagination, as natural resources can be used alone or alongside other materials, therefore are open-ended resources. Community Playthings (2021) agrees and suggests that architect Simon Nicholson describes loose parts as open-ended materials which are found in an environment and can be rearranged and used in more than one way, influencing the child's mind to be resourceful. It is suggested that natural materials can be used in many ways to support mathematical development, such as,

different sized shapes can be created by using sticks, or shells can be used as a scoop to dig, or used to measure how many scoops of sand is needed to fill different size buckets.

As acknowledged by Early Years Carees (2016), when considering the differences between resource materials, wooden and natural resources are claimed to be materials which inspire children and enhance their creative skills, offering wider opportunities for learning. It is suggested that plastic resources limit a child's critical thinking skills, as plastic equipment is set and can usually only be used for the purpose it was made. As acknowledged, children take part in an activity for longer when provided with opportunities for holistic play. It is suggested that Treasure Baskets and holistic play are both made from man-made materials and support children's development by playing with groups of resources that are open-ended, rather than plastic toys that have limited features. Similarly, Community Playthings (2015) support this, and suggest that children prefer playing with loose parts, as they quickly lose interest in objects that have been built for one purpose.

Oxford Owl (2020) describes Numicon as a mathematics resource that supports children to make connections with numbers. Although Numicon shapes are made of plastic, it is acknowledged that children learn by seeing and feeling their physical characteristics, suggesting that Numicon is a multi-sensory resource for teaching and learning. It is suggested that these physical aspects, such as their colour and shape, are paramount as they support children to see relationships between numbers, such as 'one more' or 'one less'. It is recognised by Oxford Owl (2020), as mathematic skills develop with age, the child will comfortably identify more problematic concepts, such as odd and even numbers. It is indicated that when Numicon shapes are orderly arranged, children begin to see the link between numbers, as Numicon shapes provide the child with a visual image of what each number looks like.

Role of The Adult

The role of the adult has been explored in the activity plan and identifies the adult to have an important role. Their role includes preparing resources; ensuring health and safety regulations are followed, including preparing first aid kits, gathering children's personal medication, as well as ensuring children wear suitable clothing; to be visual to the children and observe them during the activity; encourage freedom and independence, while still providing support when required, to achieve the aims and outcomes of the planned activity, such as during marking out the pictogram and transferring their data; use specific language to support the activity and enhance the children's development and to be a positive role model.

As suggested by the Welsh Government (2015), in line with the Foundation Phase Framework, the planned activity supports the learning outcomes identified within the framework. It is suggested that children should experience opportunities to develop their knowledge to handle data effectively, increasing their ability to collect, sort and record their data and present it in a suitable manner, for example, block graphs or pictograms, where one character is symbolised as one value.

According to The National Strategies (2009), it is the responsibility of the adult to create learning environments which allow children to feel safe and cared for. Nature Play (2012) suggests that the role of the adult during an activity is important, as the child's feeling of security is enhanced by the presence of the adult. Although the adult can take a step back during an activity that is self-directed, the adult must remain visible to the child. It is suggested that the adult is able to observe the activity and provide support if necessary, whilst enabling the child to develop their learning freely and maintain independence.

As recognised by Nature play (2012), part of an adult's role is to ensure the environment is safe for an activity to take place. Play England (2020) suggests that it is the responsibility of the adult to undertake a satisfactory risk assessment of their premises and apply health and safety measures that will decrease the likelihood of an injury occurring. It is suggested that an evaluation of the risks of injury to the child should be carried out regularly, as experiences and common variables can change. Early Education (no date) indicates that adults have the responsibility of providing play opportunities and experiences of risk, whilst ensuring children are safe from harm.

According to Simply Psychology (2019), both Bruner and Vygotsky believe that an adult should contribute to the child's development, by enhancing their learning through the scaffolding process. It is suggested that the scaffolding theory is thought of as a support structure between an adult, or a more able peer, with the focus of aiding the child's development and understanding, to accomplish new tasks or specific goals. As described, the child's development can be enhanced by tasks being simplified or altered as the child becomes more competent in their learning. It is recognised that Bruner believes that children should not be taught through rote learning and views the adult as a facilitator to aid in the child's learning process, by organising resources and planning lessons that allow the child to be involved in their own learning.

Professional Association for Childcare and Early Years, also known as PACEY (2020) suggests that the role of the adult includes undertaking regular observations. The Welsh Assembly Government (2008) and PACEY (2016) acknowledge the significance of observation, as it provides adults with opportunity to determine the child's likes and dislikes, and to gather information to form a comprehensive understanding of the child's learning and development and distinguish any difficulties. In agreement with this is the Department for Education (2017). It is suggested that observations aid the adult in evaluating the development a child has made and in the planning of subsequent activities that will progress the child's development in the future. According to Scholastic (2020)³⁹, teachers have a double role within a Reggio

Emilia classroom. Although the teacher's primary responsibility is to learn beside children, they have the responsibility to observe and monitor a child's development.

The Welsh Assembly Government (2008) suggests that activities should be planned in accordance with the Foundation Phase Framework, taking a holistic approach across the areas of learning, by including children in the discussion and mind mapping of themes that builds on the child's interests, encouraging them to gain positive learning experiences.

As described by Foundation Years (2020), parents have a role in strengthening a child's learning and are the basis of their future outcomes, as parents are the first people to have an influence on their child's development. Swansea Council (2019) recognises the importance of developing positive partnerships between practitioner and parent, as trust is developed by working together as a team and support is provided for the child to achieve their outcomes.

As suggested by the Welsh Assembly Government (2008), the language and communication skills of the child should be actively encouraged by the adult whenever possible. It is recognised that an adult's role includes introducing new vocabulary, as well as modelling specific language that matches the child's understanding and supports the activity being undertaken. Adults are required to ask questions that allow children to convey their thoughts and be open to the ideas of others.

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