Supporting Early Number Awareness for children with Severe Learning Difficulties

Introduction

The numeracy curriculum followed by children in Key Stages 1 and 2 and even in the Early Years Foundation Stage often identifies maths as an academic subject with the demand to understand and use many abstract concepts and principles. There is little in the guidance for schools to indicate how early numeracy development before school age occurs, and how to support early maths. Where children are assessed using P-scales, the assessment criteria specify key skills but not teaching programmes for how to develop them.

Well before counting skills are developed, early mathematicians are concerned with "issues of space, time and quantity (that) dominate our lives" (Staves, 2009) and these issues occur in real-life, practical contexts. Research including that of Vygotsky has shown that very young babies and children develop an awareness of quantity when it is relevant to their experiences. Therefore, to support the learning of early mathematical concepts such as number for children with severe and profound difficulties, we need to offer a learning experience that is:

- Based upon knowledge of how early number concepts develop
- Grounded in real experiences
- Meaningful i.e. has a purpose or follows the child's interests

The development of early number concepts

Gelman and Gallistel (1978) described a 5-stage process in learning to count. The first three steps are linear, i.e. each step relies on the previous step being secured:

1. **The one-to-one principle** (understanding that each item receives one label)
2. **The stable order principle** (the number names must always be used in the same order)
3. **The cardinal principle** (the last number in the count describes the quantity of the set)

The successful acquisition of skills at these stages is dependent upon many factors including motor skills necessary to manipulate objects or move towards then; short term memory; working memory (ability to do one thing while retaining another mentally); use of senses including visual, auditory and tactile and access to verbal output.

Activities to support the development of the one-to-one principle (one-to-one correspondence)

Before we plan activities to support this stage for children with severe and profound learning difficulties, we need to consider some key questions:

- What would this child like to count? i.e. what do they like, what are they interested in? Anything can be counted, and if we accept that early counting develops in line with a

child's own experiences we need to offer counting experiences that honour their interests. For example, if a child loves tractors, it will offer them a more meaningful context to count these rather than counters or compare bears.

- What is a real, meaningful context for the counting? All children are more motivated by counting in the early stages in a real-life context. Examples of this might be counting 3 pencils to give to a small group of peers at the table or counting to two as the child puts on socks, shoes, gloves. For children who enjoy an element of competition, simple games where counters or tokens are collected may provide a motivating context for 1:1 counting.
- Children who experience limited motor control may benefit from counting larger objects that they can manipulate easily, or using a 'hand under hand' approach supported by an adult (see SHOR handout on using this approach).
- Music, rhythm and repetition can all be used to support the development of counting at this and all stages. Familiar number songs and rhymes with props can form a good starting point for meaningful counting activities at the one-to-one stage.

 Making "cakes" using fairy cake cases and different items that the child has collected	 Counting brush strokes when brushing a favourite toy	 Counting candles on play dough birthday cakes

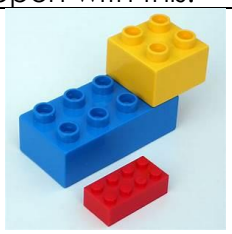
Activities to support the development of the stable order principle

The same questions apply as those to ask about supporting one-to-one correspondence, but in addition we need to consider the additional auditory input that supports most children to develop their counting skills at this stage.

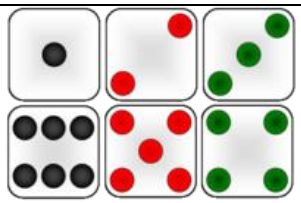
- Can the child hear the number names being used? Children with hearing impairments may have missed out on early experiences at home and in the classroom of hearing counting in different contexts including number songs and rhymes. It is therefore essential for these learners to support counting with visual and tactile supports, such as finger counting and tactile cues such as a number of taps on the arm to indicate small quantities up to five. In addition, where children have some awareness of sound, counting using heavily distinguished, consistent intonation can support their understanding of the Stable Order Principle.
- The importance of number songs and rhymes at this stage is clear. In addition, familiar or favourite counting books with repeated, patterned language can be read with the child repeatedly to reinforce this principle. The child can be involved in creating their own counting books capturing the types of activities suggested at the one-to-one stage using photographs and simple books or an app such as Our Story https://www.open.edu/openlearn/education/educational-technology-and-practice/educational-practice/reading-and-child-development-the-our-story-app-introduction
- Many children arrive at school with an awareness of rote counting in order, and for many families this has been a focus of pre-school learning. At this stage, counting is often a string of linked sounds "onetwothreefour", rather than a sequence of separate numbers. It is important that we offer children for whom this is the case opportunities to celebrate this skill, while planning activities to develop the one-to-one principle that underpins a concrete understanding of the stable order principle.

Activities to support the development of the cardinal principle

- The development of this skill can benefit greatly from auditory input- for example always using a stress on the last number when counting to draw the child's attention to the last number in the set.
- All children benefit from having their attention re-focused to the set of objects they are counting when the final number counted is said.
- Many children indicate or say the last number in the set because they have learned that this is what adults expect- not necessarily because they have a secure understanding of the fact that the last number in the count denotes the set. Teachers will need to make a careful assessment of whether this is the case. Using video as an assessment tool can support with this.

 Building with Duplo and counting bumps- start with using bricks all of one type and counting bumps, print with same brick several times and count dots.	 Setting up real life/role play table/picnic/activity for set number of people, characters	 Counting things that come in pairs in practical contexts: matching socks on a line; hands in gloves; shoes on feet; stick eyes on paper plate masks and count; make sandwiches and count slices of bread.

Another useful skill in early counting is **subitising**, or the ability to identify a small number by looking rather than counting, most commonly illustrated by the ability to read a dice without counting. This can be a supportive tool for children with short term memory difficulties.

 Use egg boxes to count different objects- number will always be 6.	 Games using dice- numbers remain the same 1-6	 Games using dominoes- numbers remain the same 1-6

Recording Numbers

While children are moving through the one-to-one, stable order and cardinal stages we may wish to introduce them to recording quantities and numbers. As with activities to support counting, it is essential to ensure that recording activities are in line with the child's current stage of maths development and that they are concrete and meaningful. Expectations of recording numbers also need to reflect the child's stage of symbolic understanding (see SHOR handout) and level of fine motor control (see SHOR mark making handout).

Further sources of information

http://www.veryspecialmaths.co.uk/articles/count.htm

file:///C:/Users/illfi/OneDrive/Documents/Ruth/Outreach/maths/More_to_Maths_the_counting_booklet.pdf