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Let infants' knowledge of pattern grow

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Let infants' knowledge

A strategy for introducing the concept of growing patterns in the early years

This article addresses the use of active teaching strategies in developing infants' understanding of growing patterns. While repeating patterns (e.g. red, green, red, green) are common place, the Primary School Mathematics Curriculum (PSMC) also recommends that pupils should be enabled to '... identify, copy and extend simple increasing and decreasing number patterns eg 2, 3, 4' (Government of Ireland, 1999: 26). The teaching strategies outlined provide children with multiple embodiments of the concept of growing pattern. It is envisaged that the teacher will act as a guide, allowing pupils to assume the role of active learners.

Teaching strategies

The teaching strategies presented in this article are the result of work with children in infant classrooms in Limerick City primary schools. Such strategies provide an alternative to the monotony of using number patterns e.g. 1, 2, -, 4 without any context.

1. From Repeating Patterns to Growing Patterns

As the benefits of moving from the 'known' to the 'unknown' are well documented, it is appropriate to begin by revisiting repeating patterns. Various different contexts may be selected eg`

- A. Colour Pattern (discs of same size red, blue, red, blue)
- B. Rhythm Pattern



1. Teacher introducing a growing pattern

(initiated by teacher – clap, tap, stamp, clap, tap, stamp)

- C. Animal Pattern (pictures of dog, cat, cat, dog, cat, cat)

Images of these repeating patterns can be introduced by the teacher. In each case, the pattern should be displayed for the purpose of whole class discussion. Questioning is central to the process of pupils uncovering for themselves the characteristics of the specific repeating patterns as well as the features of repeating patterns generally. While initial questions should include 'What do you notice about the pattern?' and 'What comes next in the pattern?' reasoning can be promoted through questions such as 'How did you know that?' Comparison of the various repeating patterns also supports the development of conceptual understanding eg 'How is the colour pattern different from

the animal pattern?' All of the above discussions lay the ground work for the subsequent introduction of a growing pattern (eg in image 1).

Once a growing pattern is introduced, the teacher can draw children's attention to the various characteristics of the growing pattern through probing questions which may include:

- ☞ 'What do you think this pattern looks like?'
- ☞ 'How do you know the pattern is getting bigger?'

Further understanding will be facilitated through questions which require comparison between repeating and growing pat-



2. Constructing a growing pattern from the story

terns e.g. "How is this pattern different from the last pattern?"

2. Children's Literature

Children's literature such as *The Very Hungry Caterpillar* by Eric Carle (other examples in Appendix A) can also be used as a context to develop the concept of growing patterns (Integration). Alternatively, existing stories can be adapted.

For example, the story may report the eating patterns of 'Freddy the Frog' over a week (linkage) and begin along the following lines: "On Monday Freddy ate an apple; On Tuesday Freddy ate an apple and an orange ... On Sunday Freddy ate an apple, an orange, a pear, a banana, a kiwi, a plum and some grapes". Throughout the story telling process the teacher may use a puppet of Freddy eating various pieces of fruit to support children's learning. On re-telling the story, children's attention should be focused on the

❖ *Questioning is central to the process of pupils uncovering for themselves the characteristics of the specific repeating patterns* ❖

of patterns grow

recording of the story's growing pattern on the whiteboard (see image 2).

Prior to moving onto a new day (in Freddy's eating pattern), invite pupils to recall the pattern to date and make and support predictions regarding Freddy's fruit for the next day of the week. Pupils can also become involved in the creation of the pictograph of Freddy's eating pattern over the week. There are many opportunities for linkage with the strands of 'Number' and 'Data' during the analysis of the completed pattern. Appropriate questions at this stage include:

- ✎ "On what day did Freddy eat more fruit Thursday or Friday?"; "How do you know?"
- ✎ "What day did he eat the most/least/5 pieces of fruit?"

On ascertaining specific information about the pattern, the teacher should focus pupils' attention on the characteristics of the pattern overall through questions such as "What do you notice about our pattern on the board?" and "What does the pattern remind you of?"

3. Kinesthetic Activities

Children can gain a new perspective of growing patterns by experiencing an activity which involves pupils themselves moving into various groups to make a growing pattern. The teacher organises the children to sit in a semi-circle at the front of the room. Four different coloured hoola hoops are placed in a row on the floor (red, green, blue and yellow). Initially pupils are selected by the teacher to stand into the respective hoops (one child in red, two children in green, three children in blue and four children in yellow).

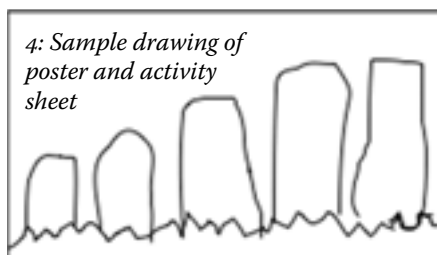
Pupil predictions should be encouraged at each stage regarding the number of children that could be in the next hoop and why. Subsequently, the teacher selects different pupils to stand in 3 of the 4 hoops (e.g. child in the first hoop, 3 children in the third hoop and 4 children in the fourth hoop). Questions to the class should include "How many children should stand in the empty second hoop?" (answer: 2 pupils) and "How do you know that?" This activity can be varied through the use of a different number of hoops and group sizes or extended through questions such as "If we had another hoola hoop and placed it after the yellow hoop, how many people would go in it?"

4. Concrete Materials

Children should also be provided with opportunities to work in pairs or individually to create growing patterns using diagrams and/or concrete materials. While this may simply involve pupils completing given growing patterns or creating their own, the poem *Napping Snakes* (NCTM, 2005: 14) provides a novel approach (Appendix B). After an initial recital of the poem, the teacher demonstrates the initial

One small snake slithered up the first rock,
Gave a hiss and fell sound asleep.
Then two snakes went to the next big rock
And slithered up without a peep.

3: Verse 2 of 'Napping Snakes'



2 steps (second verse) (see image 3) of the poem's growing pattern on a poster using large counters/discs to represent the snakes in the poem (see image 3).

Subsequently, each pair/individual receives a plastic cup containing 15 counters (each counter represents a snake) and an activity sheet (see image 4) in order for them to complete the steps of the growing pattern which are presented in the verses of the poem (see image 5). Possible questions to be used during and after this activity include: "How many snakes will be on the last rock?"; "How do you know

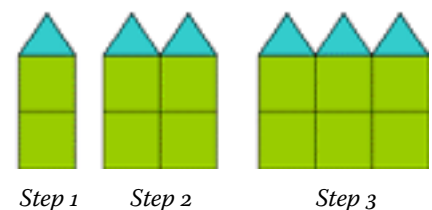
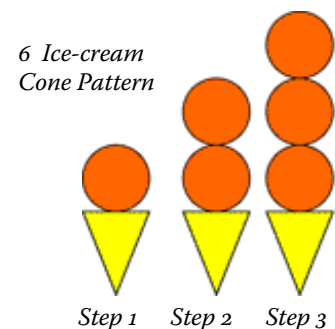


5 Infant pupils making a growing pattern

this?"; "How many snakes on this rock?" (Teacher covers one of the rocks) "How do you know this?"

5. Meeting the Needs of All Pupils

Where a teacher feels that the growing patterns used in this article are not challenging enough for all of their infant pupils, more complex visual or geometric patterns may be used as a substitute for or extension to earlier growing patterns. Unlike previous growing patterns which focused on one element (eg squares, fruit, children, snakes), these growing patterns (see examples in image 6 and 7) may involve a focus on at least two elements (e.g. circles, triangles) at each step. These



7 Houses Pattern

patterns are still accessible to infant pupils as they look like recognisable objects (ie ice-cream cone and scoop (image 6); houses (image 7)).

MAIRÉAD HOURIGAN, ÁINE MCMAHON and AISLING LEAVY lecture in mathematics education at Mary Immaculate College, Limerick.

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Web version: An extended version of this article is available online.