

How Can ‘Making Thinking Visible’ Strategies Promote Effective Communication in the Classroom

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Rationale

This enquiry sets out to investigate the impact of ‘making thinking visible’ strategies to promote effective communication, specifically looking at the use of number talks within the primary classroom. The subject of this enquiry was selected after considerable discussion among a variety of primary and secondary probationers queried how we can best develop the communication of each individuals thinking process in a specific curricular area, which can later be developed throughout the curriculum. Richhart et al. (2011) states teachers must have a window into learners understanding of learning, modelling to students what it means to engage with ideas and think; showing them that learning is about much more than memorising for a test. This enquiry will target all learners within my classroom, regardless of ability.

Aims

The aim of this enquiry was to investigate how ‘making thinking visible’ strategies can enrich learners understanding of learning and foster educational development, creating a shift in classroom culture towards a community of enthusiastically engaged thinkers and learners across the curriculum.

Methodology

The class participating in this enquiry consists of 19 pupils, varying in ability, within a composite Primary 2/3 class. The class consists of 5 girls and 14 boys, aged between six and seven years old.

Conducting the enquiry, it was important that findings were reliable and consistent; to allow this all external factors were considered, with measures put in place to minimise influence these would have on the enquiries results. Number Talks is used every day, at the beginning of mathematic lessons, with new concepts explored consistently throughout the year. Number talks is an approach to the teaching and learning of number sense. They are engaging learning tasks requiring deep thinking, involving learners in an active learning process as they search for patterns, decompose and recompose numbers and develop a flexible understanding (Boaler at al., p.5, 2014). Therefore, it was determined that the consistency and theme of number talks lends itself well to the enquiry. Each week, there was a new number talk strategy introduced, with regular revision of previous knowledge – planning of the strategies often link to children’s number work within numeracy, allowing number talks to build on learner’s mental math computation strategies. At the beginning of new strategies children

were previously encouraged to use their ‘thinking caps’ to come to an answer; however, adapting ‘making thinking visible’ strategies, children were encouraged to adapt the concrete, pictorial and abstract framework to determine whether this aided the development of mental computation. For concrete the children were presented with a variety of resources so support their thinking process, coming to a conclusive answer for their questions, for example bundles of tens, numicon, counting beads, 100 square, and counters were all accessible. During the next stage, pictorial, children were asked to use whiteboards and coloured whiteboard pens to draw their thinking. Finally, the children were asked to explain their thinking process to a partner, and then to the class as I wrote the process on the whiteboard for all to see visually. Randomisers were used to select children to share their thinking process. As this enquiry was carried out in a composite class, with a variety of ability, differentiation was considered; children were presented with three number talk questions varying in challenge.

To efficiently assess the outcome of the enquiry, a variety of data collection methods were adapted – formative assessment, observation, and pupil voice. At the end of each number talks sessions children were asked to assess their learning and understanding using the traffic lights system incorporated throughout the classroom – green to show they are confident in what they have achieved, yellow if they are still working on it and find it challenging, and red if they found it tricky and require further support. Loon (2018) and Sabbadin (2013) both agree pupil’s self-reflection and self-assessment has extensive impact on their development; assessing allows learners to compare their performance against a standard, while reflection allows in-depth judgements about the learning process, motivation and outcomes. Therefore it was imperative that this data was collected through the use of traffic lights system. Furthermore children were asked to take pictures of their concrete and pictorial work, and often questioned to how the resources were used to aid their thinking process; during this process learners were encouraged to think of other ways they could have got to an answer. At the end of learning a new strategy, where learners were fully confident and dependent to using their mental maths computation, children were asked what helped them most in developing their mental maths thinking, whether it be concrete, pictorial or abstract.

Findings

SACNCOP (2018) state that number talks provides a format for teachers to build in regular opportunities for pupils to focus on mental, with teachers facilitating the use of resources to support learners develop conceptual understanding of number as well as promoting growth mind-set – it is a pedagogy providing opportunities for pupils to ‘make thinking visible’ and communicate their understanding of number. With this in mind, children were active in the use of concrete resources to aid their thinking process at the start of each new strategy. While many children had a preferred resource, few would vary in their selection from week-to-week. As children were not used to using concrete materials to aid their thinking, this was a challenge at first, but as the weeks developed children began to turn off their ‘abstract brain’. Through discussion with children it was apparent this allowed the children to understand the strategy in a deeper context, with majority of the class feeling confident to progress to the pictorial framework.

The use of whiteboards and coloured whiteboard pens allow children to use visuals to pictorially evidence their mental computation. Different coloured dots and groupings were a common theme across all abilities. As this framework developed children used large circles to represent a group of hundred, medium circles to represent groups of ten, and dots to represent units. It was evident children were more confident to talk through their thinking process using the pictorial framework, with majority of learners presenting a green traffic light – and the rest orange – during self-assessment. This was a huge progress in developing the sharing of their thinking journey, with majority of learners using red during their self-assessment during the number talks before the enquiry, suggesting that the use ‘making thinking visible’ strategies of concrete and pictorial frameworks helps support learners ability and confidence to discuss the thinking process. In turn this raises pupil’s engagement and motivation, as well as overall attainment.

When the new strategy had developed to the abstract stage children were provided no resources and asked to use their ‘thinking caps’. All learners were encouraged to think of more than one approach further developing their mental math computation. Before using a randomiser to allow individual children share their thinking process to the class, learners would talk through their process with a peer; this would allow them an opportunity to practice talking over their learning using mathematical vocabulary. Children were reminded that all responses were valued and mistakes are regarded as learning opportunities. During this process I asked children to traffic light their confidence in sharing their number talks process, to which an increased number of learners reacted with green compared to before the enquiry. In fact, there was a change in attitude with learners eager to share their strategy, and not able to do that, share a different strategy to get to the same answer.

Observation prior to the enquiry and throughout, I feel that the children’s confidence, enthusiasm and mental maths computation has positively increase, having a direct impact on mathematical attainment. Pupils are more engaged in their number talks through the level of support from the ‘making thinking visible’ strategy, and are eager to try out new strategies without the worry of failure. As the enquiry progressed children became comfortable progressing through the concrete, pictorial and abstract framework, moving forward as they progressed, and also moving backwards if they felt they required further support.

It is interesting to note that pupils have confidently transferred these skills throughout the curriculum allowing a deeper understanding of their learning, for example using ‘See, Think, Wonder’ and ‘Think, Pair, Share’.

Conclusions

In regard to my class, the use of ‘making thinking visible’ strategy, concrete, pictorial and abstract, had a positive impact on the development of mental math computation and confidence to all, showing some level of progress for all pupils. The framework allowed pupils achieve a much deeper understanding of a numbers talk strategy with support through a variety of ways. The use of concrete, pictorial and abstract was flexible allowing children to

progress to the next stage of the framework when they felt confident. By ‘making thinking visible’ children understood how mathematical concepts worked, instead of memorising and following a step-by-step ‘script’. Their understanding was developed on a deeper level, creating an enthusiasm and motivation to learn and develop new number talk strategies.

Throughout the enquiry, it was evident children did use a comfort when using concrete materials. Learners were encouraged to use different resources, with support from class teacher or ASNA in order to develop deeper understandings. It must be noted that during self-evaluation using the traffic light system that some learners may have reacted green conveying they were confident and understood purely to please the teacher or because their friend did, with those reacting a different colour doing so for a reaction or to stand out from their peers. AifL strategies further supported the gathering of data conveying how well children had grown in confidence and their development of mathematical computation.

Implications for Future Practice

As a reflective practitioner, the findings of this enquiry had made me aware of the positive impact that ‘making thinking visible’ strategies have not only within mathematics, but throughout the curriculum. Going forward, this will be a pedagogy embedded within my teacher philosophy and throughout my planning. The reaction of children developing a love and passion for number talks was an excellent way for both myself and learners gauge how far their learning had developed throughout the enquiry. Although the enquiry has ended, the use for concrete, pictorial and abstract framework will stay embedded in the planning of number talks, developing further ‘making thinking visible’ strategies throughout the curriculum.

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