



17

The Story of the 4 Mathematical Processes –

An imaginative approach to teaching
abstract concepts in lower primary school

Renu Bhatia &
Smitha Mallya

The teaching of Mathematics is a much discussed topic in the sphere of education because too many pupils seem to develop an early phobia for the subject and often, teachers also live in perpetual dread of having to deal with the subject – it is often left to colleagues who are subject ‘experts’ to deal with. As a Class Teacher in a Steiner-Waldorf school, one does not have the choice but to delve into it and find the most creative way to bring this subject to one’s class in a way, one hopes, will build a life-long love of numbers. Since a Class Teacher in a Steiner school takes the class group from Class 1 to Class 8, one knows that this cannot be a half-baked job, because the problems, if any arise from an inadequate understanding in early years, will only have to be fixed by oneself later on!

The four mathematical processes of addition, subtraction, multiplication and division – the foundation of all Math to be taught in the future, are introduced simultaneously in late Class 1 or Class 2 and this is often a time awaited with baited breath by parents and teachers alike. “What will it be like? Will the students get the concept of each process?” “After all the storytelling and fun games are done, will they connect the symbol to the operation?” “When will they make the transition to purely doing sums with the abstract symbols without needing a story to understand the operation?” “Will they see the wonder of Mathematics as relevant to all spheres of life – not just as a concept to be memorized through a method?” As one of the pillars in the 3Rs, one cannot emphasize enough the importance of bringing Mathematics to young students in a creative way to help them then learn so many more things further in their journey of education.

Lofty ideals and very obvious goals – but how does one actually go about it? The one thing I do have on my side is that the subject is brought to the class in a ‘Main Lesson Block’ of two hours every morning for a continuous period of 3-4 weeks, allowing a deep immersion into the subject and plenty of time to digest the matter and come back to it afresh day after day.

It was very clear to me from the beginning that, like everything else I do with my students, the children will understand through images that they connect with and my role would be to bring life to these images. So the preparation for the Mathematics Block was in telling a story that had characters that the children had built a living relationship with. The characters in the story were myself and my six siblings, cousins and friends. My class has got to know them all over time with me through Class 1 and until now through anecdotes, photos, even some visits by family members to my class! The central characters of the story, however, are the 4 uncles, each with a special quirk - one likes to collect, the other likes to give away, yet another likes to make it more and the fourth likes to share equally always. All along I shared the stories with the awareness that a good combination of familiarity of the characters and unfamiliarity of the plot would work very well for my students and me. The quirks of the 4 special uncles were described with funny incidents during my growing up years (exaggerated to drive the purpose of the story) and along with it the symbols were introduced.

The following day, the story unwinds, grandfather on his deathbed, calls the four uncles to pass on the 48 gold coins that were given to him by his father, which

was passed on from his father. The gold coins were a reward by the village lord for doing an act of kindness of building a canal to bring water to the village and prosperity (seeds for another story for another time!). 48 coins are equally distributed in special bags (physical bags are shown - green for +, blue for -, yellow for x and red for ÷.) Addition uncle keeps coins safe, Subtraction uncle gives away to anyone who needs; Multiply uncle ends up trying to make deals that will get more coins; bringing in disharmony until Divide uncle comes in to ask all to put all coins together to be shared equally!

The impact of the story was obvious. Not only was the excitement of the children palpable at each turn of the plot, but also every little prop brought in connected with their inner processing of the concept. The 'Blackboard drawing', another staple of the Steiner teacher's toolkit, when revealed to the class, was received with immense recognition of every detail. Unfortunately, I did not take photos of my blackboard drawing, so have used one from a colleague here for illustration purpose only. The quality that each of the four central characters represented in the story was taken in deeply by the children and transformed into an understanding of the quality of the mathematical process that it was associated with – exactly what the teacher wants to achieve through the whole exercise!



Blackboard drawing

In the 2 weeks following the story, students collected items from Nature in the school grounds. They were asked where it becomes more (+) and where

it becomes less (—) to register the idea of addition and subtraction as parallel processes. Similar exercise was repeated with many things in the classroom. Each one wanting to barter sets up shops – again, the concept of transference and therefore addition and subtraction was highlighted. An inventory of classroom articles and count of trees in school was made (addition). Everyday life situations were taken and addition, subtraction, division and multiplication were brought alive. Initially, the children are encouraged to use their 'counters' (a collection of up to 100 identical small objects like cowrie shells, wooden buttons, glass pebbles) to aid their work. Slowly, they are able to wean themselves off the physical counting aid and mentally count their way through their Math work.



Once the processes become fairly clear to the students and a good foundation has been built, the journey is now taken to the next level – abstraction. Symbol is introduced along with the word (more, less, divide, multiply) which are slowly replaced by the 'function' symbol (4 seeds and 3 more seeds becomes $4 + 3$)

Children are given enough practice sums to get an understanding of the function even with abstraction. Multiply function is introduced as repeated addition and division as repeated subtraction. Eventually they get to a point of creating their own sums of complexity they are ready for (caterpillar sums/sausage sums - $2+3=$ tram sums - $3+4+5=$ and train sums or snake sums - $4+4+2+3+1+6+5+4$).



And of course, particularly in Math as in most other things, practice makes perfect. Four to five minutes are spent just after the Morning Circle, yet another Steiner school staple, to help as a warm up before

the Main Lesson, doing mental Math through situation sums that will have 2 functions as the key elements. 1st & 2nd graders also delight in creating number sums on large scrolls of paper, on the floor, in a story.... Any given opportunity...

In my mind I also keep the real purpose of all 'processes' alive – it is finally for the benefit of all...good economics to benefit everyone. Therefore the stories and incidents consciously carry the message across to sow seeds of good work in future. On a subtle level, I also want my students to, through the study of Mathematics, understand Natural laws - Addition and Subtraction is a parallel process which is constant, therefore they are not viewed only as gain and loss, instead they are mere transference of one thing to another, or from one place to another. This would lay the foundation, for all future life situations, of an attitude of deep confidence in their ability to do things without the fear of loss or lack and with the awareness that abundance and opportunity are the other side of the coin.



RENU BHATIA is currently a Grade 2 Class Teacher and SMITHA MALLYA is a Co-Founder and current Managing Trustee of Bangalore Steiner School. Class Teachers in Steiner-Waldorf schools endeavor to take their students through from Grade 1 to 8, doing all the main subjects of English, Mathematics, Sciences and Social Science. As a first time teacher, Renu draws on the structure & framework of the Steiner curriculum, the collegial aspect of teacher development and of course, good old common sense from raising three sons, to take her students on a joyful learning journey. As a Waldorf parent for 7 years, Smitha has drawn on her immersion into the philosophy of this education to co-author this article. They can be contacted at info@bangaloresteinerschool.org