

# **A Pathway for People with Perceived learning difficulties to embrace and succeed with studies in Vedic Mathematics.**

## **Introduction**

Until now people who do not have a natural aptitude with the four operations in arithmetic have not had an opportunity to enter the world of Vedic Mathematics. These people include Dyslexics, certain people on the autism spectrum, children who have missed schooling in the early years due to illness, family trauma etc., and those who are primarily visual, kinaesthetic, tactile or auditory learners and for whom the standard school approach in teaching arithmetic is a failure.

## **History behind the development of “Pebble Maths”**

In 1993 I began looking at the way Mathematics was being taught in high school as compared to my experience in the '50's and '60's with a view to helping children to be more successful in their studies. To my horror nothing much seemed to have changed. I worked within the confines of the school system until I was entrusted with the task of teaching a 12 year old boy who was on the verge of being expelled from school for behavioural problems and who had absolutely no ability with arithmetic. My challenge was to not only “teach him” but to inspire him with the joy of mathematics and its potential as a creative endeavour. I lived by the beach so we collected pebbles, painted numbers on them and played with arrangements, initially in groups of 10. He enjoyed this which was a most important factor in changing his attitude towards mathematics, but addition still evaded his understanding. Counting tools were not enough for him to grasp the essence of addition.

I feel that it was divine guidance that brought me to explore the distinct nature of odd and even numbers as different entities with different properties. I had discovered the key which enables every child to understand number and be able to compute successfully.

I continued to teach Tom for a term by which time he was able to return to class.

Tom now has a degree in Business studies.

Over the course of two and a half years during which time I had the opportunity to teach with complete freedom in a privately run primary school, the children and I discovered all of the patterning which later became the foundation of “Pebble Maths”. At the same time as working with Pebble Maths I was also studying Vedic Mathematics. The first book which came into my hands was Joseph Howse – “Mathematics without tears” it took me a full two weeks of study to grasp very basic Vertically and Crosswise multiplication and division techniques, yet I was totally fascinated and wanted to learn more. I found the Vedic maths website and brought one of James Glover’s books – Vedic Mathematics for Schools: Book 2, which I recommended to those of my students who had completed the foundational work which I later enumerated in my book “Pebble Maths.”

My next purchase was “The Cosmic Computer” by Kenneth Williams and Mark Gaskell.

Pebble Maths” continued to evolve with each student and with each difficulty with which I was faced. I knew very little about Autism and nothing about Dyslexia. I worked as a volunteer in a school for Autistic children for 6 months. These children had varying ability with mathematics. They all responded positively to “Pebble Maths”. Since that time I have been teaching children on the autism spectrum who all find Pebble Maths to be enjoyable and understandable.

In 2011 Kenneth Williams encouraged me to write a teachers’ manual so that more people could have access to this knowledge. I published my book in May 2012 and Pebble Maths is now taught in Australia, New Zealand, Spain, Singapore, Africa, America and Great Britain and possibly other countries as my book has been sold all over the world.

### **Dyslexic Students**

I had parents who informed me that their children had a diagnosis of Dyslexia and were unable to understand the teachings in literacy and numeracy as presented in school. In a very short period of time all of these children became adept in mathematics and it appeared that their literacy skills improved concurrently.

I was asked to run workshops for the North Coast Dyslexia Association which were attended by learning support teachers interested in finding a way to manage dyscalculia. These teachers are experiencing extremely positive outcomes by teaching their students Pebble Maths. They also report that progress in literacy improves as a by-product.

When my students have successfully achieved all aspects of the four operations (addition, subtraction, multiplication and division) as well as fractions and decimals, I teach them Vedic Mathematics.

The fact that the techniques in Pebble Maths enable the students to calculate mentally, left to right, use digit adding to facilitate understandings, always use and look for patterning as a way to solve all calculations and work without limit- as compared to school where multiplication is a matter of rote learning that has a ceiling of  $12 \times 12$ , results in a seamless transition to the later Vedic work.

### **What Happens After Pebble Maths?**

Many of my students do not stay beyond catching up with the level required by their school but some wish to learn more. One of these students, Amber began with me in her first year of high school with no understanding of addition. After four years she is not only at the top of her year in school, but is a certified teacher of Vedic Mathematics and is preparing to take an advanced course.

In 2014 Amber attended an online course on “The Crowning Gem: One Vedic master-formula for powers roots and polynomial equations” by Kenneth Williams.

Prior to this course Amber had worked with me on the creation of my book ‘Stairway to Heaven’ which is a preparation for my students to be able to reach their highest potential in Vedic maths studies.

I quote Amber “I couldn’t have understood the work in the Crowning Gem without having done the work in the Stairway book.”

This student is an example of someone for whom Vedic maths would have been completely out of reach without the prior experience of Pebble Maths.

Amber will undertake the highest level of maths offered at her school for her senior years. We are in the process of ascertaining whether one line answers

will be acceptable in the final exam. If we are successful, even in part, Amber will be paving the way for school students to see that there is a much simpler and more enjoyable way to study and achieve in mathematics.

It is my assumption that a student who is as well versed in Vedic Mathematics as Amber will be when she sits her final exam, is in a position to show the examiners and her school maths teachers that Vedic maths is indeed a far superior way to teach children.

I am sure that by tutoring senior students Amber will be successful in promoting Vedic Maths.

I now have numerous primary school students in the 9-12yr age group all of whom came to me with no facility or confidence in mathematics. After varying lengths of time teaching them Pebble Maths they are working in a group and embarking on Vedic maths work. The first lesson that I gave them on bar numbers created so much excitement that they asked for a workshop in the summer holidays specifically on Vedic maths. Those of you who are school teachers will appreciate the enormity of this request. Most school children want to forget about learning during their holidays, however in my classroom the opposite is a reality.

I need to mention that more than 50% of this group have a diagnosis of Dyslexia. In the past these children would have had little or no chance of ever being able to compute without a calculator.

### **My Hypothesis**

I observe my students very closely and found it amazing that the Dyslexics are quicker in grasping the concepts in Vedic maths than the children with no perceived learning difficulties. This observation has now become a most important research topic for me. My hypothesis is that all children, if educated within the principles of Vedic mathematics from the very beginning can be not only successful with Mathematics but foster their mental creativity which flows into all learning areas in their life.

### **Case Studies**

#### **Loui.**

Loui was 8 years old when his mother first brought him to me, the school had made him repeat kindergarten and then repeat class one. By this stage he was

suffering emotionally so badly that his mother chose to home school him. He could not write numbers or letters and he didn't have the confidence to speak during our class. He was terrified. I made a point of not writing numbers or presenting him with written numbers at all. We worked only with the pebbles until he understood the creation of the numbers and could see the patterning in adding and taking away 1s, 2s, 3s and 4s. We proceeded to the number partners for 10 and because odds go with odds and evens go with evens it was disarmingly simple for him to advance to higher addition. Over the course of 9 months with 1 lesson per week with me and practice with his mother between lessons, Loui has developed a remarkable capacity to add, subtract, multiply and divide mentally. He now writes his numbers perfectly and communicates with confidence. I began teaching him multiplication above and below the base and was astounded that his understanding of "how many places were needed in the answer" was a natural revelation, he is now 9 years old and the youngest in my group. I began work with him on powers and roots (refer my book Stairway to Heaven step 1).

I decided to introduce bar number work to my group and had no pre-conceived notion of how it would be received. There are 6 students in the class- 3 of whom are Dyslexic. Loui's brother who is 2 years older than him, and an excellent student with no difficulties in any areas, ahead of his age group in his school work, is also in the group. I began slowly showing with 7 pebbles on the table as I wanted the children to see that 7 divided by 3 could be 2 remainder 1, could be 1 remainder 4, and could be 3 remainder 2. We spent maybe 15 minutes exploring in this way before I ventured into written bar number work. I used Kenneth Williams "Vedic Mathematics Teachers Manual: Elementary Level" lesson 9 page 85. There was no hesitation- no questions. Everybody understood. When I showed the children how for example 49 times 7 could be a bit difficult but 51 times 7 is very easy there were smiles of understanding all round. I should mention that the children have all embraced "All from 9 and the last from 10".

I wrote numerous sums on the board which the children had to copy and either convert or remove bar numbers.

The amazing fact was that Loui, my youngest Dyslexic Vedic student, was the first finished with 100% accuracy.

## Maia

Maia also began with me from the beginning of 2014, she was 11 years old in her final year at the local primary school. Maia, a twin, was diagnosed with Dyslexia at age 8 as her mother was alarmed that Maia's progress was so disparate from her twin. Even with learning support at school Maia's capacity with mathematics was non-existent. Maia has a very positive attitude and wanted to learn; she progressed well. The most important change was that she could see that she could achieve in mathematics. Maia looks forward to her lessons and practices conscientiously. It was she who expressed so much excitement with the revelation of the bar numbers and how they can make mathematics so easy to the point of asking for a one week workshop specifically in Vedic Mathematics during the holidays. The other children thought it was a wonderful idea, they all want to embrace further studies in Vedic Maths.

I should also mention that she will be a participant in my class for children who are about to enter high-school to ensure that they have the primary numeracy curriculum well digested. This class also runs for 4 consecutive mornings in the holidays, which means that Maia of her own volition will spend 2 weeks of her leisure time studying mathematics. It is fascinating for most people to see that my students love mathematics and want to learn more and more. This is very different from the reality in school where the study of Mathematics is for most children boring, confronting and soul destroying.

## Daisy

Daisy's father was referred to me by the father of one of my previous students. Daisy was 15 years old at the time and in year 9 at high school. She was angry and frustrated about all her school work. She shouted at me that she tries so hard and can never achieve anything and her parents and teachers just keep saying that she should do more work.

I told her that we could make a big change and she calmed down. She sat down and picked up two pencils, one in each hand to signify that she was ready. I asked her to write the number 58- she wrote 5 with the left hand and 8 with the right.

I asked her if she is Dyslexic and she didn't know what I meant.

We began with the pebbles which is where I begin with all students irrespective of age.

Daisy progressed very well and after 5 weeks (5 lessons) had her half yearly exam.

She scored 70%. It was the first time that she had ever passed an exam, the first time that she was not at the bottom of her year.

At about the same time she sat the national numeracy and literacy exam which is compulsory in years 3, 5, 7 and 9 and scored the school average.

She was overjoyed.

When she began as my student I asked her what she wanted to do when she leaves school. She told me that she wanted to be an actress.

Six weeks later she looked at me and said 'I want to be an engineer. Can I be an engineer? Can I do maths in years 11 and 12? (Senior school) I told her that she can be an engineer if she wants to.

Daisy is now better able to understand the new work that is presented in class. Her ability to comprehend is improving steadily.

Her father has agreed to have her tested for Dyslexia and Irilin's Syndrome.

In 3 years' time Daisy will graduate from High School and it is my prediction that she will, if she still wants to, achieve the marks to enable her to study engineering.

I shall teach her next year and Amber will become her tutor for years 11 and 12.

### **Further Stepping Stones to Vedic Maths**

My contention that all children, irrespective of perceived learning difficulties, can be good at and enjoy mathematics is being supported every day by the successes in my classroom, the classrooms around the world where Pebble maths is being taught and in the homes of the children practicing the pebble work.

I made the decision to write material for use after the completion of Pebble maths as a way for the students to understand the unity of all aspects of high school mathematics; arithmetic, algebra, geometry, trigonometry and calculus

and for it to be a mentally unchallenging pathway to embrace the teachings of Vedic Maths.

In my experience and the experiences of many of my school friends, maths was divided in several subjects which seems to have very little, if any connection. This view of and attitude to mathematics is not only untrue but makes the study of the subject laborious and dependent on memory therefore rendering its success out of the reach of many students who don't have the capacity for memorising unrelated material.

Because the majority of my students are visual learners the material must be presented in a way that is harmonious for their thought processes.

The introduction of Powers and roots as the entry point is very successful. The students create very comprehensive charts making use of colour to differentiate the processes including differences and differences of differences. The later work with numbers to the third power requires one more difference to arrive at zero. This revelation ties in with integration which I don't introduce at this point. They work with the digit sums and differences and discover patterns inherent in all the square numbers up to 100 squared. They focus on number placement so that predicting the number of places in any multiplication becomes a natural process, without thought. They learn various Vedic multiply techniques including Duplex. The creation of the algebraic formulae for the creation and differences of squares flows easily from the arithmetic.

My method differs from many in that I begin with the geometrical representation, followed by arithmetic calculations and finally distil the algebraic formulae.

I find this way of introducing algebra to be very successful.

When we have completed the creation of the chart we study to numbers to discover how to recognize the root of a perfect square. If allowed to explore and discuss, the students discover much of the reversal processes themselves.

By creating the charts which can take many hours of calculations and setting out, the students become familiar with the numbers and patterns. In school no-one spends a term calculating squares to a hundred, yet this process opens the mind, not only to the maths in question but to further patterning which



enables the future work to be obvious. The learning becomes easier and easier, quicker and quicker.

It is my objective that my students have the foundation to not only understand Vedic maths but to be able to create for themselves.

## **Conclusion**

My research with Dyslexia and Vedic Maths is in its infancy at this stage. As I am becoming known as a teacher who has success with overcoming Dyscalculia I am working with more and more Dyslexic students. These children, at least those who stay with me beyond managing their school work, will all be learning Vedic Maths.

My prediction is that they will all become more and more confident, more and more capable and learn with greater speed.

In the past it has been all nigh impossible for people with Dyscalculia to overcome their incapacity with number. These people can now not only manage the basics but can enter the world of Vedic Mathematics.

People like my students will have every avenue of study open to them. They will be able to study disciplines such as engineering which would not have been a consideration prior to their Vedic studies.

It seems that teachers must eventually notice that children whom they have been teaching unsuccessfully are now not only paying attention and learning but also achieving high marks in their maths exams. Whether or not the school teachers want to change their teaching methods is not something that I have any influence over. However some of my students are saying that they want to help other Dyslexics to achieve in the same way that they are and have the ambition to become primary teachers.

It is an astounding concept that the people whom society has thought of as being incapable with mathematics may be a great power in changing the way that educators work.