

HOW TO MAKE MATHEMATICS ENJOYABLE FOR SCHOOL CHILDREN

- NIKHIL PANT *

For school children to enjoy mathematics it is extremely important that the 'fear' of the subject in the minds and hearts of these students is gradually removed. In most school-going children, the very thought of a maths exam is enough to give them sleepless nights, and very often an 'examination fever'. As a result the parents of these children too begin to get nightmares, and in their hysteria they seek short-cut measures to help their ward tide over this problem. But they fail to find a sustainable answer to their child's dilemma. Infact, many of them begin to recall how they too had spent sleepless nights over maths exams during their school days. Most of them feel that by appointing a good tutor, they will be able to help their child outgrow the problem. Sadly, they are mistaken. A good tutor can definitely solve the child's mathematical problems - topic wise - but he is a poor substitute for one who can motivate the child to start enjoying mathematics as a subject. Enjoyment is associated with the thrill, the excitement and the happiness that a child experiences on successfully solving a problem without external assistance. The child exults by 'punching' the air just like a tennis player does on hitting an ace, or what a bowler does when he outwits a batsman and gets him out. Very often, the student of mathematics today is deprived of this sensation of 'vanquishing the problem', since the child is invariably provided with ready-made answers by the teachers, tutors or else by the plethora of 'guides' available in the market. All these are mere 'props' that only provide the child a vain sense of security. It is only when the exams arrive that the child is suddenly confronted by the reality of the situation - the reality that everybody is alone in this world when it comes to fighting such battles. In such a situation the child feels lost and often resorts to unfair means to cross the examination hurdle. When things reach such a pass, the parents begin to blame the school, while the school and the teachers point their fingers towards the parents for neglecting their ward. Neither party realises that due to this confrontation of

transferring responsibility, the child has been deprived of one of the most fundamental rights - the right to experience bliss and happiness, right within the classroom! This is perhaps the earliest occasion when we can help the child in getting the first spiritual experience in life. The realisation that the source of happiness lies 'within' is the first step the child takes towards eventually experiencing the 'Divine presence' inside. The experience of 'triumph over the problem' gives the child enough motivation to delve further into the mysteries of numbers associated with mathematics. The desire and thirst to unravel these mysteries pushes the child further and further. This outward quest subsequently brings the child closer to understanding the 'self' that lies within.

In order to create an environment in the class-room where the above ideas could be inculcated, the following method was experimented successfully in classes VIIth and Xth at Manava Bharati India International School, New Delhi :

1. The class is divided into a number of Study Groups (SG).
2. Each SG consists of 5-7 students, preferably from the same residential locality.
3. The SG is headed by two Group Leaders (GLs). They are students amongst the given SG who have secured the highest marks in maths in the last exam conducted by the school.
4. Members of the SG are requested to exchange their addresses and telephone nos. to promote out-of-school interaction within the SG.
5. During the maths period, each SG is asked to sit together to promote peer-group learning.
6. The instructor guides the class through a brief period of 2-5 minutes of meditation at the very start of the period. This prepares the mind of the children for imbibing the basics of the topic better.
7. The effort of the maths instructor during a period should be to explain the basic fundamentals of the topic, and solve a few conceptual questions on the blackboard.
8. During some part of the period, the instructor engages the students in 'mathematics games' based on the topic. These would depend on the ingenuity of the instructor. For all the

'games' children should be awarded points on the basis of their performance. These points should then be reduced to marks as part of their class-assessment work. The instructor must ensure that the weaker children / the back-benchers also take part in this activity. Some examples could be as follows :

- Children are asked to solve questions on the board, and then assessed on the basis of time taken and solutions obtained. These questions could also be the difficulties brought forward by the students themselves.
 - A 'race' may also be held between two students both of whom know how to solve a given problem.
 - Children may be asked to frame a question for a given answer from the topic under discussion in the class.
 - Children may be asked to develop crossword puzzles, quizzes etc. on the concerned topic.
 - The instructor may also judiciously introduce the game of chess in the class to further enhance the child's mental ability.
9. The instructor must inspire the SG enough so that healthy intra-SG interaction gets promoted, by moving around the class, one SG to another, to see that this takes place.
 10. As far as possible, the instructor should only provide hints and clues to stimulate the child's thought processes, and not solve questions himself.
 11. The instructor should ensure that the GLs are well equipped to handle the minor problems of the SG members. However, if the GLs too are unable to handle a problem, the instructor must then guide the SG appropriately.
 12. At times, inter-SG interactions may also be permitted by the instructor if the need arises.
 13. Each SG is motivated by the instructor to meet at least twice in a month, by rotation, in the house of one of the members. If this works out well, then mathematics too can become a reason for children to socialise. All members visiting the host's house should carry their tiffins, so that after discussing maths they can all enjoy a pooled lunch! The parents of the

host-member should make it a point to participate in this endeavour, and thus motivate the SG to develop camaraderie and team spirit.

14. The maths instructor initially checks the copy of the GLs. On the basis of these checked copies the other members of the SG first check their own copies with a pencil, and subsequently submit them for the instructors checking. This process of double checking eliminates all kinds of mistakes, and the child is able to grasp the fundamentals of the topic better.
15. Each member of the SG is asked to maintain a page in the maths notebook as a 'Progress Sheet', through which they monitor their own progress in mathematics over a period of time. The instructor assists them in maintaining this Sheet.
16. The effort of the instructor should be to promote truthfulness amongst the children - during classwork as well as homework, by encouraging them to solve questions honestly to the best of their ability.
17. The instructor could devise a system by which those weak in maths are not overburdened by classwork / homework by giving them typical questions to solve and then monitoring their performance closely. Meanwhile, the brighter students could be taxed more so as to make them even better. The overall effort here should be such that over the coming months the weaker children are able to catch up with the brighter ones in the class and the brighter ones become even better, so that the overall standard of mathematics in class goes up.
18. The GLs should change if in the next maths exam any other member of the SG acquires the highest marks. In other words, at any given time the two members with the highest marks in the last maths exam will be the GLs. This acts as a motivation and incentive to others in the SG to excel.
19. The instructor should also allay the 'fears' of 'insecure' mathematics toppers as well as others in the class by encouraging them to share their knowledge and information with the weaker students in the class, as part of a wider process to enhance their own mathematical

ability. This effort is based on the precept that ‘knowledge increases by sharing’, and that ‘by helping others one is helping oneself’.

20. The instructor must make it a point to appreciate the GLs, SGs and individual students whenever they exhibit sparks of excellence during the period.

21. Innovative art-forms may also be adopted to make the instruction more interesting and enjoyable.

22. The instructor may encourage the use of ‘re-cycled’ math copies/files. This may be done by tearing blank pages from old unused copies & creating new registers/files out of them. This helps to inculcate the habit of conserving paper – which reduces the demand to cut more trees. Such linkages need to be communicated to children during the classroom situation to make the exercise more meaningful. Additional points/marks may also be allotted for such interventions.

23. This entire process of mathematical instruction should be a dynamic flow of ideas and viewpoints between the instructor, the students, and their parents. Thus, the instructor should always be open to new methods of instruction and rectification within the classroom.

Once children start experiencing the joy and excitement associated with solving a mathematical problem themselves through a method like the one discussed above, they would begin to enjoy tackling even the most difficult of problems in the subject. This would enhance their thirst for mathematics, and very soon the fear of maths would be replaced by an indomitable spirit to question the very basics of mathematical principles, and to investigate how these principles are of relevance to our daily life. This process would then open the doors of a spiritual journey towards fulfilment and bliss that the child experiences right within the four walls of the classroom.

The instructor must also attempt to impart “value-education” to the students through the various mathematical topics under discussion. For example, in the chapter on Income Tax and Sales Tax, the child should be taught not only how to calculate these taxes, but :

- payment of Income Tax is the duty of the individual. The children may then persuade their parents, and relatives to file their taxes with honesty if they are not doing so. Besides, when these children grow up they are themselves likely to become honest taxpayers, thereby playing the role of responsible citizens of the nation.
- payment of Sales Tax is also the duty of the individual. They would request their parents, relatives and friends to always ask for a receipt / bill while shopping, and in the process pay the due Sales Tax.
- the citizens of a country must elect only those representatives to Parliament who work towards framing appropriate tax laws so that the money collected through various taxes is properly utilised for public use. If this does not happen, they must express their views through forums like the media so that enough pressure is exerted on those in power to fall in line.

In this way the child not only begins to enjoy mathematics but is also trained to become an active agent of positive social change. It would be better to understand here that the 'satyagrah' of the children on their parents, relatives and friends is perhaps the most powerful tool for social reform in a country like India. What laws cannot achieve might become possible through the positive pressure of school children.

Suitable use of technology must also be integrated into the above approach. Each SG may be asked to make power point presentations about their group dynamics, make their own blogs, evolve e-groups etc. This way 'responsible use of technology' comes out as a useful by-product.

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