RAMU does not ask questions because he lives in a culture that encourages total respect for parents and teachers. They are equivalent to gods and whatever they say is god’s own truth and shall be accepted as such and not questioned.

Ramu does not ask questions in the class because he is anxious that his classmates may think that his question is stupid and may laugh at him later. A question is an admission of ignorance and ignorance is belittling. And in any case, asking questions in the class is the business of teachers. Students are expected only to give answers. Not the other way around.

Ramu does not ask questions because he was shouted at as a child when he used to ask too many questions. He does not remember the occasion. But it has left a mark on his psyche. He cannot ask a “why” of anything, anymore.

Whether the approach to finding reasons for Ramu’s not asking questions may take a cultural-anthropological perspective or a social-administrative perspective or a psychological perspective, it does not give us any clue about how we can get Ramu to express his curiosity without fear or inhibition.

Rudyard Kipling who wrote these lines was a journalist before he became a well established author in English language:

“Once I knew six wise old men
Who taught me all I know
What and why and how and
When and where and whoo”

Till date, all journalism courses teach the value of asking the 5 Ws and the H. But science courses on the other hand, do not seem to pay much attention to who, when and where as much as they do to what, why and how.

Let us examine the characteristics of Kipling’s six wise old men and their role in the intellectual and emotional development of children.

Characteristics of Questions

“What” is the first question from a child. It is not really enunciated. Adults respond to the pointing finger of the child. They introduce the child to its environment by naming things that the infant points at. The question behind the not-asking of the child is assumed to be: “what is that?”

Thus chair, fan, table, books, trees, birds etc. are named.

Even after the child starts vocalising “what is that”, the answer the child gets is always a noun. And children seem to be content with the answer. So the grownups are comfortable with this stage of the child.

But when the child starts asking ‘why’, the picture changes. Because the answer to every ‘why’ seems to generate another ‘why’ from the child. This is the stage when some adults show irritation and at times flare up at the child, leaving an indelible mark on the psychology of young minds, in relation to this question.

The ‘why’ question has many implications. For example if you ask “why did you go to the market?”, you may get an answer: I went to market because I wanted to buy a toffee. The act of going to the market is moved by the future act of getting a toffee.

We, who are conscious and have goals, motives and motivations, are often guided in our present action by the expectation of future outcomes. But in the inanimate world of the non-conscious material, the present is dependent on the past, never on the future. So asking ‘why’ of such phenomena can at times tie you up in knots. We may even end up giving wrong answers.

For example, “why do trees have flowers” may get an answer: “trees have flowers to attract insects”. The attribution of a conscious goal of trees to sprout flowers is wrong, but children are satisfied with such answers. However, the next question comes almost immediately: “why do trees want to attract insects?” Instead of guiding the child into the world of knowledge about how some trees evolved flowers, we get carried away by our wrong answers. Or express...
anger and displeasure at the questions, dissuading the child from maturing from ‘why’ to ‘how’ questions.

Mentoring a child who asks “why is the sky blue” by slowly guiding the reformulation of the question to “how is it that the sky appears to us blue most of the time”, is difficult. Most adults lack the requisite patience and intellectual stamina. Hence, most children end up not asking questions, due to the fear of displeasure from adults. Inability to ask a why question, even after becoming adults, is the consequence. When such adults become parents and teachers, the situation becomes worse for the next generation. Not asking questions becomes a cultural trait.

It is interesting to note that the child who asks “what is that” and gets an answer “it is fire”, will not continue to ask another related ‘what’ question: what is fire? The word fire or flame is enough to describe a phenomenon, without really understanding the phenomenon, fire, in this case. Fire as a phenomenon is really a collection of verbs, full of activity of molecules of volatile gases getting excited, reacting chemically and releasing energy. But the child gets a veil of nouns which covers the truth about the world with words.

Later, sometimes abstract nouns also get attributes of reality very easily, using the faulty logic of language – all things have nouns, so all nouns have corresponding things. Adults who are responsible for the growth of children may keep this in mind when reacting to the ‘what’ question. To help the child understand that there is no truth value in names. Even if we call fire by aag (as in Hindi) or thee (as in Tamil, Malayalam) the truth about the phenomenon of fire remains unchanged. And that truth is full of verbs, not easily contained by a noun.

Though the ‘what’ question is not followed by a related ‘what’ question, children are able to formulate related ‘why’ questions one after another at a particular stage of emotional-intellectual development. And the ‘why’ question has a motive force, even later in life, which somehow the ‘what’ and ‘how’ questions seem to lack. There is thus a need to detect the children who have difficulties in enunciating ‘why’ questions and to provide platforms where they can safely enunciate such questions, to help children overcome the learned aversion to the question.

The “who, when and where” questions are more intrinsically related to each other. So, “who is Cleopatra” (or “who is Caesar”) is truthfully answered by saying my friend’s cat (or my dog). And indeed, Newton is my friend who plays carom well. Why not?

Only the “who-when-where” question will give you the answer that she was the queen of Egypt around the same time as Caesar, the famous Roman emperor. Or that Isaac Newton was a mathematically talented natural philosopher, who lived in Britain in late 17th century.

By removing the who-when-where of science from science teaching, we do great harm to our children. In an apparent attempt at being objective, the humanity behind the creation of scientific edifice is eliminated from pedagogy. Except for some extraordinary characters from the history of science, and that too, without providing the context of discovery or the process of discovery, teaching the principles that were discovered alone, would leave children with an attitude to science that is not too different from their attitudes towards religion. And science textbooks start presenting scientific principles as if they were revelations.

If science teachers take “who when and where” of science seriously, perhaps learning science will even become equivalent to listening to stories – pleasurable. And children will perhaps forget the fear of the unknown by emulating the heroes who went on asking why into their adult life. And if well trained journalists who know the value of the six wise old men, write science textbooks, we will soon have a generation of readers for scientific information. Imagine!

Meanwhile, coming back to Ramu, as a citizen of India, he has...
what we could get as individuals to make decisions based on evidence. We took it up as an exercise in mind mapping of the young media consumers, a very important target group for communicators.

So, we created a bank where children in a school could deposit their questions – any kind of questions, even ones not related to what they study at school. And we announced in the school assembly that the child who asked the largest number of questions would get a prize!

The bank had a policy of non-disclosure of the details of its depositors. The children could deposit any question without fear that the principal, teachers or their classmates would find out.

However, the bank was transparent in what is received as deposits and would display all the questions, without attribution, on the notice board. This constituted a monthly statement for the school. This would in turn encourage more questions from children and influence how teachers approach their topics.

When we looked at the data of the first month, we realized that there were too many questions that were lifted off from text books in the competition for the prize. Many children formulated questions to the answers that they had read or heard, emulating the teachers. We had to discourage these tendencies. So we conducted a workshop for the students – for only those who asked questions - on the value of questions and the rules of transactions of the bank.

In a normal bank, the money we put in has a number attached to it. But the questions that are deposited in our bank have no value printed on it. Yet, as bankers, we had to clarify the value of each question. This was the rule that we proposed:

- If the answer is useful to you, it is a fifty paisa question. It's like buying a toffee and eating it yourself.
- If the answer is useful to your friends the question has higher value, like a 50 rupee with which you can treat your friends to ice cream on the way home.
- If the answer is useful to your community it is a five lakh rupee question. And if it is useful to humanity as a whole, it is a one billion rupee question.

We requested the customers of our bank to not deposit too many 50 paisa questions and instead, to be bold enough to ask one billion rupee questions.

Next, we clarified our approach to the deposits. Since the questions were on display on the notice board, any child who knows the answer can “withdraw” the question by answering it. A question that has an answer is a spent force. It does push us into further inquiry.

Third – we clarified that we will not answer their questions. Like the deposits in a bank attract interest, the questions also would elicit interest from us. So we will raise counter questions, split up a complex question into simpler questions – in other words, the interest will be in the same coin as the deposit.

Fourth – we gave an analysis of the characteristics of questions as a guide to all our investors and depositors. The content of this analysis was displayed on the school notice board.

The results of this two-month long experiment told us that only 10 percent of the children participated in the game. Most questions could be easily answered, if necessary. Questions which express genuine puzzlement and curiosity were of the order of 20 percent. About 4 percent of the questions were very thought provoking.

We ended the experiment giving prizes to a student who had asked most questions – as we had promised. And also to a student who asked the most interesting questions. With his permission, we read out the questions in the school assembly. Even some of the teachers were impressed by the quality of questions and started looking at the academically not so bright boy with some respect.

But what is more important - we had missed getting Ramu involved in our game, in spite of our efforts and time. And what about Laxmi who had asked interesting questions? How do we help kids like her to embark on scientific inquiry?

Experiment 2: Six months in 10 schools
With support from the National Council for Science and Technology Communication (NCSTC), Department of Science and Technology, under the banner of SEVAKS, an NGO, we expanded the experiment to 10 schools to cover a wide variety of schools – Govt., private, boys only, girls only, coeducational, rural, urban, rich, poor, school for academically talented...

A database was created to input the questions that were collected every week to generate monthly statements for each child and each school. The database also helped us to keep track of the changes in orientation and improvements in the questions from each child.
Besides the scale, the scope of the experiment also enlarged: How do we get Ramu not only to ask questions, but also to pursue the answers by doing literature search, and if the accessible literature does not provide answers, how to help him formulate testable hypothesis?

The Quest Bank had a well designed box with printed deposit and withdrawal slips. A database was created to input the questions that were collected every week to generate monthly statements for each child and each school. The database also helped us to keep track of the changes in orientation and improvements in the questions from each child.

By giving monthly statements to each child, returning the collated questions from the month, we managed to keep the questions alive in the minds of children from the month, we managed to keep the child, returning the collated questions from each child.

In any case, there is a need for further experimentation to formulate a methodology for creating a citizenry who exhibit a scientific temper, as prescribed in the Constitution. Participative Action Research by NGOs and intervention into schools is perhaps necessary to counteract the intellectual regimentation that takes place in the name of science education.

Instilling Scientific Spirit in School Children

Another series of workshops consisted of projecting some of the interesting questions (selected from those asked by the participants) and suggesting that we guess the answers. The guess from one student has to be evaluated by the others critically and checked whether it allows experimental investigation. The children from all ten schools exhibited very high levels of energy in this activity.

While noting that children are highly creative in the formulation of hypothesis and that they can indeed be made to respect the existing facts and data and can be provoked to think in terms of testable hypothesis, coordinating the responses and interventions from the participants often became difficult for the project staff.

The data from 10 schools in and around Delhi helped us to demonstrate that the initial participation of 10% of the children can indeed be increased by repeated interventions each month to about 20% over a course of 6 months. It also demonstrated that the ability of the individual child to ask meaningful and relevant questions can indeed be improved. And that it is not necessary to provide the children with answers if they are trained in literature search methodologies. And that they can be highly creative in formulating testable hypothesis.

Since the workshops allowed all children who deposited questions to participate, we could not distinguish between the nature of responses from pre-puberty and post-puberty. We could also not proceed further with more of our own questions: how can we help Laxmi, Mohammed and Siddharth to collaborate for designing, conducting and reporting experiments?

Moreover, Ramu is still in the 80% who did not ask questions. How do we get him to bravely ask the questions? Or is it that he is incapable of asking questions?

Call for Further Experiments

The data that we collected provide us some hypothesis. It is seen that the number of questions from children drop precipitously with each year. While 5th and 6th standard children were very active in asking questions, by 9th standard, it came to zero.

Evidently, it is not puberty which is the cause for this drop since we had participants who were post-puberty in our data. The board examination as the cause of children’s lack of interest in the activity also does not hold water since the drop to zero starts in 9th standard.

So the possibility that it is the school education that causes reduction of questions, remains. Though this could be tested with the children who have dropped out of school after 6th and are of similar age as 9th standard children, the differences in environmental conditions (of the school and the outside world), may pose problems in the design of the experiment.

In any case, there is a need for further experimentation to formulate and testable hypothesis.

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