

## What Kind of Science Should The Common Man Imbibe?

This is the age of science & technology. We all talk of scientific Temper. Science subjects are compulsory at school level. It is pertinent therefore, to ask "what kind of science do we wish the common man to imbibe?"

It is obvious that the common man will imbibe science only if he finds that in some way it helps him to face every day problems. I shall try to define science and deduce therefore, what I consider the scientific methodology and shall try illustrate how these methods are of every day relevance.

Science is an eternal search for truth. This truth is universal and everlasting. The conclusions of science are therefore reproducible and predictable. The test of the Truth is in its applications.

When we do not have the whole truth, we can start with a truth limited to given domain and still make progress. We know the earth is round. But in every day life we work as if it is flat.

We depend on our senses for all our information. Even our logic is dependent on the experience we gain from our senses. Science accepts that senses are the only route to discovering truth. In this it differs from religions. Science does not accept "revelations" as proven truth.

The methods of science are derived from the above assumptions.

### Methods of Science:

1. **Observation:** Observation is the basis of science. Awareness sharpens our observation. Instruments are an extension of our sensory organs. We need to train ourselves to observe better. This requires concentration of the mind. A fleeting mind cannot concentrate or observe.
2. **Quantification:** Quantification raises the value of all information. Measurement is the foundation for quantification. It improves the resolution of our observation. That is it helps to differentiate between observations. Unfortunately look of measurement and quantification are common weakness in our society. Often even in the scientific community. Quantification includes not only measurement but also the concepts of error and accuracy.
3. **Organisation of information:** However valuable the information may be – it is almost useless if it is not organised. Organisation includes classification, tabulation, pictorial representation etc. In this connection, the observation of Al Beruni, the 11 th century traveller, on the state of Indian Science at that time, is very relevant. He commented that we lacked classification and gave equal value to 'pearls' and 'rubbish'.

Organising information reflects organising our thoughts. It arises from both the creativity and tidiness. It often makes all the difference between the right conclusion and the wrong one. Again this is so basic to progress that we need to train our children in this from the kindergarten stage itself.

4. **Comparison of Information:** This is an important process in the scientific thought. We compare only after we bring the observations to common base. This sounds common place, but its implications are deep in every day life. The farmer rarely calculates his yields/acre or hectare and can hardly calculate the rate of application of fertilisers or pesticides. The urban shopper hardly knows the price per kg of the packaged product he buys. By not comparing we lose the opportunity to adopt the better of two alternatives and improve. Comparison implies exchange of information.

5. **Recording of Information** : Lack of recording habit is another cultural weakness in our society. A large part of our history has been written for us by ancient travellers. We don't realise that information is a capital Asset and by not recording it we are throwing away assets. And we spend more money and time to collect it again or forego the use of it and suffer the consequences – lack of progress.
6. **Recognise Trends and Patterns** : This is an intellectual skill. This should also be practice. We can start from the kind ergation and train our new generation to look for trends and patterns. From trends and patterns we begin to wonder and question "why ?" and "How ?"
7. **Hypothesis** : The why and How questions lead us us to a hypothesis . We should not be satisfied with one hypothesis. We should from the habit of making alternatives – this is what we call rational thinking. We often forget that we can rationalies almost contradictory observation being confirmed, rationed thinking leads us no where. Making hypothesis without sound information can be counter productive.
8. **Experimentation** : Last but no the least, testing of the hypothesis is the important step we cannot forget. Every experiment is a test of a hypothesis. This testing is also a skill. Experimentation needs manipulative and organisational skills. We need these also in our every day life. Experimentation is not only for the specialists and the Research and Development establishments. To say that "I will find out by trying and learn" is research, and I will keep trying and improving is development. Our society must imbibe this spirit of R&D. I believe that our society learning the above methods of science is going to be far more important than learning the laws of Physics or the formulae of chemistry. What is more, once the methods of science are absorbed, they will be motivated to learn the concepts of science and the facts by themselves.

#### **Economic significance of the scientific Methodology :**

In the old days, land was the source of all wealth and landlerts become all powerful. Then came the Industrial Revolution. Industries started generating more wealth than land. Industries needed more capital and that become the controlling parameter, giving rise to the capitalist system. In this emerging age, information generation and access is going to be more critical than land or capital in generating more wealth. Collecting, processing and using information at the grass roota level is therefore more important for all sections of our soceity, if we don't want any of them to be deprived of the fruits of progress. This is why the methology of science which generation all information in going to be economically critical in all walks of life.

To day we find S & T is benefitting one section of the society and it is getting richer and richer. Others who are bypossed remain poor. Knowledge is wealth even today. Ease of aquiring further knowledge is proportional to the knowledge already imbibed and therefore knowledge aquired grows exponentially.

Some sections of our society are not just illiterate but are unable to practice even the rudiments of the above methology. This methology gives the true scientific temper. Any attempts to remove superstition without bringing the scientific methodology will be like trying to remove darkness without bringing the scientific methodology will be like trying to remove darkness without bringing light.

In our National Literacy Mission, we have the concept of Functional Literacy. This should include simple arithmetic, underatanding diagrams, and the skill of common measurements. These skills will bring immediate economic benefits in everyday life, to the poor, that more literacy cannot hope to. And if such a functional literacy proves

to be economically attraction we will get a boost in our literacy rate that paid motivators cannot match.

The rudiments of scientific methodology as described above will also bring the poorest sections to the threshold level of skills necessary so that they can receive technology communication through the mass media and therefore they will gain access to a wider world of technology and will benefit economically.

The scientific methodology has proven its effectiveness in every walk of life. It is time we demystify it and take it to the grassroots level.