Science is learned best in the mother-tongue

by Dr J V Narlikar

ALBERT EINSTEIN, the greatest scientist of this century, had the habit of switching over to German, his mother-tongue, whenever his scientific discussion got into an interesting and difficult stage. My father, Professor V V Narlikar, recalls attending an address by Einstein in the early 1930s. The lecture was supposed to be in English. However, Einstein began talking in German when he wanted to explain some crucial aspects of relativity!

The above example makes a *prima facie* case for advocating the use of the mother-tongue for scientific teaching. However, there is another point to it, to which I shall return later in this article. Let me first elaborate the case for mother-tongue as the medium of instruction for science.

Unlike history or geography which rely on memorising rather than reasoning, science requires the use of thinking, arguing and above all curiosity. All these processes are individualistic: they are primarily carried within the brain of the individual concerned. So, to make these processes more efficient we have to ask, whether they are best carried in the mother-tongue.

In this context I would like to call that language 'mother-tongue' in which the individual concerned conducts his thought processes. We may recall the anecdote of Nana Phadnavis who discovered the mother-tongue of a person who was equally proficient in many languages, by pouring cold water on him while asleep. The language in which the person shouted, as he woke up, was rightly declared by Nana as the mother-tongue. This definition of mother-tongue, of course may not coincide with the language of the mother or the language spoken in the family.

With my definition of the mother-tongue it follows that science is best taught in this language. There are, however, practical difficulties which make it necessary to modify this proposition when dealing with higher education in science.



At school level the child should devote his mental energy to understanding concepts

At elementary levels, however, the proposition stands firmly in my opinion. For reasons stated above, in order to induct the child into science it is necessary to excite his curiosity, to make him think and to make him argue—and this is most easily done through his mother-tongue. At the primary school level, when the child is in the age range 5-10, he should devote more mental energy understanding concepts rather than building a vocabulary of new technical words in some language other than his mother-tongue.

What about the higher standards in the secondary higher secondary early college levels? Here too I would advocate the use of mother-tongue, but with a difference. In case the mother-tongue is not English, the technical/scientific terms in English should be introduced at this stage. Also, if the students are really interested in pursuing science courses further ie, to graduate/post-graduate/research levels they should be encouraged to learn English as a language. Because, I am strongly of the opinion that at these higher levels the use of English as the medium of scientific instruction is essential. The age group 10-17 can therefore be looked upon as being in a transitional stage, a stage which prepares them to change from mother-tongue to English as the medium of instruction of science.

Why do I advocate the use of English at graduate and higher levels of scientific instruction? Is this not against the example of Einstein himself? If such a great scientist as Einstein did his thinking at the highest scientific level in his mother-tongue why should we object to the use of, say, Marathi, at B Sc, M Sc, Ph D levels?

This brings me to my other point mentioned in second paragraph of this article.

With all the advantages that a mother-tongue has for scientific study the following points cannot be denied. First, science has become international. The oft quoted phrases like 'Indian Science' or 'American Science' or 'British Science' do not mean sciences specific to these countries. Rather they imply the contributions made by the scientists in these countries to the overall field of science. While countries may hope to solve their specific problems with the help of science (and they usually succeed in this enterprise), the terminology, methodology, equipment, exchange of ideas are all becoming international. And it so happens that the medium for this international communication of scientific ideas is increasingly dominated by English.

Take the case of the electronic computer. Data storage, handling of programmes, the print-outs are now-a-days done in English. The early computers had to be programmed in numerical codes. Their modern successors can 'understand' human language and this is most often English. So if one scientist exchanges his computer code with another, it is usually written in English.

In the twentieth century man has witnessed (and is still witnessing) the acceleration in the growth of science. Today's research becomes stale tomorrow! New ideas and inventions come day by day. If we are teaching science at the B Sc and M Sc levels we should expect good students to know something about the state of science outside their immediate syllabus. Excellent magazines (eg, *The Scientific American, The American Scientist, The New Scientist,* and the Indian magazine *Science Today*) serve the purpose of disseminating this knowledge; but in English!

It is argued that we should embark on similar efforts in our mother-tongues, at least in the major Indian languages. It is suggested that we should make our languages rich and capable of talking 'science'. I have no objection to these suggestions. Indeed in order to popularise science and the scientific outlook among the masses it is the only way! We have to equip all our media like newspapers, magazines, books, radio, TV, films with the ability to 'talk science' to the masses in the language of the masses. For this purpose it would be foolish to rely on English.

Nevertheless there is a difference between teaching science to the masses and the teaching and research in science at the highest levels. In the latter case it would be a waste of energy to first translate the flood of scientific research into the mother-tongue and then to learn to do research in it. If science were not moving so fast we might consider this more seriously. As it is, we would simply lag more and more behind the developed countries. Whatever research we would do in our mother-tongue would either be repetitive and hence third rate, or even if it is first rate it would fail to make the 'impact internationally'.

Even with regard to Einstein's mother-tongue, the situation has been changing rapidly. German is being replaced by English as the language of research in science! In India we tend to look upon English as a language forced upon us by our former rulers. We should give up this viewpoint, at least with regard to science. So far as science is concerned we need English as our language of communication at the international level.

To summarise the mother-tongue has a very important role to play in the communication of science to the masses, in inducting young children into science, and in the teaching of science up to say the present 12th standard. The next 3 + 2 research years of a student of science will be most fruitfully spent with the medium of English.