

Workshop on Building the Scientific Mind

New Delhi – 22 August 2005

The Challenge

Beyond science lies the spirit of science, the interconnected set of attributes of the whole person that let the beholder approach his or her world in ways that have allowed humans to become more and more knowledgeable, more and more able to interact with their world from a perspective of deep understanding. If humans had not developed that set of attributes, that mindset, which we call the scientific mind, science would not have come into being. Of course, science simply means knowledge. But it is not just any kind of knowledge the scientist – and, for that matter, the scientifically minded person – is interested in. Being a scientist means to be someone who directs his or her activities to creating *knowledge as a shared good of humanity*. The emphasis in the previous sentence is crucial. It is only science if it is indeed a ‘shared good,’ something that we all recognize as valid and relevant and that we can all participate in. Engaging with the world in the spirit of science thus means that one must be willing to hold one’s ways of knowing up to the scrutiny of others and to one’s own critical appreciation.

Science, like the arts, is a universal good. It is not something that pertains to only a portion of humanity, such as a particular part of the world, a specific civilization, or some privileged group. In fact, when one studies the history of the development of science, one is taken on a tour around the globe in addition to covering a time span of thousands of years.

Science is not something one does once in a while. It is a protracted quest for the integration of knowledge about how we see the world into more and more comprehensive frameworks. Subramanyan Chandrasekhar, winner of the 1983 Nobel Prize for physics, expresses that quest as follows (see <http://nobelprize.org/physics/laureates/1983/chandrasekhar-autobio.html>):

After the early preparatory years, my scientific work has followed a certain pattern motivated, principally, by a quest after perspectives. In practise, this quest has consisted in my choosing (after some trials and tribulations) a certain area which appears amenable to cultivation and compatible with my taste, abilities, and temperament. And when after some years of study, I feel that I have accumulated a sufficient body of knowledge and achieved a view of my own, I have the urge to present my point of view, ab initio, in a coherent account with order, form, and structure.

In a world that becomes ever more complex, in which what happens becomes ever more unpredictable, it becomes increasingly important for any person to have views of their own, based on accumulated bodies of knowledge. Having such views is essential to being able to judge elements in context, to make one’s own decisions, and by doing so to contribute constructively to how, together, we change the world. This is the great challenge for those who learn in the 21st century. Having a scientific mind is no longer a precondition to being a scientist; everyone must be able to act in the same spirit that has been responsible for the development of science.

The Need to Explore

With the above global challenge in mind, an international colloquium was held in May 2005 in The Hague, The Netherlands, to start a debate on what should change in the conditions that surround human learning so as to make the emergence of a scientific mindset more likely. The colloquium was organized by the Learning Development Institute (LDI: www.learndev.org) under the patronage of the United Nations Educational, Scientific and Cultural Organization (UNESCO; www.unesco.org). The richness of that debate can be explored on the Web page set of the Building the Scientific Mind colloquium at www.learndev.org/ColloquiumBuildingTSM2005.html. Among the conclusions of the colloquium was the need that each country and each region should explore what, in its own context,

could best be done to ensure the best conditions for the emergence and development of the scientific mind. India is the first country to follow up on this call.

The Whole Context

To engage in the above exploration, it is important to consider the whole context in which people learn all along the lifespan. The development of a mindset is typically a process that is fed by what happens in different settings and over long periods of time. It can therefore not be interpreted in terms of how we traditionally deal with learning as something that happens mostly in the school and that follows a set pattern of instructional procedures, based on the idea that knowledge can be divided into small portions that are part of a particular discipline. To tackle the question of the development of the scientific mind we must become more creative within the school, but we must also consider the conditions that promote and facilitate learning outside the school. The simple reality is that learning inside the school is only a small portion of the totality of learning in which humans engage.

The Questions to be Asked

During the workshop in Delhi questions must be asked regarding

- how people who have developed a scientific mindset are different from those who haven't;
- how having a scientific mindset serves them to their advantage and to the advantage of the communities and society they are part of; and
- what it is that would have helped them to acquire the scientific mindset.

Additional questions must be raised regarding

- how a scientific mindset, if it would be the only state of mind in which people can operate, would limit them in exercising their full humanity, particularly as regards ethical issues;
- what other mindsets must therefore be developed;
- how such other mindsets interact with the scientific mind; and
- how the scientific mind can thus best develop as part of an integral concern with mindful learning.

All of the above questions must be raised against the backdrop of a lifelong learning process that is situated in multiple environments of which people are part, such as:

- the school (at different levels – and not just in connection with the learning of science subjects but as a dimension of the learning process as a whole);
- the family environment;
- the broadcast media;
- interactive communication environments such as those facilitated by the Internet;
- environments of religious worship;
- places of work;
- settings of exploration of shared interest, such as museums and clubhouses;
- spaces of communal living; etc.

The Search for Practical First Steps

For a debate at this level, where the focus is on improving the conditions of learning for all of India's citizens, it will be of crucial importance to search for answers to the above questions that have practical and doable implications. The answers that will be found may lead to starting to do things differently, for instance in terms of how school curricula are organized and what kind of pedagogy should be encouraged. They may also lead to starting to do things that were never done before or to no longer doing things that are believed to be detrimental to the development of the scientific mind. In some areas, such as the school and the broadcast media, the answers found may be linked in an immediate sense to particular interventions that can be planned. In other cases, such as the family environment and what happens in the context of Internet-based interactive communication environments, the translation of the conclusions of the workshop into concrete action may be more convoluted. In all cases, however, the steps to be taken will be necessary and important.