

Diffusing the boundaries between different subjects

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Buckminster Fuller – the famous American designer was very fond of this pithy saying, “Whenever nature designs something it never calls a meeting of heads of departments of Chemistry, Physics and Mathematics.”

The natural world as well as the social world is not divided into compartments. They form an integrated whole – an interrelated web of life. Looking at the parts to understand the whole is a modern phenomenon. But it has its limitations. Often the whole is more than the sum of the parts. For, reality is far more complex than what it appears on the face of it. At the very basic level there is only a continuum of knowledge, and in the ultimate all artificial categorizations must meld together.

The Super specialist

Today there is a surfeit of super-specialists – people who know a lot about their narrow fields. We need specialists but we also need people who can transcend disciplines and see the “bigger” or “whole” picture.

There are specialists all around – to teach us how to bring up our children, how to form relationships, how to write one’s resume, how to cook etc. There are even specialists to teach us how to breathe! This indeed is a sign of a very sick society.

It dispossesses us even of our limited abilities. We can’t even sing a lullaby to our children, as many famous singers have cut “albums” on nursery songs. We can’t treat a common cold, but have to rush to an ENT. We can’t even decide which school will be good for our child. For that we need an Educational Consultant.

The specialist is essential for a consumerist society. Such a society dispossesses ordinary individuals of decision making and places enormous power in the hands of few. All decision making is done by the specialists. Ordinary mortals become mere consumers.

Integrated learning

Before the era of super specialization there were different kinds of schools and learning. Several tribal communities for instance, did not require schools as we know them. In such societies, living the life of the community, working in the fields, listening to the tribal elders, taking part in group ceremonies constitutes education. Unschooling people are as intelligent, creative and competent as those who have gone to school. A tribal may be able to categorize hundreds of plants in a forest with greater facility than a botany professor in a university.

The village potter was involved holistically in his trade. He dug the right kind of earth from various places, transported, sieved, kneaded, molded, baked, and then took his wares to the market and sold them. He was the proprietor, purchase manager, supervisor,

worker, designer, artist, packer, transport, accountant, adman, market representative all rolled in one. He was the jack of all trades – possessor of many skills.

With the advent of industrialization this “holistic” line of operations where one individual was associated with all the aspects of production process, began to be broken down into specializations. Imagine a line being broken into a series of small dots. The industrial economy had a direct bearing on education.

Modern Education

In today’s schools, knowledge is broken up into artificial categories and small bytes to make it more palatable. Knowledge is chopped up into subjects like language, science, mathematics and arts. These subjects are further subdivided. Science for instance is divided into Physics, Chemistry and Biology. In my U. P. Intermediate Board Exams I remember studying eight different books on Mathematics. After thirty years I can recall only a few – Co-ordinate Geometry, Integral Calculus, Differential Calculus, Statistics, and Probability etc.

Today text books have become synonymous with knowledge. Often these books have little respect, or relevance to the lives of the children - who are forced to study them. The teaching of language is very artificial. When a child comes to school he/she brings a variety of real life experiences. But schools do not build upon this edifice; instead they try to plaster a dead and alienating curriculum. Introduction of grammar as a subject further ensures that children will hate their language classes for life.

The school stands opposed to all natural learning processes. Before a child enters the schools portal he/she has already learnt the greatest survival skill - to speak. This the child picked up naturally, in the course of interacting and living in the big wide world. No one ever taught her/him to speak. There were no lessons in phonetics, pronunciations etc. But all children learn to speak before they come to school. They learn it in an “interdisciplinary” way. The great American pedagogue John Holt went to the extent of saying that we are fortunate that schools open everyday for just 6 or 7 hours. If we had 24-hour schools then all our children would turn out dumb. In schools – the teacher speaks, the children listen. The greatest survival skill of communication is learnt outside school.

A wider choice

During the formative years of the IIT’s the B.Tech course took 5 years or 10 semesters. All the students compulsorily had to take a social science course every semester for the first 8 semesters. There was a wide choice of subjects to choose from – sociology, symbolic logic, philosophy, economics, English, history of science, development and underdevelopment etc. Exposure to such wide ranging subjects gave engineering students a more matured and humane perspective of the world. They realized that technology was only one small component in the development of any society. There were several other key factors and variables which played a key role. The thinking behind such a liberal humanities programme in a technology institute was to give students a larger world view, and to broaden their horizons. Unfortunately, when the B. Tech programme was slashed

to just eight semesters the humanities courses were slashed drastically. Today I believe instead of 8 courses engineering students just do 2 courses.

Mirambika

It is difficult to describe an integrated approach in abstract terms. So, I will try to capture its essence through an example. Fifteen years back I taught for a couple of years in an experimental school. Mirambika – the school was situated in the Sri Aurobindo Ashram, New Delhi. At that time the school subscribed to no curriculum. The class teacher along with the children decided on the curriculum. The children chose a “topic” of their interest and worked on it. The role of the teacher was to help the children. Having decided on the topic of “birds” the first thing the children did was to make a bee line for the library. Here they pulled out all the books on birds and brought them into their classroom. These would be their text books for the next two weeks. Now everything centered on “birds”. The first thing the children did early morning was to go bird watching in the lovely Ashram Campus. They made a checklist of birds. With the help of the teacher they tried to record some bird calls. What were the local Hindi names of these birds? They folded paper birds, wrote their daily “bird” diary, composed poems on birds and drew them in all their glory. They collected bird feathers; fallen and abandoned nests. They made lists of resident and migratory birds. Where do these small yellow and white wagtails come from? The children actually looked at their migratory routes on the globe. For two weeks school life for these children was centered around the study of birds. It involved writing, drawing, making models, composing poems, counting, imitating bird calls and many other skills. At the request of the teacher two parents piled up all the children in their vans and took them for a day long bird watching spree to the Sultanpur Bird Sanctuary located on the outskirts of Delhi.

Mental-Manual divide

An integrated approach means not only building bridges between various subjects, between the sciences and the arts but also integrating the heart, head and the hand. The passive “chalk and talk” method practiced for years is slowly giving way to “active learning”. The rote method of learning science has given way to the “discovery method” where children perform a string of experiments using simple, locally available material and then draw their own inferences. Learning by experience is profound knowledge. It is more deeply imprinted in memory than words or formulas. Children need enriching experiences with different materials and in varied and diverse situations.

It is sad that some of the most creative and joyous subjects like craftwork, artwork and music are being marginalized and attempts have been made to throw them completely out of the curriculum. The logic behind this is almost satanic – what cannot be tested, graded (and which cannot be reduced to Multiple Choice Questions) is not worth learning. For instance, the whole richness of Indian crafts have been degenerated to SUWP (Socially Useful Productive Work) and relegated to one hour a week.

India is known for its richness of crafts. It is sad that our skilled craftspersons don't have B.Ed. degrees and are not hired by schools. But good schools must invite these skilled

workers – potters, carpenters, cobblers, farmers – they are knowledge creators to the classroom to share their experiences with children.

Field Trip History

Today one laments that teaching of science subjects through rote. But here is a wonderful example of how creatively history was taught half a century back in some schools of Delhi.

Percival Spear – the great historian who taught History in St. Stephens College wrote a wonderful book on the historical monuments of Delhi. This field guide was also published in Urdu. In those days it was compulsory for students to visit these monuments and study their glorious architecture. Like the science practical test, they were later interviewed about their visits to the monuments. A small portion of the marks were allocated for these monumental visits!

Here is another example of an inter-disciplinary approach. Prof. D. D. Kosambi introduced a new method into historical scholarship by application of modern mathematics. There are very few authentic Indian historical records. The ones which exist have no dates. One thing the ancient Indians did leave behind, however, were hoards of silver punch mark coins. These coins carry no inscriptions, king's name, date or markings, but they had been in circulation before the hoard was buried and had suffered varying degrees of wear. By statistical study of the weights of 10,000 such coins, Kosambi was able to scientifically date them. Through an inter-disciplinary approach Prof. Kosambi was able to raise a coin collector's art to the level of a science.

Need for Inter-disciplinary approach

There is also a growing realization that the boundaries between rigid disciplines are crumbling, for these boundaries were artificial human constructs to start with. In today's world a good researcher needs to be good at several things – computational skills, computer savvy, good communicator. He needs to appreciate linkages of his discipline with those of others.

More than anything else an inter-disciplinary approach creates problem solvers. In modern production processes during breakdown a machine just comes to a grinding halt! The machine does not tell you whether it is a mechanical, electronic, hydraulic or a pneumatic problem. As a good “maintenance” person you need to have a good grasp of all these disciplines to be able to fix the machine. The above example is a relatively simple problem, where the response can be easily monitored, measured. But societal problems are much more complex. They do not lend themselves to simplistic, uni-dimensional solutions.

As schools, colleges appreciate interrelated nature of knowledge, the boundaries between individual subjects will crumble and more “holistic” learning will appear.