

Science and Technology for Rural Development

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The Great Divide

Every one in India realises this great divide between the India that launches rockets, is ready to enter the 21st century and the other India that still goes on a bullock cart and is yet to come out of the 17th Century. Our teeming millions will be a liability unless, we raise every one to the level where they all contribute and our large population becomes an asset and strength.

No nation can progress fast if three fourths of it is to be carried as a burden. This divide must disappear and the whole of India must reach the state of modernity that only a small urban part has now reached. This can only happen through the medium of Science and Technology. But what kind of Science and what Technology?

What Kind of S & T?

Most scientists and technologists would immediately think of new research and development that may bring about this desired rural development. The policy makers on their part think the S & T group as responsible for this task.

This is where, I think, we have taken the wrong turn. The new developments in Biotechnology, Space research, Microelectronics, the computers and all the rest of the HiTech will no doubt be of great help to the rural area. But this is not the most important need nor will it bring true development to our weaker sections. True development must put the people and their land on the development path so that thereafter they can contribute to development and not just be the beneficiaries. It should not be just delivery of wealth and health.

If this be our concept of development, then what we need to give them, are the methods of science and the culture of technology. The method of science includes, observation, measurement, recording, classification, comparing with earlier experiences, making hypotheses and testing the hypothesis through new experiences. The culture of technology should cover writing down specifications for material, product and process, performance indices, planning for future and consideration of how resources, material and energy and finances have been used.

The above description sounds like a tall order, to be taught to rural segments who have yet to get the basics of education. Jean Piaget, who was a biologist, and devoted 40 years to research on development of intelligence in the child and the adolescent has found that the above method of science is in fact, the natural method of thinking in the human brain, from the birth to adulthood. It is only wrong environmental conditions that divert and "derail" this process. And our education system, by its stress on reproducing correct answers in the examination, helps this process of diversion from the inborn method of science. The culture of industry is only a logical application of the method of science.

So briefly, rural development must give higher priority to implanting the methods of science and technology than to development of new technology. In fact, without the former the new technology will be difficult to deliver. This has been our experience.

True Education is the Primary Infrastructure for Development:

We, as a nation, have been looking at education, particularly technical education, as a means to satisfy the manpower needs of our planning. I believe real development of the nation springs from a well developed human resource.

Having decided that we need to sow the seeds of science and technology in the rural population, in order to cultivate the scientific approach in thinking, how do we go about it?

The learning process is not just listening or pen pushing but experiencing and acquiring skills. Intelligence development also depends on giving wide exposure to the student in the formative periods. Therefore, giving multiskill training relevant to everyday life, is an excellent medium for education. Science is based on acquiring experiences. We have found that giving practical experiences in technology and

explaining the principles of science involved in them is effective in giving them the excitement that true education should be. Furthermore, when they acquire the threshold level of skill, in a technology, they can practice the skill in a real situation, by giving services to the community, paid for by them. This benefits both the education system and the community and brings us closer to the above concept of development.

We have tried this approach to education in our program at Pabal village, in the Pune district and found the results exciting. We have chosen to give skills related to water resource development, construction, workshop technology, energy systems (electrical, IC engines, biogas etc.), environment, agriculture, animal husbandry, home and health; we also give lessons in the use of engineering drawing system in conveying more information than only words can. The schools in this system give a variety of services at cost and build up assets in the community, at affordable cost.

This is really not a new method. If one ponders, this is the basis of our medical education, where teaching is linked to a hospital, thus ensuring real life situation and community service. Why should this basic principle, not be extended to all other branches of education? It can also be considered as an extension of the old system of training through apprenticeship.

We have shown that such a system is feasible within the existing constraints of finance and other resources. Our experience shows that the rural youth, including the school dropouts, are capable of delivering to the community, results that even our colleges could envy. They bring out latent creativity and inventive talent, where it exists, and nurtures demand for new services until they grow to become commercially viable. This gives rise to new opportunities for a career. This is not development by giving grants to set up industry on subsidy basis. It is using the grants to give education that produces new opportunities for gainful employment, through local effort. And what is significant, is that such a system of education reduces the cost of both education and development, both rural development and development of new locally needed technology.

The results of this experiment have been good enough to find acceptance for these principles in government and private education agencies. Schemes have been drawn up by both the Maharashtra State and the Centre for adoption of some of these principles in more secondary schools.

Technological Literacy

In this age of specialisation, I would like to insist that specialisation becomes compartmentalisation, unless we build it on a multidisciplinary base. Our education should aim at a Jack of All trades and then Master of One. Young children being asked to select their future career as a one-time decision when they do not know anything about the different options is not only foolish but unjust. Elementary practical acquaintance with skills needed in everyday life is both educationally and economically desirable. This should be given by the school level education.

Develop Inventors

While discoveries one needed to push the frontiers of knowledge, inventions are required to make every day life easier. Every person can and should make his small inventions. One should try always, to find ways to make even the petty jobs better, This is an approach, a way of working, not confined to scientists and engineers. It is needed in everyday life. It is little inventions that do not even attract the name of an inventor, that build bigger inventions. The population at large appreciates science not for its discoveries, but for the inventions that spring from the new knowledge. Inventions cannot grow, if new ideas are not nurtured through practical testing. We want to cultivate the inventive ability in all our population, including the rural, so that they not only develop their segment of the society and region but also contribute substantially to taking India forward. For this we should give not only technological literacy but also the equipment facilities for testing out ideas. The multiskill workshops in the village school serve this admirably. We have seen village dropouts

making many new small and simple "inventions" for the betterment of their own life. This must happen on a much wider scale.

Local Receiver for New Technology

We have often found that even after developing new technology, we have problems of delivering it to the people and the areas where it is needed. Just broadcasting a progress is no assurance that it is received. We need receivers located where the program is targetted. We want the development knowledge to be received all over. So we need to have this technological literacy in all villages, so that they can test, adapt and use new technology, having a base of the pro-requisite skills and technology culture. Thus the multiskill school level educations we are proposing, acts as a Receiver for all the new technology developments and can tune in to the developments relevant to local needs.

Effective Rural Development will promote S & T Growth

While S & T is needed for rural development, it is equally true that S & T growth also needs true rural development. We need many more creative scientists. Rural development we visualise will increase the "catchment" area as for our talent search and contribute substantially. We need more funds and a prosperous rural base will make them available, instead of a poor India that is often at the receiving end.

If S & T can raise our population out of the sea of poverty and high above it, people will have faith in science as their saviour; this faith is fast being eroded now. S & T always grows in an environment of growth in all intellectual activity, in an environment of 'renaissance'. Such an environment can happen only when our rural areas also develop on their own.

Summary

In conclusion, development of India and development of Science in India, both require that we focus on giving the methods of Science and Technology to our vast population. This is best done by using the secondary school education as a medium and introducing multiskill modern technology as part of the education.

The same facility in the school gives modern essential services to the community at cost, nurturing demand and also encouraging local problem solving. A technologically literate rural population is also more receptive to new technological developments. The feasibility of this approach, both conceptually and economically has been shown by operating it in a few villages in the Pune region.