

POPULARIZING SCIENCE AND TECHNOLOGY

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1. POPULARIZING SCIENCE

The twentieth century has seen many scientific discoveries and inventions. The speed of scientific advancements has been tremendous and has resulted in an information explosion. However, the knowledge about these important developments is confined to a small group of the society. The majority, especially in a developing country like India, do not have access to the vast information available. This is because of lack of proper communication. In the electronic age, newer communication technologies are available. Information is also increasingly being computerised. However, there is still a crying need to communicate the results of the vast amount of R&D work being done in the world of science & technology (S&T), in an objective and clear manner so that maximum number of people get to know of them. This need for bringing this information to the general masses demands popularization of science and technology, i.e., presenting the developments in a manner comprehensible to all sections of the society.

2. WHY POPULARIZE SCIENCE?

Science and scientific research are based on the spirit of impartial enquiry. Knowledge of science and fostering of scientific temper help to think rationally and get rid of dogmas. This is important not only for the society but for the very growth of science itself. Also, popular science provides people with the information which helps them to understand the immediate significance of new scientific developments. By presenting the positive and negative aspects of an invention, popular science helps people from all walks of life——— students, teachers, workers——— to estimate its effect on economy, future, prospects, and social life. It provides the background material for discussions and debates on controversial issues thereby ensuring the involvement of a larger segment of the society in the decision-making process.

3. SCIENCE IN THE SERVICE OF MANKIND

Of late, science is becoming a decisive factor for the whole future of humanity. On one hand,

it has endowed mankind with greatly increased productive capacities, and on the other, it has given individual nations an immense capacity for destruction. In view of these developments, science popularization has the function of helping nations to appreciate the dangers which science has created for the very survival of the human race on the earth and to understand what science can do to end hunger, poverty and much of the diseases now widespread on the earth. It is vital that mankind should understand the destructive and the constructive capacity of science. This alone can permit adaptation of our social structure to the new habitat created by science, and to the new conditions of human existence which science continues to change from day to day. For example, application of elementary hygiene and medicine to child-birth and child-rearing practices has greatly increased life expectancy. In developing countries, this has resulted in a desperate race to accelerate agricultural productivity to keep pace with population explosion. In developed countries, this has brought in the social problem of rehabilitating old people and providing for their care. Developments in nuclear science has given mankind an alternative source of energy to depleting fossil fuel. The same development has also equipped some nations with powerful weapons capable of destroying the whole world.

4. COMMUNICATING SCIENCE AND TECHNOLOGY

What is to be done in the face of these challenges? Who can help and how? What mankind needs now is the spread of objective, scientific attitudes to permit an effective approach to the solutions of the problems created by science. This is now the main task of science popularization: to educate mankind for living in the new world created by the scientific revolution. Science cannot be satisfied now only with explaining to the layman the structures of the nuclear reactor or the working of a wonder drug. Understanding of science is now needed for a more crucial purpose than intellectual

enjoyment, i.e., to teach nations how to adapt their ways of life to the inescapable requirements of the scientific age. This cannot be a short-term, emergency operation. This is what science popularization will have to be about for a long time to come.

4.1 Some Impediments

This task of popularizing science, however, is not easy. The rapid advancements in science have resulted in a new 'scientific language'. It is so full of jargon that even fellow scientists from other disciplines find it difficult to understand.

Scientists, generally, are too busy in their R&D efforts to devote time to other work like dissemination of information. Some scientists consider popularization of science as dilution and degradation of scientific knowledge. Even if the scientists were to find time and energy for the task, they may not do so with the same perfection. In the words of Sir Lawrence Bragg, "they (scientists) are singularly inept in explaining to non-scientists what they are doing". In many cases, if the work is of classified nature, scientists may need prior permission and clearance from competent authority before talking about their work in public. In some cases, the scientists do not want to part with the information for the fear that their work may not find any place in a good research journal thereafter.

How then to overcome these barriers? One way would be to develop the breed of science communicators—people with a flair for communications, strong social values, general awareness and further an above average knowledge of science. They can act as a bridge between the rarefied realm of science and scientific research and the masses.

4.2 Means of Communication

In the dissemination of scientific knowledge and information, many dimensions of science need immediate projection/attention. They are

the issues relating to the investment in R&D and major areas of thrust, problems connected with development and use of technology, impact on resources and manner of their utilization, gains from science and technology and problems dealing with ethical and other related issues engineered by the growth of science.

Several communication facilities can be employed for educating the masses and promoting public debate on these major issues of science.

4.2.1 *Print Media*

The traditional print medium can be a very powerful tool in popularization efforts. Periodicals and newspapers have become part and parcel of the life of the literate people. Specialized popular science periodicals and special features on science & technology in the newspapers can be very effective in communicating the ideas to the people. Popular S&T books, story books, picture-cum-story books are also other means of popularizing S&T among literate persons.

4.4.2 *Broadcast Media*

Use of these media is more effective as they overcome the barrier of literacy and cover a larger audience. The effectiveness of these media depends upon some factors such as the proportion of programmes broadcast which have an appreciable S&T content; the proportion of TV/Radio owners who actually watch/listen to these programmes; and the effectiveness of the S&T programmes in putting their messages across to their audience.

4.2.3 *Film and other Audio-visual Media*

Films shown in public cinema houses have been the most important source of entertainment for the common masses. Time between two shows can be exploited for S&T popularization and good S&T films can be shown to audience. Film libraries could be established wherefrom schools, colleges or other societies could borrow

S&T films for exhibition which can help enrich, supplement and complement the formal S&T education.

4.2.4 *Participatory and Interactive Activities*

Activities in science parks, activities of science clubs, contests and quiz programmes, science seminars, science fairs, etc. are some of the activities which can be exploited to spread the message of S&T among people.

4.2.5 *Formal S&T Education Programme*

With specially oriented teaching, students of S&T subjects, apart from gaining knowledge themselves, can also be instrumental in conveying the basic concepts of S&T to their fellow students in other disciplines.

These days science communication is taught only at postgraduate level by some universities and institutes while conducting mass communication and journalism courses. But if we have to make an impact on wider section of population, its study has to be introduced at all universities at undergraduate level.

5. THE INDIAN SCENE

As per the Directive Principles of our Constitution it is the duty of all citizens "to develop the scientific temper, humanism and the spirit of inquiry and reform,". That the popularizing science and technology and inculcating a scientific and technological temper would remove a major hurdle from the country's path to all round development, was a prime observation in the Scientific Policy Resolution passed by the Indian Parliament in March 1958.

Various activities and programmes aimed at popularizing science and technology, and inculcating scientific and technological temper among people have been initiated at both official and non-official levels.

5.1 Official Agencies

Various government ministries/depts or agencies have been making efforts to popularize science and technology. They employ most of the means of communication noted earlier like publishing popular science literature, arranging popular lectures, exhibitions, films and video shows, etc.

But, in most of these activities, particular audience or target group is not defined. If they do, they rarely consider actual needs concerning the anxieties, aspirations and ambitions of the people they are able to reach or do not employ the language or the medium most suited to them. Also the subjects popularized through the mass media are the most modern of S&T marvels : the satellites, electronic, gadgets, computers, organ transplants, etc. All this leaves the common people dazed and mystified about S&T. Rarely is S&T projected in terms the common people would readily relate to the things and happenings around their daily lives and living routine at home and at work.

5.2 Non-official agencies

Besides official agencies, there are a large number of voluntary agencies which have been engaged in S&T popularization and related activities. Most of these emanate from the dedication of individuals motivated by missionary zeal. Such groups are scattered throughout the country. Each group has a selected geographical area and a well-defined target group for its activities and operations. In such cases, the activities are achieving well-defined objectives. These objectives generally suggest themselves in relation to some pressing need, problem or concern of the target group. Very often, the individuals establish personal communication and active rapport with members of the target group, which contribute to the success of their activity and achievement of objectives. It has been observed that because of the very nature of their make up and the level of commitment of those involved in their work, efforts of voluntary agencies have yielded better results and have proven relatively more effective.

5.3 Co-ordination of efforts

However, the proportion of the population touched by these activities and efforts is rather small so that the overall effect has only been marginal. There is need for co-ordination of S&T popularization efforts of various agencies, which will help in adding up their yields to make a significant impact on the overall national scene. Though co-ordination is very difficult in case of voluntary agencies, some effort has been done to co-ordinate the popularization activities of the official agencies to optimise their impact on the target audience. The government has set up a nodal agency at the national level, National Council for Science and Technology Communication (NCSTC) for this purpose.

The Indian National Science Academy (INSA) has instituted an award, the Indira Gandhi Medal, to be awarded annually for outstanding work in science popularization. The Kalinga Foundation in India has founded the Kalinga Prize for the same purpose to be awarded through UNESCO.

Recently an innovative method was adopted by NCSTC and voluntary agencies to bring S&T to the masses. This unique nation wide science communication enterprise was called "Bharat Jan Vigyan Jatha". Four thousand scientists, teachers and other voluntary activists took part in this venture. They started walking from five different places in the country on October 2, 1987 and converged at Bhopal on November 6, coinciding with the birth centenary of Sir CV Raman. On the way (they travelled 25000 km), the groups propagated the message of science through street plays, poster exhibition, songs, toys and models.

Birth anniversaries and centenaries of famous Indian Scientists will be the right step in popularising science and to create scientific temper.

6. POPULARIZING DEFENCE SCIENCE AND TECHNOLOGY

In India all aspects of the Defence including

the preparation for Defence and other related works is the responsibility of the Ministry of Defence. This is achieved by the combined efforts of the Armed Forces of the Union, the Dept. of Defence Production and the Dept. of Defence Research and Development along with some other agencies. The Dept. of Defence Research and Development administers the Defence a Research and Development Organisation (DRDO). It builds up a base of progressive research into and the design and development of sophisticated equipment required by the Services. The S&T activities of DRDO cover wide range of disciplines such as aeronautics, armaments, electronics and instrumentation, combat vehicles, engineering, naval, computer sciences, materials, food and agriculture, medical and behavioural sciences.

Popularizing Defence science and technology has assumed considerable importance in the wake of recent developments. These developments have reached such amplitude only because the common man does not have enough information as to assess the situation in a proper perspective. There is an urgent need for promoting public debate on the issues related to Defence R&D applications, which is possible only when the participants including the decision makers are well-informed.

The projection of the Defence R&D results would go a long way in reinforcing the confidence of the Services that the R&D projects of DRDO are current and capable of meeting the ever-increasing requirements of self-reliant armed forces. Also, the projection of R&D achievements will help people appreciate the resources that are utilized for the Defence R&D.

Some of the technologies/facilities developed as a result of Defence R&D efforts over the years have potential application in the civil sector. Thus, awareness among the entrepreneurs about these advanced technologies would help in their optimal utilization and prevent duplication at the same time.

The popularization activities in this area have remained at a low ebb mainly because of

the 'secret' label attached to almost every document emanating from Defence Labs/Estts. Though recently, the veil has been lifted from Defence R&D developments, their popularization has been restricted to a limited, specific audience. This is evident from the reporting in daily newspapers, especially since 1984, when DRDO celebrated its Silver Jubilee.

Role of DESIDOC

DESIDOC, being the central information agency of DRDO, is entrusted with the task of popularizing Defence Science and Technology. Several publications are being brought out regularly. A journal, 'Popular Science & Technology' is being published half-yearly to create awareness and to promote interest in the applications of S&T in Defence among jawans, students and general public. Topics of current interest and wide applications like satellites, computers, toxicology & pollution etc. are covered in the issues of 'Popular Science & Technology'. Care is taken to ensure that the presentation is simple, non-technical and supported by illustrations.

DESIDOC is taking steps to enhance its activities in the area of science popularization. Apart from books, other publications like pamphlets on specific topics are proposed to be brought out in the near future. Audio-visual material highlighting the work of DRDO Labs/Estts and their impact on general public are also proposed to be prepared for mass circulation.

FOR FURTHER READING

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2. Popularization of Science and Technology : A Brief Overview of Existing Activities and Efforts. Department of Science and Technology, New Delhi, 1986.
3. Sundararajan, Mohan. Popular Science in Mass Media. Allied Publishers, New Delhi, 1985.