UNIT-8 : SCIENCE POPULARIZATION PROGRAMMES

UNIT STRUCTURE

8.1 Learning Objectives

8.2 Introduction

8.3 Science Popularization

8.3.1 Programmes

8.3.2 Organizations

8.3.3 Individuals

8.4 Methods of Science popularization

8.5 Scientific Temperament

8.6 Role of various institutions

8.6.1 CDAC

8.6.2 NCSTC

8.6.3 Vigyan Prasar

8.7 Let Us Sum Up

8.8 Further Reading

8.9 Answers to Check Your Progress

8.10 Possible Questions

8.1 LEARNING OBJECTIVES

A thorough and comprehensive reading of this unit shall enable you to understand ---

- the various types of science popularization programmes
- the different organizations undertaking this exercise
- the benefits of these activities

- how the concepts of science and technological developments can be taken to the people through these programmes
- what possible innovations can be applied for achieving this objective

8.2 INTRODUCTION

'The popularization of science and technology is intended to to provide broad sectors of the population with the challenge and satisfaction of understanding the universe in which we live and, above all, being able to imagine and build possible new worlds'. Eduardo Martinez (Regional Specialist, Science and Technology Management, UNESCO office, Uruguay)

It is often observed that whenever Science and Technology (S&T), specially the first one is mentioned, majority of the people view it as something very difficult and complex. More so for children in schools. However, it should be kept in mind that the various research findings of S&T have been able to arrive at a highly satisfactory state. These findings, if applied to our day-to-day individual and social life, have the potential to make our lives far more comfortable, safe, hygienic and rational etc. Thus, in addition to having plenty of such innovations, research findings at our laboratories and institutions, it is equally important enough to disseminate the same to the people. That is, to ensure that the latter can adopt them and improvise their standard of living in the coming days. Besides, there is this added responsibility of gradually and steadily inculcating a 'scientific temperament' among the people at all levels of the society. In this regard we can recall the motto of All India Radio here – Bahujana hitaya, bahujana Sukhaya. It means 'dedicated to the welfare and peace of the majority of the people of society.' If the modern developments of S&T can't be properly utilized for the empowerment and enhancing a better living standard for the masses, it does not have much value in the overall sense. Thus, science popularization programmes are the need of the hour. Several institutions of the government and non-government sectors along with visionary individuals have thought of and launched such exercises over the decades to achieve the objectives in the right earnest. We need to study them for improvising them to suit the changing needs of the society of the future. And also look for gaps in this direction so that things can be improved with adequate expertise.

8.3 SCIENCE POPULARIZATION

At the very beginning a question might arise in your minds – why does science need to be popularized at all. Scientific findings and principles need to be popularized for allowing to

know about them so that the people can be empowered after knowing the explanations about various phenomena of the world. For example, whenever there is full or partial solar or lunar eclipse, we can see many conversations. These include those that one should not look at the sun or moon with naked eyes and observe fast for that period and if possible remain indoors. This has been witnessed by this author since his childhood even. However, scientific fact finding has proved that there is no truth in these advises. A few years back, a group of scientists and rational-minded persons in our country have even hired an aeroplane and travelled in the air to take a closer look at the sun to prove their point. And there was no difficulty in doing so without any problem to the contrary. Also, there was a major need for educating people about the various precautions needed to adopted during the COVID19 pandemic period. So because we could see that a good number of people did not adhere to them in a proper manner. Even in case of very basic activities of life like open defecation, dumping of garbage in an unscientific way, not leaving space for proper drainage and sewage treatment facilities etc. so many issues people need to be inculcated with scientific principles. Many of you may have heard about the village of Meghalaya declared as 'the cleanest one in Asia'. Residents of this village take pride in this achievement and have vowed to maintain this status forever. Now, indirectly this is also a popularization programme on hygienic living. So why not we try to inspire more and more people to adopt such an attitude and start developing at least their immediate neighbourhood for such an endeavour. A reluctance may be experienced in a lot of the people in the society in adopting these principles for improving the society's standard of living. That is why we can go with the concept of 'catch them young' by targeting the schoolchildren and also those in higher education bracket as the change agents for this effort.

And article titled 'Boosting public understanding of science and technology in developing countries' was published in Nature. Here the author says that activities aimed at the popularization of science and technology pointed in various directions, from the 'distribution' of information in the mass media to formal education, and from the democratizing function of science and technology interactive centres to the creation of diverse spaces or processes for non-formal participation. All of them try to broaden the public mind that can be linked actively in the discovery, understanding and appropriation of scientific and technological knowledge. And these activities must be based on interdisciplinary dialogue and work, integrating diverse fields of knowledge and different theoretical and methodological approaches.

It is similar to a pyramid which rests on four components:

- Science and technology interactive centres;
- Multimedia programmes for science and technology popularization;
- Mass media and the dissemination of science and technology; and
- Formal education/science learning.

(Nature,)

8.3.1 Programmes

Different kinds of programmes for popularizing science have been undertaken at various levels of institutions and organizations both under the government and non-government sectors.

- Observation of National Science Day for commemorating the discovery of Raman

Effect is one very prominent example. It is observed every year with a specific theme to focus upon by universities, institutions. They undertake various programmes like popular lectures, visit to laboratories and research facilities, nature walks, hands on workshops with prominent researchers from S&T sector among others. It has been organized since 1986 on the recommendation of NCSTC to the Government of India.

- National Children's Science Congress observed at national level preceded by state-

level competitions to inculcate S&T ideas is another important programme. The objective is to make them familiar with these ideas and principles. We shall discuss bout it in details later.

- An ambitious and popular programme titled 'Kishore Vaigyanik Protsahan Yojana'

(KVPY) was introduced in 1999 by the Department of Science and Technology (DST), Government of India which proved to be highly successful. In the words of the programme's website, "the aim of the programme has been to encourage students who are studying Basic Sciences to take up research career in Science."

- Then there is also the Vigyan Prasar Science NETwork of Science Clubs or VIPNET

It was launched in 1988 for "providing a fillip to the science clubs movement in India" so that schoolchildren could be encouraged for developing an interest in science-related matters.

- Here is the regional science museums under the National Council of Science

Museums based at Kolkata with a network of 25 such centres across the country including Guwahati. The primary objective of these museums is to attract schoolchildren and also others

interested for experiencing various basic ideas of science and technology in a 'do it yourself' manner. The exercise is expected to enhance the learning capacity of the visitors to realize the basic underlying principles of various phenomena in this field.

- The National Council of Science and Technology Communication (NCSTC) under

DST, GoI, has another programme titled National Teachers' Science Congress in addition to its major initiative of National Children's Science Congress (NCSC).

- Publication of science journals usually in popular article mode is one important way

of making an effort to popularize science among various levels of population. Binjan Jeuti of Assam Science Society and several other such associations or societies are examples of efforts in popularizing science among people.

8.3.2 Organizations

The UNESCO declares that by bridging the gap between science and society the benefits of scientific knowledge can be used to improve daily lives, empower people and find solutions to global, regional and local challenges. Hence, to strengthen communication between science and society it is important that efforts made in bridging the gap do not go unnoticed. Popularizing science needs to be championed, including all activities that communicate scientific knowledge and methods to the public outside the formal classroom setting and promote public understanding of the history of science. Hence, it has decided to institute the UNESCO Kalinga Prize for Popularization of Science. It is a global award to recognize as well as accord incentive to persons for exceptional contributions in communicating science to society and promoting the popularization of science. (UNESCO Wbsite).

"It is awarded to persons who have had a distinguished career as writer, editor, lecturer, radio, television, or web programme director, or film producer in helping interpret science, research and technology to the public. UNESCO Kalinga Prize winners know the potential power of science, technology, and research in improving public welfare, enriching the cultural heritage of nations and providing solutions to societal problems on the local, regional and global level," UNESCO website.

Apart from this international organization, there are quite a few organizations actively engaged in various activities in this field for the benefit of mankind. These include science societies,

various media establishments, those under government patronage like CSIR-NISCAIR, NCSTC, VP, ISRO among others. You should go through the websites of these institutions for detailed activities. We are also discussing a few aspects of some these institutions towards later part of this module for your advantage.

Museums of all kinds including the National Museum (Delhi), Indira Gandhi Rashtriya Manab Sangrahalaya (Bhopal), those under the NCSM, planetariums are other types of organisational efforts in science popularization.

8.3.3 Individuals

In addition to institutions, organizations, there have been quite a few scientists, researchers, innovators over the centuries and decades who have contributed towards this direction in their own ways. There are examples of writing of scientific books in the West as well as Indian context. Charak Samhita and Shushruta Samhita etc. books can be termed as earlier efforts in popularizing various aspects of science at a period when this was an unheard of concept. In the modern times, we can cite the name of JV Narlikar who did pioneering works in this field. The uniqueness of these communicators was in the fact that they could interact with the targeted audience in a language which was easily understandable to the latter without any problem. So, thereby helping them understand what was being tried to be disseminated. In the Assamese context there are several such personalities – scientists and researchers who have been able to communicate effectively with the audience in simple and understandable language over the decades. They include Dr Dinesh Chandra Goswami, Dr Kshiradhar Barua as the leading ones. Some of the communicators like Jules Verne, Issac Asimov among others use the science fiction mode of communication for sending across an idea to the people for ease of understanding. Apart from books, popular articles, science fiction novels, many feature films like The Martian facilitate peoples' understanding in a simple way. At least one can get a rough idea about the whole activity.

It needs to be mentioned that organizations, institutions and individual researchers and scientists must come together to continue this effort in various ways and means. A synergistic relationship must be developed among these stakeholders to carry this effort towards fulfilment for the benefit of all concerned.

It is worth mentioning that several universities and institutions have also been conducting formal academic programmes in science communication and popularization. The idea is to develop an adequate number of future science communicators can be groomed for taking up this challenge. The government and all research and teaching institutions engaged in the field of S&T activities have been trying their best to strongly encourage the resource persons to make continuous efforts in communicating their findings for the overall advantage of the society.

8.4 METHODS OF SCIENCE POPULARIZATION

We have discussed a few ways of popularizing science among various age groups of people. In addition to these initiatives, films and documentaries, science theme parks etc. are also other means of science popularization. The basic objective of these exercises is to reach out to maximum number of schoolchildren and other people so that scientific ideas and mentality can be inculcated among them. In case of NCSC, at the first level schoolchildren from districts are involved in preparing and showcasing science-issue based models and methods. And those judged as the best ones are sent for state-level to be followed by national-level contest. It is done for developing a positively-competitive mindset for developing S&T-related products and systems. In the process, the schoolchildren become aware of the benefits of the need for developing a scientific mindset. Those students who are declared successful in KVPY competition which is a tough one to compete are awarded scholarships for pursuing higher studies in science and technology. Further, such achievements in KVPY was also considered as a way of getting admission in higher degree programmes in various institutions offering S&T academic programmes.

Over the last few years, the government has come up with a new idea in this regard. It is that all institutions and academic organizations working in the field of S&T development should showcase their research findings to the public. The primary objective is that people can become aware of the latest developments in these fields and thereby can think of adopting some of these innovations or inventions in their life. Thus, all these organizations including those in Defence sector dedicate specific days and times of the year for public display of their developments. It is expected that mass people can get to know about them and apply the same in their own life.

Similarly, in agriculture universities including colleges of Veterinary sciences, there is the provision of Extension Education Centres. The major mandate of these centres is to expand or communicate to the masses the advancements in technologies for adoption by the people.

The underlying idea behind these exercises is to implement the 'lab to field' concept of transferring the benefits of S&T to the masses wherever and whichever way they might be relevant to the real needs of the people in society.

Bharat Jan Vigyan Jatha (BJVJ) : A unique experience

While discussing science popularization programmes and initiatives, it would not be complete without some words on this unusual and novel experiment. Conceived by Kerala Shastra Sahitya Parishad (KSSP), a voluntary body dedicated to the spread of a scientific temper its aim was popularize the cause of science. According to a news report in The Times of India (Nov. 15, 1987, updated on Dec. 13, 2013), the show was designed in every possible way to excite curiosity among ordinary people about science. The first sign of the unusual event is a pilot van with a four-man crew of aeromodellers and ham-radio operators who stage a special aerobatics show". Launched on Oct 2, it was expected to be concluded on Nov. 7, birth day of Sir CV Raman.

It is highly encouraging to think that the organization led by foresighted leaders could visualize such a unique experiment way back about three-and-a-half decades ago. It traversed the entire country demonstrating simple experiments and aspects of science to the people, specially those of younger generations. It may be mentioned here that this author who was in his higher class of school also witnessed this activity in a remote town of Assam.

8.5 SCIENTIFIC TEMPERAMENT

This is a highly important aspect of the whole activity of science communication. It means inculcation of a mindset which is rational enough not to accept anything without a logical or scientific analysis. For example, a person may be advised to use a particular type of 'gem' or ring made of a specific metal for getting rid of so called 'bad days' in his or her life. This happens quite a lot in the society. Now, if the person who is advised like this is a rational thinker, one would never go for such advises. Similarly, when people were asked to wear masks

in the times of COVID19 pandemic those who were rational-minded used this as a preventive measure against the disease. But in case of many others we could see that they refused to wear masks with various excuses despite repeated advises from medical practitioners to do that. Again, maintaining of social distance, defecating in the open, spitting and smoking in public places, throwing garbage anywhere are also ready examples of people not having a logical and rational mindset or a scientific temperament. The excuses for not doing so are mostly baseless and does not stand scientific scrutiny. Another small example is the feeding and teasing of animals in zoos which should not be done at all. However, visitors end up most often doing so despite countless reminders about it.

Following our Independence, the governments have put a huge amount of emphasis upon disseminating advisories about living a better standard of life by adopting modern and scientific methods of doing things. Hence, institutional delivery of babies or birth of new-born babies in a health facility were advised. That would be helpful as experienced properly-trained medical personnel would assist here rather than giving birth at home without that. It was encouraged to a big extent and at present a significant success have been achieved in this direction. Further, administering of vaccines for various problems including Pulse Polio, use of iodised salt etc. also needed a strong scientific mindset to be developed. So that these ideas were adopted by the people for the sake of a healthy society.

This is an ongoing effort and must be supported by all sections of society including government, non-government institutions for converting it into a success in the coming days. Though obviously a difficult task, yet it is not unachievable.

8.6 ROLE OF VARIOUS INSTITUTIONS

To sustain the effort of popularizing as well as utilizing the advances in the S&T field, the government has at various points of time established institutions with specific goals to be achieved. These organizations and institutions range from the Indian Institutes of Technology (IIT), Centre for Development of Advanced Computing (C-DAC), Indian Council of Agricultural Research (ICAR) Vigyan Prasar, National Council of Science and Technology Communication (NCSTC), National Children's Science Congress, Council of Scientific and Industrial Research (CSIR) and National Institute of Scientific Communication and Information Resources (NISCAIR), National Laboratories in Physics, Chemistry, Indian Institute Science Education and Research (IISER) among others. They are primarily being

engaged in research and innovation in different areas of S&T. Yet, these organizations are also doing their best for popularizing S&T-related aspects and concepts for the benefit of the common people. The idea is to help the masses so that they can enhance the standard of living of their life by the findings from these institutions.

8.6.1 C-DAC

Established in 1988 under the Ministry of Electronics and Information Technology (MeitY) for carrying out Research & Development (R&D) in IT, Electronics and associated areas, it has been carrying out pioneering and high-value research and extension activities in their mandated field. These include building of PARAM series of supercomputers, Indian Language Computing Solutions by setting up GIST group (Graphics and Intelligence-based Script Technology) and also Indian Language Computing around the same period. Health informatics programmes are also one of its major priority areas which facilitates maintenance, exchange of information in the health sector to a big extent. Since 1994 it has also been involved rigorously in education and training of Industry professionals on specific requirement for raising the expertise of intending industrial organizations.

"As an institution for high-end R&D, C-DAC has been at the forefront of the Information Technology (IT) revolution, constantly building capacities in emerging / enabling technologies. And also innovating and leveraging its expertise, caliber, skill sets to develop and deploy IT products and solutions for different sectors of the economy, as per the mandate of its parent, the MeitY, Government of India and other stakeholders including funding agencies, collaborators, users and the market-place," C-DAC website.

8.6.2 NCSTC

This agency was set up specifically for communicating Science and Technology to masses, stimulate scientific and technological temper, coordinate and orchestrate such efforts throughout the country. Uplift of the society through dissemination of scientific knowledge to the people and subsequent adoption of the same has been its primary goal. Since inception, it has been trying its best to achieve this objectives through various ways and means with a major amount of success till date. A few of the schemes it has adopted over the years are ---

Annual awards in the fields of - Outstanding Efforts in Science & Technology Communication through books and magazines, among children, translation of popular S&T literature, print and electronic medium. It may be mentioned here that at least two prominent science communicators from Assam have received this award in the past about a decade.

It further organizes outreach activities, training in Science and Technology communication, development, production & dissemination of S & T software, incentive programmes, and field-based Sci-Com projects, research in S&T communication, international co-operation, motivating students and teachers, environmental awareness and programmes with a special component exclusively for women (NCSTC website).

Other popularization programmes of this organization include - campaigns over the Year of Scientific Awareness, Year of Physics, Year of Astronomy, Year of Mathematics, observation of the National Science Day and National Mathematics Day, the National Children's Science Congress, National Teacher's Science Congress, and Science Express etc. (NCSTC website).

National Children's Science Congress (NCSC) is organized by NCSTC every year for "brilliant young scientists (10 -17 years of age group) since 1993 to popularize the method of science." This is done by working in teams under a guide on an identified problem from the neighbourhood, develop a hypothesis and conduct field researches patterns in data and prepare a report and present findings before peer group in one's own language are the steps the youngsters need to go through for developing a scientific mindset and logical search into a specific problem. The idea is to prepare future scientists of the country.

Simultaneously it also organizes the National Teachers' Science Congress (NTSC) for providing a platform to the country's teachers for uplift the level of their scientific awareness since 2003 which is currently a biannual event. Additionally, it further engages teachers, educators of vocational / open schools / teachers educators / DIET faculty / B.Ed and university researchers, scientists, technologists and activists are also eligible to submit their papers. (Website).

8.6.3 Vigyan Prasar

Vigyan Prasar (VP) is an autonomous organization under the Department of Science and Technology (DST), GoI. Its major objectives is to serve India's science popularization agenda. It partners with various organizations and agencies or stakeholders to communicate about

principles and practice of science and technology and implications for development of quality of life. Science popularization, therefore serves as a robust knowledge-led tool to fulfil three mutually reinforcing public policy objectives.

One of the primary goals is to create and foster a well-informed citizenry with special emphasis on developments in science and technology and the open-endedness and continual evolution of science and related knowledge systems. (Website).

Secondly, building capacities to communicate through inroads into formal and non – formal teach and learn systems including education and other community-centred interventions across thrust areas and regions of the country. (website).

A third one is implicit in the first two as mentioned above here. It is about engagement that follows knowledge enrichment. (Website).

A major project of VP is the Science and Technology Communication, Popularization and Extension (SCoPE) in Indian languages. The Assamese language programme is being coordinated by the Mass Communication & Journalism Department of Tezpur university since 2021. The idea is to reach out to the different language speakers of the country to the maximum possible extent through various efforts involving different media including, Print, Audio-visual, interactive etc.

CHECK YOUR PROGRESS

Q.1 : What is the importance of science popularization in today's world ?

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Q.2 : What type of programme can be taken up for reaching out to the masses ?

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Q.3 : Is there any specific format for such programmes to be conducted ? What are those formats is there happens to be one?

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CHECK YOUR PROGRESS

Q.4 : Discuss a few organizations / institutions engaged in science popularization in India.

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Q.5 : Write a few lines about the programmes these organizations take up from time-to-time for this task .

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Q.6 : What is your understanding of the term 'Scientific Temperament' ?

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8.7 LET US SUM UP

- The various findings of research and advancements of science and related areas need to be popularized among the people, specially children and the young people so that they can adopt the best practices of these developments
- These programmes can take any form including a film, open access to laboratories on particular days to get oneself familiarized with recent innovations in these fields, demonstration of some aspects of science which may look like magical in nature.
- There are many organizations / institutions / agencies involved in popularizing science and related aspects in the world
- At different points of time, many of these institutions collaborate and set up a network of their activities for popularizing science-related activities which otherwise may have remained a mystery to the society
- Additionally, there are quite a few prominent and dedicated individuals scientists, researchers who have contributed more than adequately to enrich peoples' understanding of science and associated aspects in the society. These persons have taken science popularization and communication as a major goal of their life
- Various methods are utilized for achieving success in this direction. These may differ from institution to institution and also person to person depending upon different circumstances.

8.8 FURTHER READING

Important websites -

Kerala State Council for Science, Technology and Environment (KSTEC), https://kscste.kerala.gov.in/

Institute of Fundamental Technological Research, Polish Academy of Sciences, https://www.ippt.pan.pl/en/scientific-activities/popularizing-science

Website of Vigyan Prasar / NCSTC / CSIR-NISCAIR / ASTEC,

Science Outreach & Popularisation, https://www.indiascienceandtechnology.gov.in/covid-19-the-pandemic/awareness-material/science-outreach-popularisation

Boosting public understanding of science and technology in developing countries, https://www.nature.com/wcs/c16.html

8.9 ANSWERS TO CHECK YOUR PROGRESS

Ans to Q No 1 : If the various developments in S&T are kept confined to the laboratories only, they will not be able to facilitate a better living standard for the people in the society. Thus they will be a waste only. So those findings which are directly beneficial for enhancing our state of life need to be popularized for human utilization in different walks of life.

Ans to Q No 2 : These programmes can be of various types like cinema, documentary on specific topics, visits to science laboratories, nature walks in the wildlife for introducing people to the rich aspects of flora and fauna, conducting of exercises of science in simple forms as do-it-yourself activities etc. It depends to a big extent on the innovative mindset of a researcher or scientists about how interestingly these can be demonstrated.

Ans to Q No 3 : There are some methods being followed by scientists and researchers which have become popular over the ages as mentioned above. However, with the passage of time, ever new methods and systems of doing these exercises can be developed to attract the interests of the people and specially children.

Ans to Q No 4: These institutions include C-DAC, NCSTC, VP, CSIR- NISCAIR, Indian Association for Cultivation of Science, various state-level science associations etc. Apart from their research activities which are also highly important, they are also engaged in carrying out

popularization activities for passing on the benefits of S&T to the people at all levels of the society. Thus, the masses benefit properly from such endeavours.

Ans to Q No 5 : National Children's Science Congress (NCSC), National Teachers' Science Congress, publication of books, pamphlets, audio-visual programmes (both short and long) on different aspects of the field, laboratory visits, nature walks, popular lectures and talks with senior scientists, mobile exhibition vans etc. are just a few of the popularization programmes taken up by the persons and institutions concerned. There can be many other such innovative programmes which need not necessarily be similar to the already-existing ones. There is no limitation to utilizing different forms and innovative ideas in this regard. Only condition is that they should be attractive as well as effective.

Ans to Q No 6 : A scientific Temperament simply means a rational or logical mindset who would not accept anything at face value and would accept it only after a proper analysis of the various facts and backgrounds. For example, a person may be asked not to look at the sun or moon during eclipse times saying that it would badly affect his or eyes. But the latter would study all relevant literature about it and consult knowledgeable persons before actually taking a decision in this regard. In simple terms it is the mindset which would analyse everything in a rational manner before taking a decision about experimenting with it at all. This is one of the topmost objectives of the whole exercise of science communication.

8.10 POSSIBLE QUESTIONS

A. Short Questions (Answer each question in about 150 words)

Q.1. What is the need for popularizing science and its related aspects among the people ?

Q.2 : Discuss the role played by organizations or institutions and also individual communicators, researchers or scientists in the field of popularization of science.

Q.3 : Write about various popular formats and methods of science popularization activities.

B. Long Questions (Answer each question in about 300-500 words)

Q.1 : What is the significance of inculcating a 'scientific temperament' among the people of the society ? How will the society benefit out of it in the long run ?

Q.2: Discuss the contributions of a few scientists or science communicators over the years.

Q.3 : Compare the roles played by the government and non-government sectors in science popularization in our country.