COURSE CODE: MAMCD 402

COURSE NAME: SCIENCE COMMUNICATION

CENTRE FOR DISTANCE AND ONLINE EDUCATION
TEZPUR UNIVERSITY

MASTER OF ARTS

MASS COMMUNICATION AND JOURNALISM

BLOCK II

Tezpur University
Centre for Distance and Online Education
Napaam, Sonitpur, Assam - 784028

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Objective

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MMC-402: SCIENCE COMMUNICATION

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Published by Director on behalf of the Centre for Distance and Online Education Tezpur University, Assam.

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UNIT 10: Science Communication and Voluntary Organizations

UNIT STRUCTURE

10.1 INTRODUCTION

In India, science communication activities have gained popularity and thrust since the last two decades. Government and non government platforms have intensified the public perception towards science. The main purpose was to understand science and help scientific culture to penetrate in India's socio-culturally diverse society and developed nation of scientifically aware people.

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India has a strong scientific heritage that has been diverse out within the Indian subcontinent since the earlier period, in the field of Mathematics, Astronomy, Medicine, and Material Science. However, a significant gap has been there between this knowledge domain. Therefore the 'common' man and women have almost put no effort to bridge this gap until now. There are attempts throughout history to bridge the gap for instance a monthly popular science magazine in Hindi Vigyan(science)has been published by Vigyan Parishad (a learned society of scientist and academics) since 1915. Jawaharlal Nehru, the primary prime minister of India after independence introduced a concept of 'scientific temper'- a phrase taken to mean and inquiring attitude and analytical approach that ends up in rational thinking and therefore the pursuit of truth without prejudice . The Constitution of India has a special provision "to develop the scientific temper, humanism and spirit of enquiry".

10.2 OBJECTIVES

After going through the Unit, the learners will be able to

- Enumerate different types approaches used in science communication
- Analyse the challenges and scope in science communication in present scenario.
- Explain the significance of science communication

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10.3 VOLUNTARY ASSOCIATION FOR SCIENCE COMMUNICATION AND THEIR JOURNALS

After 1947 a vast number of government agencies and non-governmental organisations (NGOs) motivated by the Constitution became involved in science popularization. Science communication was taken up to various levels micro (individual) to macro (institutional), and Nehru was a major force behind the development of science in independent India .

The National Institute Of Science and Communication (NISCOM) previously the publication and information directorate-began publishing Vigyan Pragati a Hindi popular science journal in 1952. An English monthly "The Science Reporter" and “Science Ki Duniya” (Urdu quarterly) followed soon after NISCOM also brought out 11 scientific journals and famous science books were published by NISCOM.

Science communication was given priority in the sixth five year plan of India in 1980 and after two years the national council for science and technology communication (NCSTC)was found .The council has a precept to unite regulate assemble and support communication and popularization at the micro as well as macro level. NCSTC 's programmes include software development research and training in science and technology. It also has networks and databases on field based projects and creates information networking.

Other Indian government initiatives with Vigyan Prasar which is an autonomous organization of the department of science and technology set up in 1989 which has a key factor in coordinating

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efforts among educational and academic bodies and scientific institutions museums, laboratories, industry and other organizations for effective advertisement of scientific information. Vigyan Prasar also promotes and advertises software materials and organizes famous science events including debates and lectures and workshops.

The National Council of Science Museums is the equalizing body of 26 science museums and science centers across the country. There are 1000 exhibits in science city in Calcutta which attracts around 500000 visitors a year. Other such products are also being developed across the country due to the popularity and experience of science cities. Science communication program pursued by several NGOs like The Indian science writers association (ISWA) : was established in 1985 with a vision of development and helping to grow the science writing profession in India . Association has 200 members enrolled and activities like lectures and fellowships and training courses are provided. ISWA is also tied with government agencies and NGOs in promoting science communication activities.

10.4 DIVERSITY OF SCIENCE COMMUNICATION MEDIA

Various modes of communication used by India's science communicator to reach out to the masses depend upon different means of communication technologies as well as human resources and infrastructure which are available in India . Each having its own utility and significance in the vast diversity of the country

- ***Print media:***

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Scientific journals were published by the government including popular and technical features. Now national and regional daily newspapers have now started producing science pages weekly. Vigyan Prasar provides a weekly ready-to- print science page in both English and Hindi which some 21 newspapers use at nominal cost.

However signs indicate a decreased interest in science communication in the print media. For ex: the Indian science magazines "science today and bulletin of sciences" have been discontinued as have Indian editions of certain foreign magazines such as La Recherche and scientific American. Audio visuals media

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- ***Audio visual media :***

Radioscope, science today, science magazine and science news are science based programmes available on all India radio(AIR). In the early 1990s, a landmark 144-part radio serial Mana ka Vikas (human evolution) was jointly produced by NCSTC and AIR . The programme was broadcasted in 18 Indian languages with 100000 children and 10000 school registered listeners from more than 80 radio stations.

A number of television channels have also been broadcasting science programmes for many years. For example, Bharat Ki Chaap , a 13 part film serial based on the history of science and technology in the Indian subcontinent and its impact on the world was produced by NCSTC and broadcast on Doordarshan channel in 1989.

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- ***Folk Media***

Puppet shows street plays, stage performances, folk songs and dances are common observations of folk Media. These are the reach segments of society where other media have limitations. It is a traditional means of communication and it is treated as alternative media for science communication. One of the significant advantages of using Folk media as a means of science communication is its cost effective nature and also can easily reach the audience through entertainment. While print and electronic media have limitations as its reach is determined by the literacy level and accessibility. Several voluntary agencies such as Kerala's Sastra Sahitya Parishad (people's science movement), are actively involved through folk Media in taking science to the people.

- ***Interactive media***

Science fairs, demonstrations, science exhibitions, workshops, lectures, seminars scientific tours, conferences and more recently digital software have the advantage of being an interactive form of science communication. For instance, Vigyan Jatha could be considered the biggest science communication experiment anywhere in the world. During this massive event communicators walk in groups from villages to villages spreading information and interacting with local people about the relevance of science in their day to day life . It was held in 1987 and 1992 themes have included health, water, environment, appropriate technology, superstitions, scientific thinking and literacy. In this programme about 2500 government agencies and NGOs have been actively involved . Jatha has covered nearly 40000 locations in 400 districts touching almost a third of the country's population.

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The annual children's science Congress was started in 1993 by the NCSTC network. It has become a highlight in the science communication calendar. The aim is to extend classroom science teaching by providing open laboratories for 10 to 17 years olds for enjoyable easy learning.

Scientific explanation of miracles was another very important programme in India. This programme uses trained science activists to demonstrate and explain so called miracles. For example, in 1995 the author investigated and demonstrated the phenomenon of deities drinking milk on television and exposed as a hoax.

Recently, Information Technology has been facilitating a new form of interactive science communication in the form of digital media consisting of Internet and CD ROMs.

10.5 COVERAGE

There are a number of factors in determining the framing of scientific information and agenda of portraying it in the media by the journalists. Some of these factors are the tactics which journalists use to present new information. For instance, some journalists covering complex policy debate rely on news format and few standardize plots. The economic liberalization in 1991 flagged the growth story of Indian media. Through economic liberalization, India officially acknowledged the new opportunities brought about by globalization and technological advancement.

The National Institute of Science Communication (NISCOM) previously known as the Publication and Information Directorate began publishing the monthly Hindi magazine Vigyan Pragat in

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1952. It was a newsletter disseminating information on scientific research activities and was subsequently started publishing as a science magazine The Science Reporter (English monthly) and Science Ki Dunia (Urdu quarterly). With the formation of the National Council for Science & Technology Communication in 1982, launched to promote proper science education in the country, it utilised various forms of media, both traditional and modern for promoting science and technology. In 1989, Vigyan Prasar (an autonomous organisation of the Department of Science and Technology) was setup. As of now, it is one of most active organisations coordinating with various scientific institutions, educational and academic bodies, laboratories, museums, industry, for effective dissemination of scientific knowledge. It publishes a monthly newsletter titled Dream 2047.

In 2002 merger of National Institute of Science Communication (NISCOM) and Indian National Scientific Documentation Centre (INSDOC) resulted in the formation of National Institute of Science, Communication, and Information Resources (NISCAIR) with an objective to collect and store, publish and disseminate scientific and technological information through the use of modern as well as traditional media.

The coverage in various mediums can be categorized under following criteria

1. *Nuclear science and technology.*
2. *Scientists on nuclearization.*
3. *National security and nuclear programs*
4. *Nuclear safety.*
5. *Nuclear energy*

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6. *New research*
7. *Patents*
8. *Perceptions about Indian science Technology* - Subject of an editorial or article that presented the views of many top scientists and science administrators in various fields who critically examined the issues with their opinions and perceptions.
9. *Public understanding of science Science and society* - The articles to gauge people's awareness, attitude and perception about various natural phenomena.
10. *Environmental science*
11. *Science and religion*
12. *Science administration*
13. *Biography of scientists*
14. *Allocation of resources to science and technology*
15. *Biotechnology*
16. *Science education*
17. *Ethics in science and technology*
18. *Miscellaneous items.* - Which dealt with basic sciences and original theories

For most people, the reality of science is what they come to know through the mass media. Mass media is probably the most important factor that continues to influence and shape perceptions of science and technology among readers. People understand science through direct experience or past education than through the filter of journalistic language. The media is the only source of giving out details on rapidly changing scientific and technical fields. It also addresses and disseminates information about the implications of these scientific changes on their lives.

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10.6 PRESENT CHALLENGE AND VISION FOR THE FUTURE

In science communication there is an urgent need to make activities more effective and efficient quantitatively as well as qualitatively. Efforts have to be made to iron out superstitions that have been existing since ages. Moreover, the general public is still unaware about many common scientific principles.

- ***Mass media***

On average science articles account for only 3 percent of mass media coverage. People don't rely on print material as their only source of information hence readership of popular science magazines has declined.

For the above reason, the Indian Science Writers Association (ISWA) aims to encourage the editors of newspapers and magazines to regularly feature a science column . It also encourages the readership of popular science magazines by making them available through digital media and publication may also cater to India's many languages that can provide different languages.

Radio and Television which is extremely popular in rural areas as an important source of scientific matter has challenges such as lower number audience and viewership (in case of Television).

- ***Mass education***

Scientific information has become an essential an integral part of people's life. Present science communication efforts have a great impact in shaping people's life and making their decisions more explanatory and logical. However, illiteracy and ignorance are

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major challenges. The current literacy level is estimated at 52 percent of the population and is increasing day by day but the scientific literacy level is extremely low . Due to India's large population and limited resources, multitude of languages, mass science education faces are particularly great challenges . There have been many efforts to increase scientific literacy by producing some scientific publication in vernaculars and then translating certain television and radio programmes through 18 different languages. There is a requirement of more attention to the local language as without it the majority of the population will be left out. Also, folk forms must be used frequently so that superstitious belief can be wiped out from the society and the scientific environment can be created at elementary level.

- ***Training science communicator***

In order to develop interest for science communication and taking it to the mass, different training programmes are conducted. However, the number of capable science communicators and voluntary science organisations is disturbingly low. To overcome this, science communicators are being trained through post graduate degree and diploma courses in science communication and short term science writing and workshops. In the past, four Indian science communicator have won UNESCO's Kalinga prize for their outstanding contribution towards popularization and science communication

Indian media needs to make a drastic change on the way that scientific information is presented to make it more interesting and innovative in the manner in which it is presented to the masses. For example, science and technology news creates a poll by the new

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generation writers and journalists that allows writers and journalists to exchange information on scientific research and development and innovative ideas to make it more interesting.

- ***Networking***

Science communication activities must be conducted and governed in a systematic manner with plans under central organisation and should adhere to a properly defined national policy.

This issue is already being addressed to an extent and all India People Science Network was created in late 1980s with 27 constitute voluntary organisations. The NCSTC network started in 1991 to increase the popularization activities to the whole country presently has hundreds of members including government organisations and NGOs are working under it. It also has a country wide project to combine information in science communication software and hardware, humanware and agencies to facilitate further networking. But forming networks of organisation is not sufficient. A more cohesive mechanism must be worked out to work together; in fact steps have to been taken towards the intertwining national database of science editors, writers, journalist, columnist, illustrators, media persons, producers, media, organisations interested in science coverage

10. 7 SUMMING UP

The level of science communication activities increased greatly after the industrial revolution in Western countries. In some sort India is in a similar position. The need for scientific information increases as technology advances .Similarly, India will soon observe and

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evidently see an increase in science communication and popularization. The success of the information technology industry is an outcome of increasing scientific awareness in India. A large number of science communication initiatives have been undertaken by India and have led to innovative approaches to reach out to more people. New ideas, methodology, programmers of other parts of the world should be followed and learn from successful strategies one employs for better understanding of Science.

Initiative can be taken by India as far as science and journalism are considered. It can include like mobilising like-minded people in South Asia to form science writers and journalist association in each country with the help of international organisations. The science communication scenario is based on technologies available today which can be further utilised to carry a significant message to the people.

10.8 QUEATIONS

1. Enumerate on growth of science communication in India?
2. Explain the role of different media in science communication and its reach?
3. How coverage of topics in science communication are decided?

10.9 REFERENCES AND RECOMMEDED READINGS

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UNIT 11: ACADEMIC STUDY PROGRAMME IN SCIENCE COMMUNICATION

UNIT STRUCTURE

11.1 INTRODUCTION

Science communication is a very young discipline and unlike many established domains of study, it has only recently established itself after a gradual increase in the demand of professionals who are capable of communicating the intricacies of lab work to the general public. Such communication is important because mostly scientific research is funded by public money and as such scientists who use this public money for their research are accountable for the kind of outputs they are able to make out of that public money. Science has to benefit the society, such is the nature of science and it is the duty of science communicators to educate the masses so that scientific temper is inculcated among them and they are able to use science and scientific innovation for their benefit and the benefit of others in their society.

Owing to this market shift, of late, there has been development of both research and teaching infrastructure to support the development of science communication as a profession. The publication of books related to science communication has also aided in the development of a common body of knowledge for this relatively new discipline. Owing to structural differences in science communication around the world, there is also considerable difference in structure and curricula of science communication programs in universities around the world.

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In India the scope for science communication is relatively very limited with a full time master's course being offered only by Devi Ahilya Vishwavidyalaya in Indore, Madhya Pradesh and the Institute of Mass Communication in Science and Technology, Lucknow University in the university category. There are other PG Diplomas but the number of courses are very scarce. While a number of university courses do have individual papers in the course that address science communication yet the number is very limited. This is probably due to the lack of trained faculty and specialized professionals to teach such a specialized subject.

Around the world there is a growing recognition that the relationship between science and the public is at a critical phase. During the next few years the choices made, either deliberately or by inaction, will deeply affect the future both of science and society. Under such circumstances it is the need of the hour to develop institutions that are capable of training adept science communicators.

11.2 OBJECTIVES

A thorough study of this unit shall enable you to

- Explain the scope of science communication as an academic domain
- Analyse the gaps in science communication programs in India
- Evaluate the various science communication programs around the world

11.3 SCIENCE COMMUNICATION AS A DISCIPLINE

Science Communication as a discipline by its nature is interdisciplinary. Mulder, H. A. J., Longnecker, N., & Davis, L. S. (2008) in their paper on The State of Science Communication Programs at Universities around the World make interesting observations on the nature of science communication as a discipline. More importantly the paper discusses the nature of science communication programs in universities in North America, Australasia and the Netherlands. While this cannot be considered as representation of the nature of science communication around the world yet, there are clear differences in the way science communication is taught in the respective places.

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While in the Netherlands science communication masters have been set up in the science faculties with an interdisciplinary approach combining science, educational studies, social studies of science and communication studies; North American universities run their science communication programs through social sciences departments and hence the primary focus of the communication is societal implications of science. In Australasia, the teaching of science communication is mainly weighed to science faculties and hence the focus is primarily on effectively communicating science.

Figure 1 as under depicts the various areas that support the discipline of science communication. More or less science communication programs around the world are based the model as under.

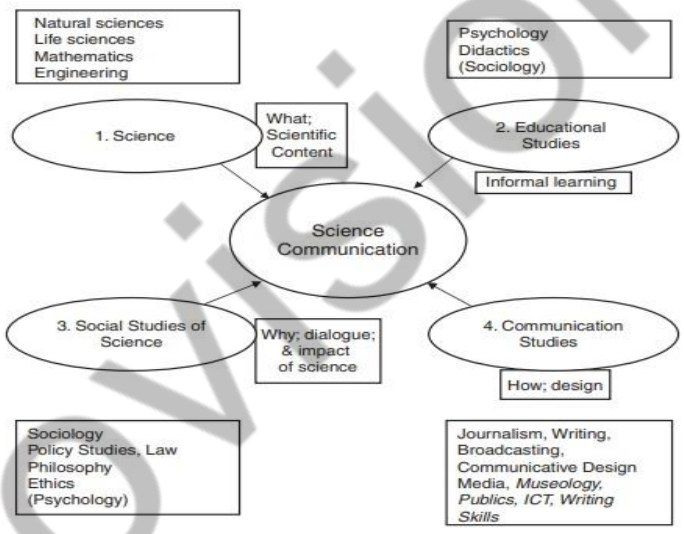

Figure 1: The areas of study that constitute the discipline of Science Communication (Source: Mulder, H. A. J., Longnecker, N., & Davis, L. S. (2008). The State of Science Communication Programs at Universities around the World)

ASSESS YOUR PROGRESS

1. Why is there a sudden need for the development of the science communication discipline?
2. What are the various domains that support the discipline of science communication?
3. Why is the nature if science communication interdisciplinary?

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11.4 ACADEMIC SCIENCE COMMUNICATION PROGRAMS IN INDIA

From the previous units, the importance of science communication in a developing nation like India is very evident. Developing countries have the need to inculcate the spirit of scientific temper and ensure that the people in such countries are able to move from blind superstitions to a scientific approach to thinking. It is also very evident that due to the lack of trained workforce there is a definite gap in the quality of science communicators in India. There are various reasons for this but one of the reasons that is worth discussing is the lack of the availability of academic programs that are aimed at training science communicators.

The Centre of Science Communication (CSC), Devi Ahilya University, Indore offers a two-year full-time regular Master of Science programme in science communication. It is a fellowship-based programme funded by the NCSTC. The Centre admits 20 students each year and fellowships are provided to meritorious students. The Centre has also started a one-year PG Diploma in Science Communication through correspondence mode.

The Institute of Mass Communication in Science and Technology, Lucknow University, is also running a similar course – M.Sc Mass Communication in Science. It is also a two-year full-time regular programme funded by the NCSTC. The Institute admits 40 students each year. The National Council for Science Museums (NCSM) in collaboration with BITS, Pilani, is offering a two-year regular MS degree programme in science communication at Kolkata. The NCSM also provides fellowships to meritorious students admitted to the course.

The Indian Science Communication Society (ISCOS), Lucknow is running a one-year 'Certificate in Science Journalism' programme. The programme is open to anyone with a basic degree in any branch of science. ISCOS admits 100 students each year. It is a distance course executable either on-line or through correspondence. Makhanlal Chaturvedi National University of Journalism and Communication, Bhopal has also started a one-year PG Diploma in Science and Technology Journalism.

The Department of Journalism and Science Communication, Madurai Kamaraj University, also offers an NCSTC-funded PG Diploma in Science Communication. In

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addition, the National Institute of Science Communication and Information Resources (NISCAIR), CSIR, New Delhi also organizes short-term science-writing training workshops.

Most other institutions across the country have only options for PhD topics in science communication besides individual papers within the course framework which is simply not sufficient. For a country as big as India, the number of academic programs and the number of students it caters to is just not enough. The number of fellowships and the amount provided as fellowship amount is also very meagre and is under no circumstances substantial for the capacity building in the area which the government intends to do. In first, centrally funded institutions across the country should be encouraged to run academic programs in science communication with such emphasis as is priority of the greater good of the public.

11.5 SUMMING UP

The communication of science is a priority task of the governments in developing countries. There is an evident and immediate need for the increase in the number of science communicators in a developing country like India. As such there is also the need for institutions which train such individuals in both academics and profession. While most institutions in India are open with the prospect of taking up science communication as a Ph.D. research topic yet there are very few dedicated full time academic programs for the training of science communicators and this is very unfortunate for a country where the government intends to pull out the masses from superstition and false beliefs and inculcate scientific temper. As discussed in the unit there is a need for the training of existing faculty in science communication so that at least funded institutions across the country could make it a priority to start and carry out courses linked to since communication.

11.6 QUESTIONS

1. What do you think is the reason for the lack of motivation to take up science communication as an academic endeavour?

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2. What is the reason for the lack of academic institutions that provide full time academic programs in science communication?
3. Suggest improvements to enhance the scenario of the academic study in science communication?

11.7 REFERENCES AND RECOMMENDED READINGS

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MODULE IV: EXPERIMENT IN SCIENCE COMMUNICATION

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UNIT 12: SCIENCE COMMUNICATION ON WHEELS EXPERIMENT

UNIT STRUCTURE

12.1 INTRODUCTION

This unit introduces the reader to an innovate program with the intention to promote understanding and importance of science and thereby inculcate scientific temper. Tracing the history of the origin of mobile exhibitions around the world and factors that contributed to it, this unit tries to establish the importance of a program like 'Science on Wheels' in a developing country like India. As discussed later in the unit the primary reason for the rise of mobile exhibitions was the Second World War which had devastating effect in the war-torn countries. The unit also touches upon the contribution of UNESCO in the promotion of science communication in the war torn countries. India being a developing country with less than adequate infrastructure for the promotion and effective dissemination of scientific knowledge, the science on wheels program is an attempt to bridge the gap. Science communication, especially in rural areas become essential so as to make science more accessible in such areas. This unit also sheds light on the practice and implementation of the program in India. The unit goes on to further discuss the application and need for similar programs of the kind in future.

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12.2 OBJECTIVES

A thorough study of this unit shall enable you to

- Explain the need for the Science on Wheels Programme
- Evaluate the intricacies of the implementation of the programme
- Assess the scope for similar programmes in future

12.3 ORIGIN OF SCIENCE ON WHEELS

With the intention of spreading knowledge outside their campuses, institutions at the end of the 19th century started introducing programs to tour with exhibitions. In the year 1983, out of 390 museums surveyed for a particular study in the USA, 19 had such outreach programs prior to 1900. In the UK, Victoria and Albert Museum, which was established in the year 1850, had a dedicated department concerned with travelling exhibitions which was one of the oldest such establishments in Europe. Likewise other countries like Canada, Brazil, France, Israel, Mexico, Pakistan, Poland and Sweden also had similar establishments for national or regional circulation.

The American Museum of Natural History in the USA has been circulating its books, manuals and natural history objects for free, to school students since 1903. Two major travelling exhibitions were also organized in the 1940's by the Cranbrook Institute of Science – 'The Races of Man' and 'Stories in Hair and Fur'. In Sweden, Tekniska Museum and in France Palais de la Découverte made provisions for temporary exhibitions which went on a tour across the country and abroad. Interestingly, though these exhibitions were not on wheels viz. they were not directly conducted out of vehicles instead they travelled like circuses. One of the earliest known exhibitions to work out of a vehicle was in fact conducted by the Saint Louis Educational Museum. The museum was known to have formally begun in the year 1905 when the teacher in charge of the vehicle made the first journey. This

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particular action led to the start of an era of mobile museums that toured at length in various countries around the world. This emergence is attributed to the advancement of technology in the automobile industry. Another reason for the growth of mobile educational museums was World War 2 as there was a concern about making cultural values and education more accessible to the general public. It was primarily the latter reason that fueled the efforts to disregard geographical isolation to get exhibitions to even the remotest places in the USA.

With the extension of these mobile exhibition centers to more geographically isolated locations, other problems started to come to the fray. Most importantly, it became tougher to find venues for the exhibitions at such remote locations. It is therefore that the vehicles formerly carrying the material for conducting the exhibitions now started building and transporting the entire exhibitions with them and thus culminating into the 'mobile museums'.

The Second World War also had devastating effect on the education and cultural services in the war-torn countries and therefore there was a need for the improvement of science education in the respective countries. Laboratories needed to be built from scratch so that scientific experiments could be carried out and therefore scientific advancements be made.

UNESCO also stepped in and in its attempt to improve the condition in its member counties came up with the 1948 book titled Suggestions for Science Teachers in Devastated Countries. This text was not just helpful in the war-torn countries after the world war but also in the developing world even decades after.

The problems are similar here. In a country like India with its huge geographical area and less than adequate infrastructure the potential of mobile exhibitions on wheels is immense. The Science on wheels program has the potential to provide access to education and facilitate the communication of science in some of the most remote parts of the country. In other words, this program has the capability of the democratization of

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scientific knowledge among masses with less accessibility. There are various legs of the program across various states around the country but the primary objectives mostly circle around the effective communication of scientific knowledge so as to inculcate scientific temper.

ASSESS YOUR PROGRESS

1. How did the concept of mobile exhibitions grow around the world?
2. Why was it suddenly important to introduce mobile exhibitions after World War 2?
3. How are programs like the science on wheels capable in democratising scientific knowledge?

12.4 SCIENCE ON WHEELS: CONCEPT AND IMPLEMENTATION

The 'Science on wheels' is a nationwide program for communicating science and inculcating scientific temper. This is the reason why various editions of the program was launched around the country.

In Nagpur, the Science on Wheels program started in the year 2004, the same year that was declared as the year of scientific awareness. It was one of the major events of the year and was in fact declared as a national festival. It was organised at Regional Science Centre and 14 Mobile Science Exhibition units from different parts of country covered thousands kilometres with the message of science and technology finally exhibited at Raman Science Centre, Nagpur.

The intention of the mobile exhibitions was to connect the rural areas of the country to the mainstream and it did wonders to have been able to achieve it. The festivals included a series of science activities, workshops, demonstrations, lectures, science dramas, science film shows and several other programs. The exhibition themes of the mobile science van were

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diverse in nature and touched upon different scientific and technological subjects like water, environment, time, perception, invention, food and nutrition, forest, fun science popular science, space and mankind etc. relevant to society. It is expected that this network will grow to 66 at the end of 12th plan. There is an attempt to incorporate interactive means of communicating science at all 'Science on Wheels' programs.

The Assam chapter of the 'Science on Wheels' program was rechristened as "Science Communication on Wheels". Science communicators, resource persons travelled for eight consecutive days in October 2017 carrying a mobile exhibition of science communication materials and science equipments to places around Assam.

Assam Skill Development Mission, Oil India and Numaligarh Refinery Limited sponsored the 'Science Communication on Wheels' segment of the festival. Again the intention of the program was to communicate scientific thought by delivering talks, conducting workshops for development of skills for science communication on digital platforms and science photography in various educational institutions.

The institutions covered in this leg included Tezpur University, North Lakhimpur (Autonomous) College, Morigaon Jatiya Vidyalaya, Jorhat Government Girls' Higher Secondary and Multipurpose School in Jorhat, Delhi Public School, and OIL India Higher Secondary School in Duliajan and Dibrugarh University. With a coverage of over 2000 Kms, the endeavor for communicating science was one of a kind and was one of the many efforts around the country to inculcate scientific tradition.

12.6 SUMMING UP

The Science on Wheels program has been instrumental in creating an awareness about concerns in the area of science. The communication is intended to draw attention to the importance of the promotion of scientific thought and temper. The program involves the use of innovative and

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interactive mechanisms to communicate scientific thought to the public, especially in rural areas where accessibility to infrastructure is a problem. The UNESCO laid down suggestions for science teachers in war torn countries after the Second World War for improving the awareness of science which was extremely helpful not just for these countries ravaged by war but also the developing world that lacks the infrastructure and faces similar problems. The Science on Wheels program is a culmination of efforts to improve the status of science communication in the remotest parts of the country and has been extremely successful in this regard.

12.7 QUESTIONS

1. What are the primary reasons for the growth of mobile exhibitions in the world as well as in India?
2. Evaluate the role of Science on Wheels in India.
3. Do you think such programs are viable in India for the future?

12.8 RECOMMENDED READINGS

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UNIT 14: PROMINENT SCIENCE COMMUNICATORS

UNIT STRUCTURE

14.1 INTRODUCTION

This unit categorically tries to highlight the lives of eminent science communicators who have contributed to the promotion of scientific temper. The list of science communicators is comprehensive and includes Western, Indian and regional science communicators in Assam.

14.2 OBJECTIVES

A thorough study of this unit shall enable you to

- Understand the contributions of eminent science communicators
- Assess the role science communicators in India and around the world
- Make a comparison of the local and the national and international approaches to science communication.

14.3 PART 1: ISSAC ASIMOV AND DOROTHY NELKIN

Issac Asimov: He was born on January 2, 1920 in Petrovichi in Russia. He is considered as one of the most prolific writers of the 20th century and his

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writing spanned across various genre. He moved to the United States and eventually took to teaching biochemistry while also continuing with his writing. He was an alumnus of Colombia University where he procured his Bachelors in Science, Masters and PhD. He joined as an Associate Professor in Boston University School of Medicine in the year 1955. He later became a Professor at the University in the year 1970 but by the time he had already given up full time teaching.

Even though he had very commendable academic credentials, his main interest lay in writing for general readers. He had an extremely successful writing career, writing for general readers. His contribution to the field of science communication started with his entry into the world of Si-Fi literature with his first book, Pebble in the Sky in 1950. Asimov was in fact credited with coining the term 'robotics' after 'I' and 'Robot' where the three laws of robotics was featured. Foundation, his seminar work, was released in the year 1951. Interestingly, it introduced a statistical method of predicting outcomes known as 'psychohistory'. Two more editions came up soon after – 'Foundation and Empire' in the year 1952 and then 'Second Foundation' in the year 1953 and the series continued into the 1980s. Along with Robert A. Heinlein and Arthur C. Clarke, Asimov was considered one of the "Big Three" science fiction writers during his lifetime.

Asimov also wrote on a variety of subjects beside Si-Fi. In total he wrote nearly 500 books, the subjects of which were not limited to Si-Fi but took on various topics like biology, mathematics, religion, astronomy and biographies. Some of his other notable titles include: Asimov's Guide to the Bible (1969), The Human Body (1963), The Mystery Murder at the AB A (1976) among others. He published his autobiography in the year 1979 which was called, In Memory Yet Green. He died at the age of 72 in the year 1992, from kidney and heart failure. He has also contracted AIDS from a blood transfusion during a bypass surgery but he did not make it public and only dealt with it privately. He received a lot of awards and accolades from Science Institutions which also included the Hugo and Nebula awards.

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During his lifetime he was also the president of the American Humanist Association. An asteroid, asteroid 5020 Asimov, a crater on the planet Mars, four literary awards as well as an elementary school in Brooklyn are named after him. Interestingly, Asimov was also called on as an advisor for a number of Star Trek projects.

Dorothy Nelkin: She was born in the year 1933 in Boston. She grew up in Massachusetts and was the first member of her family who was able to procure a college degree. Unfortunately, as is the case with most female academics, she had to stay home for a decade owing to her motherhood. She was an alumnus of the BA program in the Department of Philosophy at Cornell University in 1954, which assisted her in breaking through the academic hierarchy. By 1970s she had become a senior research associate at Cornell and eventually rose to the rank of Professor at the New York University despite having no advanced degrees.

She was a prolific author and as a researcher at Cornell University she discoursed on how science is perceived and most often misperceived. She is best described as a sociologist of science who has done notable work in the in recording the complicated relationship between science and the society at large. Her contribution to the field of Science Communication is noted through the authorship of a total of 26 books which includes Selling Science: How the Press Covers Science and Technology, The Molecular Gaze: Art in the Genetic Age, and Body Bazaar: The Market for Human Tissue in the Biotechnology Age. She was also an advisory member of the National Centre for Science Education and also served on other governmental and other advisory boards. She was actively involved in addressing the legal community, political leaders and the general public and in doing so she was a very effective science communicator. She was a highly cited author and received a number of honours. She was also on the editorial board of a number of journals in sociology, law, social studies, public health and history. She also undertook a number of projects in various countries both in the United States and other countries.

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Nelkin was particularly interested in press and public culture and this is the reason why she became interested in how press coverage was shaped by the culture of journalism. She concluded that the practices of journalism had a tendency to encourage only certain kinds of reporting and especially when there was enthusiasm associated with a particular technological innovation, the press would be resentful on the failure of it. In her later work she concentrated on the cultures of biomedicine. While she was initially interesting in analyzing controversies, she had now started producing them. She died in the year 2003 of cancer.

ASSESS YOUR PROGRESS

1. Name a science communicator of your choice and briefly describe his/ her contributions to the field.
2. Write a short note on the contribution of the Dorothy Nelkin to the field of science communication.
3. How has Issac Asimov influenced the domain of science communication? Briefly Explain.

14.4 PART 2: J.B.S. HALDANE AND JAYANT NARLIKAR

Moving from the global to the national arena, it is important to discuss the contributions of some of the eminent science communicators in India. India has had a very old history of scientific tradition and there is also communication of scientific knowledge through various means. It is probably the reason why the contribution of Indian scientists to the field of science has travelled far and wide. Although there have been numerous science communicators in India, our list is limited to only recent science communicators who have made significant contributions in the field in modern times.

John Burdon Sanderson Haldane: was born in the year 1892 in Oxford, Oxfordshire. He was initially a British citizen and a geneticist, biometrician, physiologist and popularizer of science. He opened up new paths of research in population genetics and evolution. He died an Indian citizen in

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Bhubaneswar in the year 1964. He was the son of noted physiologist John Scott Haldane and started studying science at the age of eight as an assistant to his father. He was an alumnus of Elton College and New College, Oxford where he studied classical science.

He was associated with some of the most prestigious Universities in the world and taught at the University of Cambridge, University of Berkley and then at the University of London. He joined the Indian Statistical Institute, Kolkata after coming to India in 1956. He then joined the government Genetics and Biometry Laboratory in Orissa in the year 1957.

Interestingly, he also fought in the British Army during World War 1 where he was commissioned as a temporary second lieutenant in the 3rd Battalion of the Black Watch (Royal Highland Regiment) in 1914. He was then promoted to a temporary lieutenant in 1915. From 1927 until 1937 he was also Head of Genetical Research at the John Innes Horticultural Institution.

His contribution to the field of science communication could be attributed to the kind of books that had written. Haldane's major works include Animal Biology (with British evolutionist Julian Huxley, 1927), Daedalus (1924), The Causes of Evolution (1932), The Inequality of Man (1932), The Marxist Philosophy and the Sciences (1938), Science Advances (1947), and The Biochemistry of Genetics (1954). He made innovative contributions to the field of statistics and biostatistics.

Jayant Narlikar: The story of Jayant Narlikar starts with reports across newspapers around the country carrying front page stories about a young Indian researcher and his senior research collaborator at Cambridge who had come up with a new theory of gravitation that could see beyond Einstein. This was 1964 and was therefore huge in India at the time. India, at the time was hungry for successes in international forums in its attempt to and this is the probably the reason why Narialkar's success was so extensively covered.

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Narlikar, owing to his credentials was awarded multiple times and with various awards which include both national and international awards. He also has a number of honorary doctorates. He received the Padma Vibhushan in 2004, Padma Bhushan in 1965. He also received the Maharashtra Bhushan in the year 2010. He is a recipient of Bhatnagar Award, M.P. Birla Award, and the Prix Jules Janssen of the Société astronomique de France (French Astronomical Society). He is an Associate of the Royal Astronomical Society of London, and a Fellow of the three Indian National Science Academies and the Third World Academy of Sciences. He also received a Sahitya Akademi Award for his autobiography in Marathi, *Chaar Nagarantale Maze Vishwa* in 2014.

His contribution to the field of science communication is also very notable. Interestingly, he was featured in Carl Sagan's TV show Cosmos: A Personal Voyage in the late 1980s. He received the Kalinga Prize, awarded to him by UNESCO for his contribution as a science communicator.

He wrote a number of books which could be categorized under both fiction and non-fiction categories. The prominent titles include: Highlights in Gravitation and Cosmology (1989), The Primeval Universe (1988), The Structure of the Universe (1977), Absorber Theory of Radiation in Expanding Universes (2002), The Return of Vaman (1990) among others.

14.5 PART 3: DINESH CHANDRA GOSWAMI AND KHIRADHAR BARUAH

Moving from global to national and now to local this part of the unit deals with eminent science communicators from Assam. While the list is exhaustive with Science Communication being part of the cultural tradition for a very long time, we have chosen only two of the most contemporary

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science communicators who have made significant contributions to the science communication with Assam.

Dinesh Chandra Goswami: Dr. Goswami started off with teaching as a lecturer at B Barooah College in the year 1970 and moved to Cotton College in 1972 where he taught for a couple of years. In 1976 he joined the Publication and Information Directorate, New Delhi, presently NISCOM, as Scientist B and Assistant Editor. He was later on promoted to Scientist C and eventually to Scientist G. He moved to Jorhat in the year 1982 and worked in the Regional Research Laboratory till his retirement in 2008.

He is an alumnus of Guwahati University where he completed his graduation with an honours in Physics and a Masters in the same subject, specializing in nuclear physics and cosmic radiation. He also completed a post graduate diploma in the prestigious Saha Institute of Nuclear Physics, Kolkata. He was also conferred with a PhD in the year 1976 for his thesis titled 'Studies on Electromagnetic waves both at optical and radio frequency regions from extensive air showers'.

He is best described as a popular science and science fiction writer and has written more than 60 books, 1000 articles and delivered more than 500 talks on All India Radio (AIR). Some of his popular titles include Manuh aru Mahakash (1976), Abhinava Abiskar (1975), Biswabrahmanda (1977), Usmah Prabah (1993) among others. His efforts in promoting and communicating science is also evident from his endeavour of editing and publishing a bi-monthly magazine 'Drishti'. He is also credited with editing another science magazine 'Bijnan Jeuti' for four years. He was the chief editor of the Assamese Encyclopaedia. Of the many awards he received, it included the Asom Sahitya Sabha award in 1968 and 1972. In 1997 he also received the National Award for Best Science and Technology Coverage in Mass Media, awarded by the National Council of Science and Technology Communication.

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Khiradhar Baruah: He is known for his contributions in the field of chemistry and retired as a head of the Department of Chemistry in Biwanath College in the Sonitpur district of Assam. He is an alumnus of Cotton College, where he pursued his graduation and then his Masters and M.Phil from Guwahati University. He has been consistently associated as a Science writer with Assamese fortnightly Prantik. He was also the editor of Bijnan Jeuti published by the Assam Science Society. He has also contributed over one thousand articles to dailies, weeklies and periodicals in Assam. He is also has 30 book on popular fiction, 9 text books of Chemistry for Degree students and a few other books to his credit. Some of the titles of the texts that he has published are: Dhatu aru Manuh, Paniei Jivan (1997), Asomiya Bijnani (1999), Bijnan Cartoon (2003), Plastic: Manav Jatir Prati Bhabuki (2006) among others.

Khiradhar Baruah has been working very hard to inculcate scientific temper among the common masses of Assam and he has been making extensive use of various tools for the same. Since 1968 he has been using 'Scientoons' (Science Cartoons) to popularise science making him the first in the entire North-Eastern region to do the same. He has also been actively involved with children being the President of Children Science Organization. He developed a number of kitbags for children for Chemistry and environmental sciences.

14.6 SUMMING UP

While the field of science communication has seen a lot of contributions by numerous scholars of science, we have only made an attempt to look at the contributions of a mere few. Our aim was to categorically highlight eminent science communicators globally, nationally and then regionally and in doing so we have tried our best to keep the list as inclusive as possible. The unit talks about two eminent science communicators in each category and in

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stating their contributions in the field has made an effort to map the science communication practices in each category. Further, it is understood that the list of science communicators is too exhaustive and as such the coverage in this unit might not be enough and therefore the reader is encouraged to personally trace the lives of other eminent science communicators in order to understand their contributions in the promotion of science and the inculcation of scientific temper among masses.

14.7QUESTIONS

1. Evaluate the contribution of any science communicator of your choice towards the communication of scientific thought and inculcation of scientific temper.
2. Name any Indian science communicator who has contributed immensely to the field of science communication and write a short note on the life of the individual.
3. What is the contribution of Dinesh Ch. Goswami in communicating science in Assam. Briefly explain.

14.8 RECOMMENDED READINGS

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