COURSE CODE: MAMCD 402

COURSE NAME: SCIENCE COMMUNICATION

CENTRE FOR DISTANCE AND ONLINE EDUCATION
TEZPUR UNIVERSITY

MASTER OF ARTS

MASS COMMUNICATION AND JOURNALISM

BLOCK I

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

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Vision

To grow to be a leading centre for human resource development through distance, open and universal learning system.

Mission

To provide quality higher education at door step through barrier-less, flexible and open learning mode in conformity with national priority and societal need.

Objective

- **To offer degree, diploma, certificate level programme of study through distance learning in various emerging subjects across the disciplines.**
- **To offer job oriented and vocational programmes in flexible terms in the line of the national and regional level demand of manpower.**
- **To offer various programmes under lifelong learning contributing to the local and regional level requirements and as per the need of the society at large.**
- **To undertake various research and academic activities for furtherance of distance education in the region.**
- **To contribute to conserve and promote cultural heritage, literature, traditional knowledge and environment conducting short programmes, workshops, seminars and research in interdisciplinary field.**

MMC-402: SCIENCE COMMUNICATION

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BLOCK I

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MODULE I: COMMUNICATING SCIENCE

UNIT 1: SCIENCE COMMUNICATION

1.1 INTRODUCTION

Following the industrial revolution in western countries, the level of science communication activities increased dramatically. In some ways, India is presently passing through a similar stage. As technology advances, the need for scientific information will also increase. Accordingly, an industrial India should soon witness a similar increase in science communication and popularization. Indeed, the success of the information technology industry is proof of a growing scientific awareness in India.

India has undertaken a large number of science communication initiatives, and has sometimes led the way in innovative approaches. However, we should also be open to new ideas, methodologies and programmes available in other parts of the world, and similarly share with others the successful strategies we have employed.

As far as science writing and journalism are concerned, there is ample scope for furthering such efforts in developing countries. India could take the

initiative in mobilizing like-minded people in South Asia to form Science Writers' and Journalists' Associations in each country, ideally with help from international organizations.

The science communication scenario of our dreams is not unobtainable. Rather, it is based on technologies available today, which can be better utilized to carry scientific messages to the people. Science communication in India is expected to have a bright future.

More than ever, scientists are called upon to provide assessments, often to non-scientists, on which management policies are built and experts should consider becoming more involved and effective in raising public awareness of these threats.

Traditional scientific training doesn't typically prepare scientists to be effective communicators outside academic circles. For scientists, the most important aspect might be how something fits into the given body of research, whereas, the public wants to know how a new finding might impact their lives. By considering the needs of the public audience versus a scientific one, by crafting an appropriate message, and communicating it clearly, more scientists will be more effective at bringing the world of science to the general public.

In this course , we will emphasize on discussing the significance of communication in disseminating messages based on science and technologies. The importance of developing awareness on science and technologies cannot be undermined for creating a platform for discussing scientific topics. From this unit, you will have the understanding about the concept of science communication, its importance and challenges and also the evolution of science communication in India.

1.2 OBJECTIVES

A thorough study of this unit will enable you

- To explain the meaning of science communication
- To write about evolution of science communication in India
- To evaluate the importance of science communication

1.2 SCIENCE COMMUNICATION

Science communication is the practice of informing, educating, sharing, and raising awareness of scientific topics. Science communicators and audiences are ambiguously defined, and each group varies in skill and awareness level. Two forms of established science communication are scientific "outreach" (typically carried out to non-expert audiences by professional scientists) and scientific "in reach" (expert to expert communication from similar or different scientific backgrounds). An example of "in reach" phenomena is scholarly communication and publication in scientific journals. Science Communicators can use entertainment and persuasion including humour, storytelling and metaphors. Scientists can be trained in some of the techniques used by actors to improve their communication.

For a very long time, from at least the late 18^{th} century onwards, if not before, 'science communication' was not there to 'make a difference' or to 'have a chance to influence policy' or, to use another fashionable phrase, induce 'behavior change' etc. Rather the need for communicating science wasn't deemed to be very important.

1.3 EVOLUTION OF SCIENCE COMMUNICATION

1.3.1 The historical context

India's scientific heritage is impressive. Scientific research has been carried out in the Indian subcontinent since ancient times in fields such as mathematics, astronomy, medicine and material science. Nevertheless, there has been a significant gap between this scientific knowledge and the knowledge that ' ordinary' man and woman posses, and there has been hardly any attempt to bridge this gap until recently.

Nowadays, India is experiencing a widespread diffusion of science communication activities. Public institutions, non-governmental organizations and a number of associations are busy spreading scientific knowledge not only via traditional media but also through specific forms of interaction with a varied public. 2004 was the Year of Scientific Awareness in India, one of the most recent of a series of major events that provides some idea as to the extent of the diffusion of public science communication in one of the most populated countries in the world. There are two types of science communication: On the one hand, there is institutional communication, managed at a governmental level for over twenty years by the National Council for Science and Technology Communication (NCSTC), a purpose-designed body dedicated entirely to promoting a large quantity of initiatives, whereby information is conveyed through mass communication and the national education system. On the other hand, there is communication among the population itself, which - since the independence of India from British rule in 1947 -, aims at the dissemination in rural areas of basic scientific knowledge that had only been accessible to the upper classes of society up until that time. The combination of these two types of communication provides a complex image of the variety of levels, methods and languages that characterize science communication in India, with research in this sector only having made its debut a few years ago. A variety that mirrors the diverse and complex social nature of a country that spreads out from the Himalayas

to the Indian Ocean, marked by hundreds of years of severe economic exploitation, foreign rule and also ethnic and religious wars.

Throughout history, there have been attempts to take science to the common people. For example, *Vigyan* (Science) — a monthly popular science magazine in Hindi — has been published by Vigyan Parishad (a learned society of scientists and academics) since 1915.
Following Independence in 1947, the first Prime Minister of India, Pandit Jawaharlal Nehru, introduced the concept of modern 'scientific temper' — a phrase taken to mean an enquiring attitude and analytical approach that leads to rational thinking and the pursuit of truth without prejudice. Accordingly, the constitution of India has a special provision "to develop the scientific temper, humanism and spirit of enquiry".

1.3.2 The science communication movement in India

After Independence, a number of government agencies and non-governmental organizations (NGOs) took their cue from the constitution and became involved in science popularization. In this way, science communication was taken up at various levels, institutional as well as individual. The National Institute of Science Communication (NISCOM) — previously the Publications and Information Directorate — began publishing of the Hindi popular science journal *Vigyan Pragati* (Progress in Science) in 1952. The Science Reporter (an English monthly) and *Science Ki Dunia* (an Urdu quarterly) followed soon after. Today, NISCOM also brings out many professional scientific journals and publishes various popular science books (often in Indian languages).

The most recent history of science communication in India dates back to the end of the Nineteenth Century, when the first science books imported from Britain were translated into the local languages and distributed amid the upper echelons of society. It was only in 1947, the year India obtained its independence, that the first popular movements for science communication

began to form. From the Nineteen Fifties onwards, the new Indian government decreed the need to build the new nation on the basis of a widespread scientific knowledge and awareness. Several science communication activities were promoted, also through the media, and an intensive period of publishing and translation of school and popular science books began, which quickly revealed a major lack of terms and expressions in the Indian languages suitable for conveying modern notions of physics, biology and medicine. At the same time, as an effect of the sudden accessibility of scientific knowledge to all social classes, small local groups of science writers and people involved in activities for the diffusion of scientific culture began to form. The first group to be established was the Kerala Sastra Sahitya Parishad (KSSP) and over the years it went on to become one of the largest and most active associations in this field. The People's Science Movement (PSM) was founded in the Nineteen Eighties, later changing its name to the All India People's Science Network (AIPSN), consisting namely of a committee for the co-ordination of the numerous local and regional non-governmental organizations (NGOs) set up over the years.

The National Council for Science and Technology Communication (NCSTC), the main organ of government designed to diffuse science, was officially established in 1982. Nehru was indeed the first to understand how important the diffusion of scientific knowledge was, and he introduced a special provision into the Indian constitution, to make it clear that it was every citizen's duty to adopt 'scientific temper, humanism and spirit of enquiry'. Creating scientific awareness and developing a 'scientific temper' does not merely entail the diffusion of science. It means giving people the tools to develop an ability to think in line with the scientific method, and which is as logical and rational as possible. All NCSTC's efforts - and those of many other organizations set up over the years - are made with this in mind. It is difficult to list all the activities carried out by the NCSTC, or even those in which it participates. The Council has offices and delegations in almost all of India's 37 states and territories, where activities are carried out

and run in approximately 18 different languages, and it has also set up the NCSTC-Network, which groups together around one hundred organizations, the majority of which non-government run. The science communication programmes run by the local departments reach most of the Indian territory, and the NCSTC also offers direct training for expert communicators specializing in various areas of the sector. The major large-scale events organized by the Council include the National Science Day programmes (a day, a week, or sometimes even an entire month of the year dedicated to an intensive range of science communication activities) and the National Children's Science Congress, which took place for the first time in 1993 and, once a year, gathers over one hundred thousand children aged between 10 and 17 from all over the country and is dedicated to hands-on learning. Last but not least, the NCSTC also produces popular educational material, often organized in kits distributed directly to village populations, as well as articles or series for the local media (television, radio and newspapers), for the most part dedicated to themes relating to health and prevention. The Council publishes a newsletter every month, in both Hindi and English, entitled NCSTC Communications, and collaborates in the running of over 200 university science communication courses throughout the country.

It was only in1980 that science communication was given prominence in India's sixth Five Year Plan, and two years later the National Council for Science and Technology Communication (NCSTC) was formally established. The Council has since then mase it a mandate to integrate, coordinate, catalyze and support science communication and popularization, at the micro as well as macro level. NCSTC's programmes include training in science and technology communication, software development, research, field-based projects, and creating information networks and databases.

Other Indian government initiatives include Vigyan Prasar — an autonomous organization of the Department of Science and Technology set up in 1989 — which plays an important role in coordinating efforts among

various scientific institutions, educational and academic bodies, laboratories, museums, industry and other organizations for the effective exchange and dissemination of scientific information. Vigyan Prasar also develops and disseminates software materials and organizes popular science events including film festivals, workshops, debates and lectures.

The Indian Science Writers' Association (ISWA), for example, was founded in 1985 with a view to developing and nurturing the science writing profession in India. The association has around 200 members and undertakes a broad spectrum of activities including training courses, lectures and fellowships. ISWA also works with government agencies and NGOs in promoting science communication activities.

1.4 SCIENCE COMMUNICATION IN DIFFERENT FORMS OF MEDIA

India's science communicators have used various modes of communication to reach out to the masses. As a result, a lot of infrastructure, software and human resources are available in the country. Each has its own significance and utility, given the vast diversities that exist in the country.

Print media

In addition to the scientific journals (both popular and technical) published by the government, several national and regional daily newspapers have now started producing weekly science pages. In a unique initiative, Vigyan Prasar provides a weekly ready-to-print science page, in both Hindi and English, which some newspapers use at a nominal cost.

Sadly, however, there are signs that interest in science communication is waning in the print media. For example, the Indian science magazines Science Today and Bulletin of Sciences have been discontinued, as have Indian editions of certain foreign magazines, such as *La Researcher* and *Scientific American*.

Audio-visual media

A variety of science-based programmes are now available on All India Radio (AIR), such as *Radioscope*, *Science Today*, *Science Magazine* and *Science News*. In the early 1990s a landmark 144-part radio serial *Manav Ka Vikas* (Human Evolution) was jointly produced by NCSTC and AIR. The programme was broadcast simultaneously from more than 80 radio stations in 18 Indian languages with 100,000 children and 10,000 schools registered as dedicated listeners.

A number of television channels have also been broadcasting science programmes for many years. For example, a 13-part film serial on the history of science and technology in the Indian sub-continent and its impact on the world, entitled *Bharat Ki Chhaap*, was produced by NCSTC and broadcast on the state-run Doordarshan channel in 1989.

Folk media

It is a common observation that folk media — such as puppet shows, street plays, stage performances, and folk songs and dances — successfully reach segments of society where other forms of media have limitations. These traditional means of communication have all been exploited as alternative media for science communication. They are not only entertaining, but also offer two-way communication and are cost effective.

‘**Interactive’ media**

Science exhibitions, science fairs, demonstrations, seminars, workshops, lectures, scientific tours, conferences and, more recently, digital software, have the advantage of being interactive forms of science communication. Perhaps the most impressive example is the Vigyan Jatha. During this massive event, science communicators march in groups from village to village, interacting with local people and spreading information about

science relevant to their day-to-day lives. Catalyzed by NCSTC, Vigyan Jatha could be considered the biggest science communication experiment anywhere in the world. Held in 1987 and 1992, themes have included health, water, environment, appropriate technology, superstitions, scientific thinking and literacy. Some 2,500 government agencies and NGOs have been actively involved, and the Jatha have covered nearly 40,000 locations in about 400 districts, touching almost a third of the country's population.

Most recently, information technology has given birth to a comparatively new form of interactive science communication — digital media — which includes the Internet and CD-ROMs. This is proving to be an effective way to illustrate difficult scientific concepts. It has also made science communication more accessible both to handicapped and less educated people. Though the reach of the technology is still a limiting factor, the government is working to extend this and reduce the costs of connectivity.

1.5 THE IMPORTANCE OF SCIENCE COMMUNICATION

India, the seventh largest country in the world, has over one billion inhabitants (almost one sixth of the world's population), who speak more than 1,600 different languages and dialects, the most common being Hindi and, until recently, English. Apart from the problems linked to overpopulation and the shortage of food resources, due to the recent and often disorderly industrial development, the country is now also facing serious problems linked to environmental deterioration, which make incidents of deforestation, desertification and water and atmospheric pollution all the more worrying. In the country's rural areas (the sustenance of two thirds of the population is based on farming), the lack of basic skills, combined with widespread superstitious beliefs, still causes the diffusion of fatal diseases, malnutrition and poverty today.

1.5.1 Present challenges and visions for the future

Although much has been achieved in India, there is still an urgent need to make science communication activities more effective, both in terms of quality and quantity. We have yet to make a dent in wiping out superstitions that have prevailed throughout the ages, particularly in tribal areas where literacy levels are low and superstition is a way of life. Also, the general public is still largely ignorant about common scientific principles, such as the fact that the Earth orbits the Sun.

Mass Media

Science is not succeeding in attracting mass media interest. It rarely appears as a lead story, as editors and reporters do not consider science to be 'news' in the normal sense. On average, science only accounts for around three per cent of coverage by India's mass media. Additionally, readership of popular science magazines has declined — people no longer rely on print material as their only source of information. For this reason, the Indian Science Writers' Association aims to encourage the editors of newspapers and magazines to regularly feature a science column. It also hopes to increase the readership of popular science magazines, for example by making them available through digital media. In addition, publications must cater to India's many languages.

Mass Education

There is no doubt that scientific information is becoming an essential and integral part of people's daily lives. Present and future science communication efforts have great potential in shaping the lives of the people and making their decisions more informative and rational. However, illiteracy and ignorance are major challenges. While literacy levels are increasing scientific literacy is still drastically low. Given India's large population, limited resources and multitude of languages, mass science education faces particularly great challenges. There have been efforts to

popularize science through our regional languages, for example by producing some scientific publications in vernaculars and translating certain television and radio programmes. But without more attention on local languages, much of the population will miss out on science communication efforts.

Training science communicators

Science writing still tends to be dry and boring, making it unsurprising that few science articles interest newspapers and magazines. The number of capable science communicators and voluntary scientific organizations is alarmingly low and hardly sufficient to cater to the country's large and diverse population. Although , four Indian science communicators have won UNESCO's Kalinga Prize for their outstanding contributions to science communication and popularization. The way that scientific information is presented in the media needs to undergo a metamorphosis, with a new generation of the science writers and journalists presenting useful science in an interesting and innovative manner. For example, a science and technology news and features pool could be formed to allow writers and journalists to exchange information on scientific research and developments.

Networking

Most importantly, science communication activities must be conducted and governed in a systematically planned manner, under one umbrella organization, and according to a properly defined national policy. An All India People's Science Network was created in the late 1980s, with 27 constituent voluntary organizations. The NCSTC Network started in 1991 with the objective of taking science popularization activities to all the corners of the country. Presently it has around 100 members, including NGOs and government organizations. NCSTC has also started a countrywide project to compile information on science communication software, hardware, 'human ware' and agencies to facilitate further networking. But the formation of networks of organizations alone is not sufficient. A suitable mechanism must

be evolved to ensure we work together in a more cohesive manner. In fact, moves have already been made towards a national database of science editors, writers, journalists, columnists, translators, 'scientoonists', illustrators, media-persons, producers, and media organizations interested in science coverage.

1.6 SUMMING UP

This unit discusses about the emergence and evolution of Science Communication in India. A good and clear concept about science communication is necessary for inculcating scientific temperament among the common people as a journalist or communicator. In this unit you have been introduced to the concept of science communication. The definition of the concept as a whole is discussed in detail in the unit. The concept and the importance of this type of communication for the masses is also discussed here which will help you to understand the use and benefit of science communication in media specially in the Indian context.

1.7 QUESTIONS

1. What do you understand by science communication?
2. What is the importance of science communication? Explain citing examples.
3. What is the role of media towards the concept of 'science communication'? Explain in your own words.

1.8 REFERENCES AND RECOMMENDED READINGS

Wilson, A. (1997) , Handbook of Science Communication, Overseas Press.

Grave, M.L. (2009) Introducing Science Communication : A Practical Guide, Palgrave Macmillan.

UNIT 2 : REPORTING FOR SCIENCE COMMUNICATION

UNIT STRUCTRURE

2.1 INTRODUCTION

This unit on reporting for science communication emphasizes on developing your skills in reporting for science communication. In your previous semester , you have learned the different aspects of writing news from a general perspective. This unit under the course of science communication will give you an understanding of how to write a scientific writing as well as science news stories. From this unit, you will learn the principles of scientific writing.

2.2 OBJECTIVES

A thorough reading of this unit shall enable you –

- To explain how to write science news and what are the structure of a science news story
- To describe the principles of scientific writing

2.3 WRITING SCIENCE NEWS

Science and technology is increasingly shaping and revolutionizing our everyday lives. Nowadays, we just cannot possibly think of our lives without the contributions of science and technology. So in that case the common public need to know what scientists are doing and their inventions and other technological advancements. Science news is difficult to comprehend for common people. Most people think that the difficulties of science arise out of necessity and out of the extreme complexity of scientific concepts, data and analysis. Complexity of thought need not lead to impenetrability of expression. As a result, science writing as a different genre has evolved. Science news writing is a skill that every science communicator or journalist is required to develop and hone it with experience.

There are certain techniques or parameters upon which news writing is based. And every news organization follows these basic techniques despite the fact they may all have individual styles of news presentation. The very first step towards learning this technique is to learn the structure of a science news story or news report. Explaining scientific advances to the general public is a worthwhile even a noble endeavour. If you have a substantial background in the subjects you are writing about you will have a real advantage over most journalists, who typically are trained in journalism rather than science. But the purpose of this chapter is not to prepare you for a career in newspaper or magazine publishing. Rather this chapter is included because writing about a specialised topic for a general audience can sharpen both your thinking skills and your writing skills: writing, thinking, and speaking are all interconnected. Assimilating a piece of research published in the primary scientific literature and reorganizing that information to produce a successful piece of science journalism is an excellent exercise in summarizing information, simplifying complex material, and de-jargonizing your writing. Most important, writing for a general audience of intelligent non-scientists is a wonderful way to tell if you really understand something,

and to show your instructor how much you have learned from what you have read.

The science journalist is essentially a teacher. But as you may have discovered already, trying to teach something to someone else is one of the best ways of teaching it to yourself. It can also be fun—fun for you to write and fun for your audience to read.

2.4 STRUCTURE OF A SCIENCE NEWS STORY

In the most basic sense, a science news report has the following elements:

Headline: You all must have been familiar with the term 'headline'. It is that part of a news story which first catches the eye of the reader. It is the title of the news story and it is the most visible element. It is always written in a font few sizes bigger than the rest of the news story. The headline identifies the reader's area of interest and introduces and summarizes the story. It is usually after reading the headline that the reader decides whether or not to read the rest of the story.

Sometimes headlines try to create curiosity through interesting use of language and prompt the reader to read the full story. There are different types of headlines based on nature and significance of the story. As you know science is not much interesting for the readers. So, to attract a reader to read a science news story the headline should be attractive.

Here are a few basic rules for writing good headlines:

1. Build the headline around a strong verb

2. Avoid articles and helping verbs like a, an, the, is , are, were etc.

3. Never use the feel of the past. Use present tense and future tense. Use active voice. It helps cut out extra words and also helps give the feel of the present.

4. Do not over abbreviate. Although headlines permit limited space, do not , in any case, use arbitrary or rare abbreviations.

5. Mention the subject in the headline wherever it is known. If the name is known, then use the name, otherwise use another title that identifies the subject.

6. When certain parts of direct speech are significant enough to be used in the headline, then is put in quotes. Unlike the use of double quotes in the main body of the news story, in the headline, only single quotes are used.

7. The 'period' or 'full stop' is **not** used at the end of the headline.

8. The headline should always try to summarize the story and highlight the most important/striking element in it.

9. While attempting to write attractive/smart headlines, clarity of information should not be compromised.

Byline/ Creditline: The byline on a newspaper or magazine article gives the name, and often the position, of the writer of the article.You must have seen in the newspapers that below the headline, on the left hand side, a name of a person is written and some time the source is also written. This is called the byline or the credit line and it identifies the source of the story.If the person's name is written, then it is called the byline. If there is no mention of the person's name, but simply that it is from a staff reporter,then it is called the credit line. It could also be 'by our correspondent' or 'our bureau' or 'by our special correspondent' etc as applicable.

Dateline: Below the credit line or byline, just before the actual news story begins, you would have seen the date of the story along with the name of a place. This is the dateline. The date mentioned is the date on which the event has taken place and on which the reporter has filed the story and the place mentioned is the place from where the reporter has filed the story.

Lead or Intro: Just where the dateline ends, starts the main part of the report. The first paragraph of the news story is called the lead. It is usually written in bold or in a font larger than that used in the rest part of the story. Usually the lead should possibly be containing all the elements- the five Ws and an H. However, in some cases when it is impossible to club all the elements in the lead then the rest of the elements should be carried in the next paragraph. But the reporter must try to include as many elements as possible in the first paragraph itself. If the incident is big in terms of effect and importance then it becomes difficult to incorporate all the elements in the lead itself, as it may end up cluttering of the lead. In such a situation, the body should deal with the rest of the elements, mostly the 'why' and 'how' elements. However, when it comes to detailing the event in the body of the news story then the inverted pyramid style is followed invariably, where the more important points are told in the beginning, followed by the lesser important details. Therefore, in a way, the lead summarizes the story in three to four sentences. Ideally, the lead should not contain more than 30 to 40 words, within which the summary of the event should be given. And within those 30 to 40 words the lead should attempt to contain all the five Ws and an H as much as possible. Otherwise normally the 'how' element is carried forward to the following paragraphs in the body as it deals with detailing of the story.

Body: It gives the elaborate details of the event including all the 5W's and H and the related explanations of the event. The body is the part where the actual story is narrated. The body describes what the story is all about. Usually the lead provides just the gist of the actual event, the body gives a description in order of importance of information and finally the story is drawn to an end with a concluding paragraph, probably threading the important parts of the story or giving a general conclusion.

As stated earlier, the body is the middle part of a story and it deals with the detailing of events. After having summarized the story in the lead, still many relevant points are left to be elaborated regarding the story which the readers might be interested to know. And this is done in the body part. Similar to the

lead, the body is designed using the inverted pyramid style. That is, playing down the facts in chronological order of importance and relevance. The most necessary aspects are highlighted in the beginning of the body followed by the lesser essential facts, in a descending order. However, since the body deals with the description of the event, most of the readers get wary of reading the whole detail and skip to other news item, having skimmed through the lead. But a clever writer would know how to retain the interest of the readers until the last line of the story. For that the writing should be interesting and beautifully treated so that the readers find it hard to leave it half way through. Also the reporter should always attempt to say more with fewer words due to space restriction in newspapers.

Of all these **elements**, the most powerful element is **the lead**. Because it is the **lead or intro** that leads one individual into the news story.

Generally, the standard technique is followed while writing news is, news is to be classified in the form of straight and interpretative reporting then, it can be said that the first four Ws- Who, What, When and Where reflect the hard facts of the story (straight news or the hard news) and while answering the- Why and How -an element of interpretation is introduced. In this context it is important to mention that contrary to the "hard news" the concept of "soft news" pertains more to the background information and it attempts to capture not only the event but also the process that goes behind the happening of an event.

2.4 SCIENTIFIC WRITING

Scientific writing is a technical form of writing that is designed to communicate scientific information to other scientists. Depending on the specific scientific genre a journal article, a scientific poster, or a research proposal, for example some aspects of the writing may change, such as its purpose, audience, or organization. Many aspects of scientific writing, however, vary little across these writing genres. The basic purpose of

scientific writing is not the mere presentation of information and thought, but rather its actual communication. It does not matter how pleased an author might be to convert all the right data into sentences and paragraphs ; it matters only whether a large majority of the reading audience accurately perceive what the author had in mind .There are several different kinds of writing that fall under the umbrella of scientific writing.

• Peer – reviewed journal articles (presenting primary research)

• Grant proposals (You can't do science without funding)

• Literature review articles (summarizing and synthesizing research that has already been carried out)

• Popular Science articles (communicating scientific discoveries to a non – scientific audience).The main purpose of scientific writing is to present data or ideas with a level of detail that allows a reader to evaluate the validity of the results and conclusions based only on the facts.

Some Do's and Don'ts in Scientific Writing :

1) Precision – You need to be precise in scientific writing. There is no scope for ambiguities as it creates confusion in the minds of the reader.

2) Clarity –You need to present your writing clearly .Language should be easy to follow.

3) Objectivity –Subjectivity needs to be avoided. Any claims that you want to make should be based on facts, not by intuition or emotion.

These following points need to be kept in mind while writing a science write up:

1) **Word choice** : Often several words may convey similar meaning, but usually only one word is most appropriate and that needs to be put in the given situation. For example : "Population density is positively related to SARS transmission rate." So you can see that in some contexts, "correlated"

and “related” have similar meanings. But in scientific writing correlated conveys a precise meaning because it states the statistical relationship between the two variables. So, simply pointing out that two variables are related is not enough. Our readers want to know about more precise relationship between the two. Therefore, it is important to choose the appropriate word.

2) **Phrasing choice** : The above mentioned idea is applicable here also in case of choosing the right phrase. For example, the phrase “writing of an investigative nature” could also be used in sciences. Also it might refer to a police investigation. So in that case a more specific phraseology needs to be used by avoiding ambiguous phraseology. Here it is noticed that repetition is to some extent preferable.

3) **Figurative Language**: Figurative language must be avoided because it is imprecise. For example “experimental subjects were assaulted with a wall of sound” does not convey the precise meaning of “ experimental subjects were presented with 20 second pulses of nonspecific mating cells”. Exclude similes and metaphors in scientific writing. You just cannot leave anything to imagination.

4) **Level of detail:** You should avoid irrelevant information but do include as much information as required. Whatever information you want to put must be followed by your reader easily without being distracted by irrelevant facts and descriptions.

5) **Quantify:** Whenever possible, use quantitative rather than qualitative descriptions. For instance, a phrase like “development rate in the 30C temperature treatment was ten percent faster than development rate in the 20C temperature treatment “ is more precise than the phrase “development rate was fastest in the higher temperature treatment . “

6) **Language use**: Complex ideas and concepts must be conveyed in a lucid manner. You need to distill complicated ideas into simple explanations. Use familiar terms rather than technical or obscure terms

There are some situations where the use of a technical or obscure term is justified. For example , in a paper comparing two different viral strains , the author might use the word "enveloped " rather than the phrase "surrounded by a membrane ".

7) **Sentence Structure:** Science writing must always be precise. It should be written in simple sentences rather than complex sentences. Precision requires a fine level of detail. Careful description of objects, forces, organisms, methodology etc can easily lead to framing of complex sentences without pause which may cause difficulty for learners. So usually simple sentence is preferred. *For example :The osmoregulatory organ , which is located at the base of the third dorsal spine on the outer margin of the terminal papillae and functions by expelling excess sodium ions , activates only under hypertonic conditions* . This sentence is too long and complex .Learner has to wait a long-time to get the main idea. So instead of that sentence a more simple sentence can be used which reads: "Located on the outer margin of the terminal papillae at the base of the third dorsal spine , the osmoregulatory organ expels excess sodium ions under hypertonic conditions." So you can see that a simpler sentence is easy to comprehend. Hence sentence structure needs adequate care in scientific writing .

8) **Verbosity:** Avoid verbosity and use concise writing .Most of the scientific writing is space limited. Grant proposals, journal articles, and abstracts all have word limits .So you need to concisely write your scientific writing. Common phrases like *"the fact that,*" and *"it is interesting that "* are cumbersome and unnecessary in scientific writing.

9) **Use of Passive Voice**: Generally in science write up passive voice is used to enhance objectivity. But this again depends upon the reviewer who would instruct you whether to use passive voice or active voice.

2.5 PRINCIPLES OF SCIENTIFIC WRITING

There are *three* fundamental aspects to good science writing – *planning the structure* , *thinking about your reader* , and *choosing your words*. Always remember the following points when you write a science write up.

- Padding: words that are used to make a piece of writing longer but they donot contain any interesting information.
- Be concise. Clear thinking and careful planning lead to economy of expression and avoidance of repetition and padding.
- Use simple words. Good style doesn't require you to be pompous or flamboyant.
- Write short sentences. Avoid long sentences as it becomes difficult for the reader to comprehend.
- Take care of your grammar.
- Beware of fashion. Words and phrases can become fashionable and over used, and their meaning often becomes uncertain.
- Use your own words as far as possible so to make it more understandable to readers.
- Use words correctly. Always write with a good dictionary at hand (eg. Oxford Advanced Learner's Dictionary).
- Use words that your reader will understand. Always remember the knowledge of technical expressions (jargon) is often limited to a comparatively small group of people
- Spell correctly. Use a good dictionary.

Characteristics of good scientific writing

- **Clear** - it avoids unnecessary detail;
- **Simple** - it uses direct language, avoiding vague or complicated sentences. Technical terms and jargon are used only when they are necessary for accuracy;

- **Impartial** - it avoids making assumptions (Everyone knows that ...) and unproven statements (It can never be proved that ...). It presents how and where data were collected and supports its conclusions with evidence;
- **Structured logically** - ideas and processes are expressed in a logical order. The text is divided into sections with clear headings;
- **Accurate** - it avoids vague and ambiguous language such as about, approximately, almost;
- **Objective** - statements and ideas are supported by appropriate evidence that demonstrates how conclusions have been drawn as well as acknowledging the work of others.

2.6 SUMMING UP

This unit offers a few useful hints about science writing. Science being increasingly associated with our life science news and different kinds of science writings have assumed a new importance. The unit elaborately deals with the structure of a science news story which includes such basic elements as headline, byline/ credit line, lead or intro, dateline, Body etc.

Another important point referred to in this unit is the inverted Pyramid Style.You have also been familiarized with the general principles of News writing, some knowledge of which is highly essential for writing a science news item. The unit finally highlights some do's and don'ts in science writing besides certain points regarding science writings. There are various ways of presenting science communication and a detailed account of the methods of writing science news and reports is given in this unit. Writing of science news and writing of features and articles have been discussed here to offer a comprehensive description of the essentials about science reporting.

2.7 QUESTIONS

1. Describe the structure of science news story.
2. What are the basic points to remember in science writing?
3. What are the different kinds of science writing?

2.8 REFERENCES AND RECOMMENDED READINGS

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UNIT 3 : WRITING FOR SCIENCE COMMUNICATION

UNIT STRUCTURE

3.1 INTRODUCTION

These days Science Communication is an emerging discipline in the field of both Sciences and Social Sciences. It is essential to understand the need of science communication in everybody's life. As we are aware that India consists of multi-lingual population with varied socio-cultural norms and codes; age-old indigenous traditions, beliefs and practices; even and uneven geographical terrains; ethnic communities and customs. In most of the cases, the understanding of scientific logic and reasoning overshadows in front of age-old cultural belief system. The knowledge of science is considered to be different from indigenous practices and values. Generally, it is understood that science has something to do with laboratories and experiments.

Meanwhile, there has been a constant drive by the Government and Non-Governmental Organizations (NGOs) to disseminate awareness towards science communication. For instance, events like Science exhibitions, fairs and festivals are a few common initiatives by the Government of India to popularize science primarily among young school-going children both in rural and urban settings. However, contributions of Indian scientists towards development of science are not neither old nor new. India made its presence in the field of science on 28th February 1928, when a physics genius discovered 'Raman Effect' for which he was awarded Nobel Prize in 1930 for the remarkable discovery. And to mark the greatest discovery of the Raman Effect by Sir Chandrasekhara Venkata Raman, 28th February is celebrated as National Science Day.

Reading science as a subject and writing science for all are not the same thing. When we read science as a subject the specific objective is to learn science. Whereas the specific objective in writing science for all is to disseminate the idea of science and technology. So, in both the approaches the execution component is very crucial. Especially writing for science

communication requires a set of do's and don'ts for effective results. Science communication plays a crucial factor in making science for all.

3.2 OBJECTIVES

The objectives of the Unit 3 are to make the students aware of the fundamentals of science writing. After reading this unit you will be able-

- To explain the importance of developing interest in science writing.
- To describe the skills required for writing science for common people.

3.3 UNDERSTANDING SCIENCE COMMUNICATION

3.3.1 Communication process

When we say communication for science it is understood that we have to communicate science. We can find out THREE W'S and 1 H- What? Whom? Why? And How? For example, what is to communicate about science? to whom we want to communicate science? Why should we communicate science? How can we communicate science among masses? The very idea of looking into these questions gives us a fair understanding of ways of communicating science with both science and non-science audience. In communication studies, we generally consider the important elements in the process of communication- Sender, Message, Channel, Receiver, Noise, Feedback. Similarly, in science communication we can explain the same elements to understand the process of communication. So, let us break the elements as follows:

Sender: Is the one who thinks and choose to send an information/idea etc. to an individual/group/masses.

Message: It is the information or the idea to be sent to an individual/group/masses

Channel: The medium through which the message will be sent to an individual/group/masses

Receiver: Is the person/persons who receives the message

Noise: It can be any barrier or hindrance in sending and receiving the message through a channel

Feedback: It is the response/reaction of the receiver/s

In case of Science Communication, all the elements play a vital role as each element will determine the effectiveness of the process of communication. Let us understand it here with an example: Suppose **Sender** here is the Government of India who wants to send a **message** on *Swaach Bharat Mission* through newspaper advertisements (**Channel/Medium)** to illiterate section of India (Intended Receivers) only. This means **Sender** choose to send a **message** through a **channel** for a selected group of **receivers** only. Unfortunately, in this situation**,** message on *Swaach Bharat* **Mission** has been decided for only illiterate population through newspaper advertisement. So, could you identify the loopholes in the process of communication here? There is a problem in the selection of the channel and receivers. As illiterate masses can't read newspapers so the message on *Swaach Bharat* Mission won't be delivered to the intended receivers/audience. And we call it to be noise (anything that act as barrier in the process of sending and receiving message). In this situation, inappropriate channel for a selected group of receivers have led it to be an ineffective communication. Therefore, success of a communication process depends on each element. Similarly, in case of science communication, one must follow the same principle. It is to be remembered always to do a research first to identify each element in the process of communication. As it helps in designing the content for a specific purpose for an intended audience.

Sometimes, the message fails to reach to the receivers or received messages are decoded differently by the receivers based upon the context, content and communication and even there are unidentified noise in the process of communication. Hence, feedback helps in identifying the effectiveness of each element.

SELF ASSESSMENT

Suppose there is a need to create awareness on **Myths and Taboos linked with Menstruation.** Identify who can be the sender, what could be the message, which channel/medium to use for the awareness, who will be the receivers, what could be the possible noise in the process of communication? Give justifications to your answer._____

_____

3.3.2 Communication for science

After understanding the process of communication, let us understand the communication for science. As the name suggest, communication for science is very specific and it has a specific purpose. The idea behind science communication is to impart scientific knowledge and temperament among masses through various means of communication. It allows to develop scientific reasoning and understanding. In India, there has been a historic practice of using traditional knowledge more than scientific knowledge. Many a times, there has been battle

However, it also follows the process of communication as mentioned in previous sub-content.

3.3.3 Science education, Mission Science

Scientific knowledge and technological information must be made accessible to the science communicators for dissemination to the people of India. Science Communication can instil communication skills in order to overcome lack of scientific awareness among masses. To have discussion and interaction on various issues and aspects concerning science and technology communication.

Writing and reporting science for non-science audience needs to be different from writing and reporting science for scientists.

3.4 WRITING FOR SCIENCE COMMUNICATION

3.4.1 Qualities for a Science Writer

A science writer should have knowledge about all the latest developments in the field of science and technology. He/She should be well-versed with the issues, good command over language, must understand the audience, able to write in simple an effective manner, knows the subject properly, good communication skills, good presence of mind, cares for society and most importantly is to be creative.

3.4.2 Do's and Don'ts while writing Science related stories

In science reporting and writing, one must be careful of certain do's and don'ts. The list given is not exhaustive but still it explains what is to be followed and what is to be avoided.

Do's while writing Science related issues

1. Keep it simple
2. Must cover all the aspects of the issue. The outcome/result/impact is very important.
3. Always present the information clearly.
4. Cross-verify the information beforehand.
5. The idea should be to inform people about something new.
6. Always have an intended audience.
7. Science writers must understand the society and culture to deliver better coverage of stories.
8. One must be well-informed and well-read.
9. One must be creative.
10. To make people aware of everyday science and build scientific temperament.

Don'ts

1. Avoid factual mistakes.

2. Don’t use too many technical jargons.
3. The write up should not be full of graphs/facts only.
4. It should not be too lengthy.
5. Avoid repetition.
6. Not to hurt anyone’s cultural practices or beliefs
7. It should not be biased

So, you must have understood the points stated above. The thumb rule of science writing is to present it logically. There should be overlapping of the information. The content needs to properly balanced that have both side of the views and should not be partial in nature. The language for the write up depends on the audience, it can be in English, Hindi or any regional language but the writing should be simple and clear. But one should keep one important thing in mind is not to hurt any community or individual’s cultural identity. The science writing should be understood by the readers and it should not have many technical jargons.

SELF ASSESSMENT

1. What are the basic qualities of a science writer?

   _____

2. Explain the do’s and don’ts while writing science stories?

   _____

3. What is the idea behind science communication?

   _____

3.4.3 Writing is an art

As we all know writing is an art. It needs experience and creativity to write effectively. It
also involves imagination, creativity in writing science communication. The simpler and clear the language helps readers to understand better. Writing

science doesn't mean only text, one can use graphics and diagrams to explain the same point. It is sometimes very difficult to write about diseases or introduction to new medicinal discovery. But the science writers should be able to make a connect between a common man and the latest discovery in a very simple manner. For example: Recent coronavirus issue in China. A common man needs to be made aware of the basic characteristics of the disease and the precaution some must take to avoid the spread of the disease or control the disease.

3.5 LANGUAGE FOR SCIENCE COMMUNICATION

3.5.1 Basic language

The language is the one of the basic needs in any form of communication be it sign language or textual scripts. In case of science communication also, the language for communication should be very simple, free of technical jargons and direct. Depending on the intended audience, one should decide which language to be used and why. For example: Suppose you are assigned to do a campaign on health and sanitation in a tribal area of Assam. So, you need to decide what will be your message and in which language you will disseminate the message. However, it is not necessary that you must be expert in that language, but you may facilitate the message in the local dialect of the selected community. At the same time, it is necessary to take into consideration the diverse age-groups, gender, religious affiliations, socio-cultural norms and behavior of the community. The content and flow of information for a school going kid will be certainly different in compared to an adult. It is also essential to note that while disseminating knowledge on health and sanitation, the idea is not to tell what they are doing is wrong or right but to generate scientific understanding in adopting certain behaviors for a disease-free life. It is also needed to understand that there will be resistance in accepting the new idea but there lies the effective use of language in making people understand the purpose. Hence, the objective is to transfer the message/information in most simple and direct manner.

3.6 COVERAGE OF SCIENCE AND TECHNOLOGY EVENTS

These days coverage of science and technology events are an important area to inform, educate and entertain people about latest gadgets model, new technology, medicinal achievements, climate, environment and space exploration etc. The logic is to keep people informed about the latest contribution by different scientists and scientific bodies around the world in the field of medicines, technology and life on space etc. Be it electronic media like radio or Television, print media; newspapers or magazines or new age media, there is a constant focus on coverage of science and technology. The special programmes are conducted by the expert on the areas only.

3.6.1 Science Journalism

Science journalism is not a new concept. Reporting of science should be done by experienced ones who is either from science field, a practitioner or an expert. As it will be help in giving a balanced and fair reporting on the issue. Taking into consideration the societal economic, cultural aspects the reporting should be done very carefully. One should not hurt the sentiments of any community or culture while reporting an issue.

3.6.2 Do's and Don'ts for Science Reporting

Let us first understand the Do's for science reporting:

1. There is a need for proper research on the subject.
2. The reporting should be objective.
3. While reporting science stories it is required to always consult a science expert or practitioner.
4. It should be balanced and unbiased.
5. The reporting must state on the benefits of the science for humankind.
6. The language for reporting should be simple and straight.
7. The language for reporting depends on the audience so it is important to take audience into consideration.

8. Cross-verify the information always.
9. Science should be made understandable to listeners/readers/viewers etc.
10. There is a need for regular training/workshops for reporters.
11. One must follow the ethics in science reporting.

In science reporting, the idea is not to only talk about the latest discovery or invention but to make people understand the relation of that discovery with the society. Many a times there is a gap in understanding the scientific logic and traditional understanding. So to avoid the science reporters must do proper research of the subject and take out the element which is required for reporting.

Similarly, let us have a look into Don'ts for science reporting:

1. Never misled the audience.
2. Avoid factually incorrect information.
3. Don't put too many information in one report.
4. Don't make it a scientific report or research paper.

3.7 CREATING A SCIENTIFIC ATTITUDE AMONG MASSESS

3.7.1 Scientific Temper

Scientific temperament is necessary to achieve the goals for development. Being a responsible citizen of a country one must develop scientific thinking or reasoning ability. Whether it is health, environment, society, culture, medicine or technology they all contribute in developing a mature society. Science communication is a platform to make masses aware of the scientific development and to implement it in a scientific manner. After Independence, late Pandit Jawaharlal Lal Nehru encouraged people to have scientific temperament for the benefit of the society. Today, Government is

emphasizing on scientific temper and various schemes and projects have been introduced to make our environment sustainable and good health life.

3.7.2 Superstitious beliefs and practices

Superstitious beliefs need to be logically explained so that the people practicing them can understand and think rationally. To have a developed society, one must come out evil practices that not only stops development of a society but also the entire human race. For example: witch hunting in Assam is an ill-practice that needs to be stopped.

3.8 SUMMING UP

Let us sum up the entire content here. It is clear now that science communication is important as an academic disciple that can help in reaching to the intended audience. To practice science communication, one must be understand the communication process, do's and don'ts in scientific reporting, skills of a science writer, language used for science communication and promote scientific temper and science writing.

3.9 QUESTIONS

1. Do a survey in your colony or residential area to find out the types of superstitious beliefs practiced or followed by the masses. And write a report on it.
2. Find out any science innovators/inventors in nearby school/colleges. Write a report on his/her achievement emphasizing the innovation and its benefits to the society.

3.10 REFERENCES AND RECOMMENDED READINGS

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MODULE II: MEDIA AND SCIENCE COMMUNICATION

UNIT 5 : MEDIA FOR SCIENCE COMMUNICATION

UNIT STRUCTURE

5.1 INTRODUCTION

"Communication is not only a system of information, but also an integral part of education and development" - McBride Commission Report (1978). Nations and societies across the world have set up many prominent institutions of education which have been developing a huge repository of knowledge through their research activities in all the fields like agriculture, medicine, technology, humanities and arts and pure and social sciences. Some of these knowledge contents are of high caliber like Higgs Boson, large Hedron collider, Mars mission or Mangalyan etc. These contents may not be directly beneficial or linked to the common people. On the other hand, some of these research findings such as medicine or vaccine for various common and major diseases, earthquake-resisting house-building style, fuel efficiency in motor vehicles etc. are of direct benefit to the masses. All these

knowledge contents need to be disseminated to the people for a better usage so that people can utilize them to improvise their living standard. Thus, the role of communication is so very important in communicating these contents to the people. In our efforts to communicate these to the masses, the need of media assumes vital importance. This is because, unless the right kind of media is used, these efforts would not be able to return the desired optimum level of benefits and the proper purpose would not be effectively served. Hence, choosing the potential media and a judicious media planning are of high significance for the success of any communication effort, not more so for science communication.

5.2 OBJECTIVES

This course is planned and prepared for facilitating the learners to acquire a comprehensive idea about the use of various kinds of media for facilitating the reach of science communication messages to the masses in an effective and meaningful manner. Hence, once the study of this course is successfully completed, you shall be able -

- To explain the potential of all kinds of media for spreading science communication
- To compare different characteristics of the media in consideration
- To describe the concept of media planning for an optimum or maximum coverage of the targeted audience

5.3 BRIEF ABOUT COMMUNICATION AND SCIENCE COMMUNICATION

Communication is the science and art of sharing information in different areas and under various circumstances. This is one of the major driving forces which acts as a connecting line for all human beings and societies

across the world. Because of its importance it is even termed as the 'fourth basic human need' nowadays (Bora, 2013).

A journalist or media person being highly capable in one's own area is a welcome effort. But, the same person also needs to develop or enhance his or her capability for studying complex phenomena of the scientific world and then decipher the same in a way that a usual reader or viewer of TV can understand without much difficulty.

In this field the communicator has to be clear of the following aspects ---

- Status of the Target Audience of the write up or programme that one is going to write or broadcast,
- What and how is it to be written, edited and then printed in newspaper or magazine or broadcast through TV or radio,
- Is the source authentic because many a times someone may try to cheat by making tall claims about inventing or innovating something which may turn out to be a hoax later on,
- What kind of simple language the communicator would use for disseminating the information to the people,
- How to create as well as sustain an avid interest of the readers or target audience in the written piece or programme,

Science Communication :

"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. In order 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 scientific methods to the public outside the formal classroom setting and

promote public understanding of the history of science," United Nations Educational, Scientific and Cultural Organization (Science Policy and capacity Building, UNESCO website).

It is to be mentioned here that a journalist of earlier years - Peter Ritchie Calder (1906-1982) was the pioneer in the field of science journalism in the very initial periods when it was not yet a recognized, let alone established area of mass communication. Developing a deep interest in this field this person went on to dedicate his life for this new area of journalism and wrote 30 books in all in addition to many pieces of science communication news and articles. He was also honoured by UNSECO with the Kalinga Award for outstanding contributions of individuals in communicating science to society and promoting the popularization of science.

In this regard there is an anecdote about the Nobel laureate in Physics Lord Ernst Rutherford who declared that unless a scientist is successful in making his manual helper understand what the former had been pursuing in one's laboratory there is practically no meaning to such findings at all.

Hence, this should always be kept in mind by the scientific community so that the findings and results are people-oriented and have to deliver at least some positive benefits directly or indirectly to the common man at the grassroots level

It is said that a somewhat similar effort like science communication was practiced by Galileo who in his book 'Dialogues' (1632) tried to take his findings to the people. In the later periods, prominent scientists from the developed nations and also from our country such as - Michael Faraday, Thomas Henry Huxley, Sir Jagadish Chandra Bose, CV Raman among others tried to popularize science with a public orientation. Further, late Prof. Jayant Vishnu Narlikar was a prominent personality in this field who catered to the need of bridging the gap between scientists and the common man.

Professional communicators : It is a fact that researchers and scientists engaged in these kind of studies usually are not expected to be proficient in speaking and writing in a language that the general people would understand. This is because they are much more familiar and proficient with the language that their fellow scientists and researchers would understand.

Here emerges the role of the 'professional communicators', These are the people who would be highly proficient in understanding the basic concepts of those findings in the laboratories. And they would be able to translate the same into a simple language that any literate person can understand if published in the print media. Or which can be understood by any person even without the benefit of a formal education if broadcast on TV or radio or disseminated in the form of a documentary or a film.

5.4 MEDIA FOR SCIENCE COMMUNICATION

From your studies of this programme in other courses in the previous semesters, by now you have a fair idea of the concepts of communication, mass communication and media and mass media. However, to refresh your understanding, let us say again here that in simple terms 'media is the carrier of any message to the receivers, intended or otherwise'. It signifies that it is a means of carrying your messages (any kind of messages) to the person or audience you intend it to be aimed at. You may recall the saying that 'communication' is so important in our life that it has been accorded the status of 'the fourth basic human need' following food, shelter and clothes. Media also reflects an equally-important, if not less significance for the life of humankind. So because without it, the messages shall not be able to reach the people and in the process the entire activity shall become redundant.

Like the different kinds of communication, media also can be of various types. These include – traditional and folk media, conventional mass media (print, electronic – Radio / TV / Films) and the latest development is the new media based on the internet platform. All these media are unique in their own

rights and possess characteristics which call for treating or utilizing them in their own ways rather than employing the same method or yardstick for all of them together. As humankind needs to use various media for different purposes for reaching out to segments of the mass people, for science communication, there also is a need for applying separate media entities for sending our messages to the target audience in a planned manner.

So all the possible and potential media for the future are important for furthering the cause of science communication at different levels depending upon the situation and the mandate for doing so.

5.4.1 Conventional Media

This is rather a new development that mass media are being more and more termed as 'conventional' media following the advent of the digital media which has made a major stride in the recent times. Broadly this includes print – newspapers, magazines, books, booklets, manuals etc. and electronic – radio / TV / Cinema.

With the invention of the printing press in the 15th century the era of mass media had begun and later, addition of radio and TV further added to its importance over the centuries to have arrived at today's situation.

Till the coming of the digital and new media and even after that, mass media are used widely for spreading messages of science communication in different nations with optimum success.

Because mass media possesses the unique advantage of reaching the remotest areas across the world with a lot of ease than any other media. It has no parallel as a carrier of bulk messages in an influential and effective manner. However, preparation or designing of the messages in the proper way has to be ensured by all counts. This is a pre-requisite for all media not necessarily mass media. That way, it can be expected that the messages shall be able to influence the target audience adequately and convert them to 'thinking human beings'. And thereby make them active human beings to carry forward the task of science communication in the desired manner.

As media is also one of the most powerful tools for developing and shaping public opinion for any cause in the world, this advantage should be seriously considered for utilization in furthering science communication.
Let us consider a few examples to illustrate the development.

MEDIA IN GENERAL

Ours is a country with several major natural advantages over the decades. That is, today, there are more than one lakh newspapers and journals of different modes in circulation as registered with the Registrar of Newspapers, India. This is supplemented by the facts that we are also being served by about 800 TV channels of various kinds including those dedicated for news and current affairs, entertainment, infotainment etc. Further, the film industry of the country boasts of producing about 700 – 800 films on an average every year.
Hence, this scenario throws open an immense potential for employing this media in general for spreading messages of science communication.

FILMS

Further, films – all of its kind such as – feature films including science fiction, documentary etc. are also a very effective medium for science communication. This medium can be employed for depicting or showing complex or simple developments in any field of life – be it the need of sunshine for our bodies, knowing about various aspects of snake bites which may help a person survive at crucial moments after a bite to issues of whether living beings would be able to survive in Mars or Moon in a highly interesting way. This would help the audience to understand it properly and become educated in that field.

We can cite examples of sci-fi films like Jurassic Park series, 20,000 Leagues Under The Sea (Jules Verne's novel made into film) to those produced in our country also – Padman, Toilet – Ek Prem Katha and even Munnabhai MBBS, Three idiots etc. they are dealing with some simple but important issues in

our life including taboos, a hyiegenic lifestyle, role of human care in medical sciences. These are good examples of trying to educate the masses in those areas of life which need to be faced with some courage and tactfulness to enhance the living standard of our life in the society.

TELEVISION :

In the world of television again, there are quite a few ideal examples to be cited. The popular TV channels like – Nat Geo, Planet Earth are providing good service in this direction. These, and many other such TV channels some which may be general entertainment channels are also carrying out science communication programmes for the benefit of the audiences.

In the late 90s of the last century, Doordarshan India broadcast several episodes of 'Turning Point' that was a milestone in the history of science communication in the country. This was a weekly science magazine programme conceptualized and visualized by the science communicator of enormous repute - late Prof. Yash Pal and late Girish Karnad. It was a highly successful science communication programme ever produced in Indian electronic media till date.

“"Scientific Temperament – Do not Lose it" has been the theme of this TV show series which is one show of its kind in Doordarshan that brought several young minds like me to be interested into science and technology. This programme was divided into several small parts like "Looking Glass", "Breakthrough", and "Tailpeice" each lasting about eight minutes and each elaborated on one major scientific issue of the contemporary period. Topics were selected by their relevance to the betterment of the Indian society and public popularity”, said a reviewer.

Professor Yash Pal was the moderator of the series which contained queries, feedback and the mails he received from the viewers. The topics ranged from reproduction cycle of insects to Dark Matter in the universe, and occasionally on certain scientific developments in rural India.

This magnificent programme was succeeded by the UGC Countrywide Classrooms programme which was also a major achievement in this field.

Another programme titled 'Imagine Science' by film personality Mukesh Bhatt also needs mention for its quality in the late 1990s.

Similarly, the reputed journal Indian Journal of Science Communication in its January-June, 2002 (Volume 1, No. 1) published a review of the programme which stated that this highly-popular science education programme had five segments in each of its episodes such as Mother Earth (environment and astronomy), recent breakthroughs in the field in Milestones, The Body (health and medical science).

However, the reviewer also opines, "Most of the science programmes originating from India however need to concentrate more on visual pattern and evolve a grammar conducive with the demand of understanding and level of the Indian populace. The key lies in continuance of 'Turning Point', 'Imaging Science' and many others on similar lines."

Doordarshan even had telecast a highly popular and successful programme on health communication called 'Kalyani' a few years ago. All the episodes of this programmes would select a specific health issue with two or three experienced medical professionals in those fields in the local TV studio. After an introduction and explanation of various nitty gritty about that particular health problem in the language of that state or region for common man's understanding, questions were received from persons concerned suffering from such problems about solutions and suggestions from the experts. This had allowed a large number of people to be benefit as generally majority of the health issues had a universal appeal. Here again, this writer watched quite a few episodes of this series and found them highly-satisfactory and beneficial for all concerned. It was launched in 2002 in eight states of the country identified as the most backward ones at that point of time.

In DD's own words - Kalyani is a pioneering initiative in health communication in India with several innovations in project design, content creation and community engagement through television broadcast in eight most backward states of India as a weekly programme in an entertaining & innovative format. (See Annexure I)

It can be mentioned here that Doordarshan is continuing with its long-serving Krishi Darshan programme in different formats since last several decades,

RADIO :

During the 60s and 70s decades of the last century the Green revolution was sweeping across the country under the able leadership of Dr MS Swaminathan. Radio being an electronic medium with a very convenient and instant reach to the remotest corners of the country was an instant and major help for facilitating awareness about the schemes of the development. Print media could not be relied upon much as its circulation was much less. Doordarshan was just born and was in not even in its nascent stage to account for any such contribution.

Thus, Radio, though was less in number compared to today's era, yet had a formidable presence considering the times of those days and was the most popular medium for all purposes of publicity. Hence, during those years many of the high-yielding variety (HYV) seeds were known as Radio Rice or Radio Wheat as they were popularized by this medium. So, one can imagine the significance of the media in popularizing something amongst the people.

All India Radio also has dedicated space form agricultural programmes in its regular schedule of programmes. As it is widely known that the AIR network in our country has a coverage of more than 95 % of our land mass, it is a highly popular effective mass medium for spreading such contents amongs the masses.

PRINT :

In the field of Print media, many newspapers, magazines, journals are also publishing considerable number of contents including news, special features, articles on different aspects of science and related developments. Prominent among them include The Hindu which has a dedicated space of two pages every week for development in science and technology also covering health and agriculture which are a great help to people in the need of such information.

For using print media, a person needs to be literate in the general sense of the term – to be able to read the texts in any language. With our country's current record of 75 % literacy, this may prove to be a problem for a considerably-high number of people out of the population of 130 crore. Again, among those who are literate, many may not like to spend money on buying a newspaper or magazine out of lack of interest or maybe financial problems.

Also, while the effect of written words is expected to be high, yet the same for the audio-visual medium would obviously be much higher. This is why many of the communicators involved in this field may prefer to use only the electronic media for then purpose.

5.4.2 SPECIAL / UNCONVENTIONAL MEDIA

Climate Action Special :

It needs to be mentioned here that when we are searching for the right kind of media for spreading messages of science communication, an innovative person would be able to find out and utilize even highly-unconventional media for the purpose. There is a fine example of this aspect.

That is, in the year 2007 the Deptt. of Science and Technology, Government of India launched a highly-innovative programme towards efforts in

popularizing science education in an informal manner. Though this was primarily aimed at children it was also open for anyone else whoever would like to be benefitted by it. It was named as Science Express Climate Action Special (SECAS II). Other agencies involved with this unique scheme included - Ministry of Environment and Forest, Dept. of Biotechnology, Wildlife Institute of India (WII), Dehradun and Vikram Sarabhai Community Science Centre (VSCSC), Ahmedabad.

The official description of the endeavour is, "Science Express is a flagship programme of the Dept. of Science & Technology (DST), Govt. of India in collaboration with several other departments coming together to make it a successful endeavour. It is an innovative mobile science exhibition mounted on a 16 coach AC train, traveling across India since October 2007. Since then, it has made eight tours of the country, traveling about 1,53,000 km and exhibiting at 495 locations. Over its 1712 exhibition days, Science Express received an overwhelming response and 1.64 crore visitors. It has become the largest, the longest running and the most-visited mobile science exhibition. Its Phases - I to IV showcased cutting-edge research in Science and Technology.

The author of this module himself visited one of these trains while it was on a tour of the state of Assam in April, 2017 at Rangapara North railway station in Sonitpur district. The entire arrangements were highly-satisfactory and though it was aimed at children mainly, yet people of any age could visit and learn a lot of things from the posters, prototype machines, do-it-yourself fun activities and thus overall it was an enlightening experience. The train was scheduled to visit 68 railways stations for catering to the adjoining areas in different states of the country with a travel of about 19,000 kilometres in all.

It can be said that this is a novel way by which the communicator is trying to reach out to the people at their doorsteps rather than making them go far for benefitting from the experience. The theme for this occasion was 'climate change' and it was very effectively depicted in easy language and

demonstration was also carried out to impress the young minds with the phrase of "catch them young".

Here, let us try to understand an interesting and important difference even among the science communicators – people who are involved in the activities of communicating various developments of science and technological developments to the masses using so many different kinds of media.

That is, a portion of these communicators may be scientists and technologists themselves who may have the talent of being able to communicate their findings and developments effectively to the people in a language the latter can understand without much problem. But, it can't be expected that each and every one of this category of people would be so good and effective in doing so.

Herein comes the other category of persons or communicators – called as Professional Communicators who have a major responsibility to fulfil in this direction. This category of communicators need not or may not be people with formal educational qualifications in the field of science and technology. But they are qualified in communication practices. And with a good understanding of the basic principles of new developments in these fields, they should be able to communicate in an effective and convenient language adequately understandable for the common people for whom the messages or contents are meant for.

A good understanding and coordinator between these two categories of resource persons is exactly what is needed for success in this direction with future perspective.

5.4.3 COMMUNITY MEDIA :

Community media of which Community radio is an active example is described as - a non-profit organization consisting of members of the community and its programming is based on community access and

participation. It reflects the special interests and needs of its listeners whose first duty it is to serve. It treats its listeners as subjects and participants and not as objects. It is owned by the Community without any commercial interest and are different from the usual commercial 'for-profit' media, public service broadcasters mostly owned by the state. This community may be formed by a geographical congregation or community of special interest in any field.

The UNESCO declares, "Community media, whether broadcast or online, are crucial to ensuring media pluralism and freedom of expression, and are an indicator of a healthy democratic society. As an alternative medium to public and commercial media, as well as social media, they are characterized by their accountability to, and participation of, the communities they serve. They have a greater focus on local issues of concern and facilitate public platforms for debate and discussion."

The major advantage of using community media for science communication is that the needs of the community members can be very precisely pinpointed so that there is no mismatch between the requirements of the audience and the contents provided by the people in running the media.

As the media belongs to the community itself, it would be highly convenient for the community to ask for contents in different formats which would be of utmost necessity for their life.

Here, we can cite the examples of the two major experiments carried out in the country in 1975 which somewhat resemble community media broadcasting. They are, the Kheda Communication Project (KCP) and the Satellite Instructional Television Experiment (SITE).

In the words of a publication in this regard, "The KCP which is a field laboratory that aimed at the development and local communication in Kheda district of Gujarat began in 1975 and continued till 1990. The Development and Education Communication Unit of Indian Space Research Organization (ISRO) managed this project and produced the development and educational

programmes that involved the local audience. This project was tested for the production of research based participatory development programmes receiving worldwide recognition and acceptance.
It was yet another pioneering experiment using television for educational purposes in India."

It is reported that this project contributed a lot in transforming this area into a major centre for milk production in India, as part of the so-called "White Revolution". The project effected a major effort of collaboration among various developmental agencies including those involved in extension working in dairying, agriculture, and health services, and with local banks, cooperatives, and employment exchanges etc. It aimed at bringing about a coordinated all-round effort geared towards development of the 'Community' with active involvement of the community members in the real sense of the term.

It employed contents and formats like folk drama, puppet shows, and other popular local formats for spreading across the messages to the targeted audience.

Another major experiment in this direction was the Satellite Instructional Television Experiment (SITE)- a joint project of the Department of Atomic Energy of the Government of India which entered into an agreement with the National Aeronautics and Space Administration (NASA) of the U.S.A in 1975. It was launched to jointly conduct a TV programme with a view to provide informal education to the rural population of India through an intimate medium of communication. This joint venture of NASA, ISRO and AIR had the objectives of broadcasting instruction programmes in the field of agriculture, family planning, education etc. It was introduced in 2400 villages in 20 districts of Rajasthan, Bihar, Orissa, Madhya Pradesh, Andhra Pradesh and Karnataka.
PEO Study No.119 EVALUATION REPORT ON SATELLITE INSTRUCTIONAL TELEVISION EXPERIMENT (SITE) – 1981}.

Both these highly-successful experiments conducted in the country at the same time have special characteristics to be observed. That is, ISRO, Dept. of Atomic Energy, Doordarshan, AIR have been involved in both these programmes and broadcasting was aimed at the grassroots level communities. Hence, it can be conveniently called as an embodiment of both communication of scientific contents to the masses or the community and also involving the community at the same time.

So, in simple words we can say that community media have been used for communicating scientific developments about enhancing our living standards in all walks of life.

Presently, the Community Radio system which is catching up in the country also throws up ample scope for utilizing this community medium for our purpose – facilitating and advancing science literacy or scientific knowledge to the grassroots levels at ease. This is much more effective because it is in the local or regional language, prepared by the community members who have a deep understanding of the local issues, aspects and developments to come up with adequately-prepared contents for the people.

5.4.4 NEW MEDIA

The advent of 'new media' which is based on the internet platform has brought about enormous potential for dissemination of messages in any field in this world. More so for science communication.

Let us consider the some of the developments in our country itself. India currently boasts of about 1200 (1183) million cell phone connections by May, 2018 which translates into 92 connections per 100 as well as --- 36.3 crore internet users, according to *The Hindu*. This newspaper (Nov. 24, 2018) also informed that the number of 'broadband' subscribers of the country touched a new record of 463.6 million by August, 2019. So, the digital growth is really something to be seriously taken note of.

Out of this huge segment of the population, a majority shall be having 'internet' connection in their mobile phones. So, it is becomes highly convenient for reaching them for the purpose of passing on information about new developments in health care or possible hazard from unscientific use of gadgets including cell phones and what not.

Nowadays, many organizations have developed specialized applications (simply called as Apps.) for many areas of life even including health and medical needs of various segments of people.

The fast and ever-growing importance of new media can be gauged from the fact that in almost all walks of our life in both social or personal ones its usage is becoming a necessity rather than a luxury. That is evident right from its ever-increasing utility from ordering food to booking of tickets, contacting people across the world in an instant through the different types gadgets.

Hence, this medium can also be properly utilized for sending information and contents from the point of scientific developments with a potential for improving the standard of living of our life in many ways.

At this point, we need to reiterate that media is an 'informal university' even for the illiterate and literate people alike. Any issue concerning the society needs to be discussed here threadbare and the best decision should come out of the debates.

Further, media is also an open transparent stage or platform around which the masses are sitting watching and observing every activity. All the news and other contents are subject to the minutest scrutiny and eagerly waiting for directions at times of crisis looming large for the society.

This is Information Age. It is not possible to suppress any information from anyone. This ia indeed a very appreciable initiative and we must welcome it.

Yet, a lot depends on 'how' and for 'which target audience' of the society we are presenting news and information. Are we releasing only selective news items to suit certain sinister interests or neutral ones.

On the other hand there is a blessing in disguise of course in the availability of so many diverse media outlets for us. That is – this availability has rendered it very difficult to cheat or hoodwink people by furnishing wrong or incorrect information or copying things from somewhere else. Even if it published or uploaded, there is every possibility that someone somewhere will get to know about it and raise the issue.

We can take a reference to the 'fake news' syndrome through new media. So, this can also be said that with development of several innovative applications, fact-checking to establish the veracity and truthfulness of the so many information and contents being circulated through this medium can also be checked and found out with just a little effort.

5.5 MEDIA PLANNING

Now we come to the important question of what is media planning and its significance for utilizing the media for science communication. The dictionary meaning of the term is - the process of identifying and selecting media outlets – mainly newspapers, magazines, websites, TV and radio stations, and outdoor placement – in which to place paid advertisements. The person responsible for evaluating the many media options and strategizing campaigns to support a particular product, service, or brand is called a media planner. Media planners typically are employed by advertising agencies.

A media planner's job is to develop a coordinated plan for a particular client's advertising budget. They decide where, when, and how often to feature a specific advertisement. The more the planner can optimize – meaning stretch – a client's budget to reach the largest number of people, the better are the odds of seeing results. The whole purpose of advertising is to

make potential customers aware of a company's products or services and to persuade them to buy them (Business Dictionary).

Media planning is necessary because it has come to be observed that no one particular medium fits all the requirements of every segment of the society. Therefore, al the available media need to be utilized in a wise manner so that maximum number of the target populace can be expected to be covered under the scheme of disseminating contents of science communication. This is a normal practice in the field of Public Relations and Advertising so that maxium possible number of the potential audience can be reached with a correct combination of various kinds of media available at our hands. This process can also be utilized for taking the messages of science communication to the masses with the optimum use of mass and other media. So, even for getting the optimum benefit of coverage of the targeted people we should have a proper 'media planning' in place before embarking on the path to communicate contents of scientific developments to the correct audience in the society.

5.6 SUMMING UP

We have found out that the established media that includes conventional mass media, new media etc. are highly popular, useful and effective for facilitating dissemination of contents and news items of science communication. However, an important point to be noted here is that depending upon the circumstances of the society or a country or region, any instrument or tool can be utilized as media for this purpose. For example, you have seen that a train was used for educating children in the simple and complex issues of scientific developments. Further, comics, science fiction, cartoons or scientoons are also other means of spreading awareness or education of people in this field. Mass media including print (newspapers, magazines, books, posters), electronic media (Radio, TV, films, documentaries etc.) are strong and highly-useful media for science communication which can reach the target audience within the shortest

timespan. This is why they are also called as ‘Magic Multipliers’ for re-producing messages innumerable time in a very short timeframe. On the other hand, community media and new media etc. have their own significance for a country of continental proportions like that of ours. So, it would be ideal if a judicious combination of all these media and any new development in this regard can be arrived at. And to utilize them for bringing out the maximum effect for the society as a whole. Hence, we need to look at all media available to us and utilize them in a proper manner by going for a comprehensive media planning to take the best advantage out of all of them in the near and distant future. We have also discussed concepts like professional communicators and media planning which need to be studied properly while taking up any endeavour for such ventures. This is because in today’s world, there is an overflow of information and other contents through a multitude of media available from all sides. But, to make a proper impact we need to be able to pick up only those media which possess the potential for reaching out to the maximum possible number of people.

5.7 QUESTIONS

1. What do you understand by the term ‘media’ ? Briefly discuss different types of media and their potential for science communication.

2. What is Media Planning ? Discuss its importance for science communication in our country.

3. Prepare a plan for using various media for popularizing ‘childhood nutrition’ for the state of Assam. The plan should identify the target audience, media to be used, frequency of release of messages etc.

5.8 REFERENCES AND RECOMMENDED READINGS

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UNIT 6 : ENVIRONMENTAL COMMUNICATION

UNIT STRUCTURE

6.1 INTRODUCTION

The word 'environment' signifies the overall surrounding amidst which we human beings live day in and day out. But, proper emphasis also needs to be put on the activity of 'communication' as it has assumed a major importance over the years. Specially, in the present-day context of information revolution when we are talking about systems more advanced than fifth generation standards. Communication attains such significance as it is the ultimate means of disseminating information or messages to the people for whom they are to be aimed at for informing and empowering them for future. In this regard, the quote by Ann Devereaux, Deputy Lead for Entry, Descent and Propulsion team of National Aeronautics and Space Administration (NASA) in an interview with *The Hindu* (Oct 27, 2019) is worth mentioning. She said, "The biggest trick is communication". Though she was speaking of telecommunication in terms of space experiments the same is true to the highest extent even in case of communication for each and every walk of life, more so in the field of creating awareness about various environmental issues confronting the society every passing day.

6.2 OBJECTIVES

After a detailed study of this unit the learners shall be able ---

- To develop a comprehensive and clear idea about the concept of Environmental Communication along with all its associated disciplines,
- To explain the major issues in this area across the world
- To describe the role of media in creating awareness among the target audience and convert them to active human beings to crusade for the cause of environmental conservation,
- To write about the role played by various persons as 'agents of change' or 'environmental activists-cum-communicators' across the world

6.3 BRIEF IDEA ABOUT ENVIRONMENTAL COMMUNICATION

"Communication is not only a system of information, but also an integral part of education and development" - McBride Commission Report (1978).

The International Environmental Communication Association (IECA) defines Environmental Communication (EV) as 'communication about environmental affairs.' This includes all of the diverse forms of interpersonal, group, public, organizational, and mediated communication that make up the social debate about environmental issues and problems, and our relationship to the rest of nature. Further, it is both a lay activity and a field of professional practice and an interdisciplinary field of study.

On the other hand, the faculty concerned of University of Wisconsin, Oshkosh (USA) says, "Environmental Communications pertains to any profession which communicates an environmental or scientific message. This message can range from conservation of resources to promotion of products to education about community programs and anywhere in between, and environmental communications professionals are working in every sector of the economy from the largest corporations to the smallest

newspapers. The field is becoming more and more important as the stakes have become greater and greater and the tools for communicating become more diverse. Effective communication of an environmental message can determine the fate of an environmental campaign at any level - local, regional, national or global."

(website http://www.enviroeducation.com/majors-programs/env-comm.html, 2/4/04).

This definition almost sums up the entire activity of Environmental Communication with its various dimensions.

In simple terms, EV means communicating different aspects of environmental concerns and issues to the target audience. Here, the term target audience encompasses all categories and age groups of people right from young children in schools to adults. This is because preservation and conservation of environment is not the responsibility of one single individual or organization or nation. That way it would not be possible to achieve any substantial results also.

Hence, the key point is how to communicate all the crucial aspects of environmental protection and improvisation to the different kinds of people – such as common people, governments at national (countries and nations) and international level (global inter-governmental organizations) etc. That too, with newer and newer emerging challenges and conflicts coming up everyday in the horizon of this discipline.

As you have already studied communication and media earlier, it needs not be pointed out that a single system or kind of communication or media activity shall not be convenient or beneficial for all groups of people in the society. Every target audience needs a different approach because of the differences in characteristics. The researchers Jurin, Roush and Danter (2010) opine that as long as human beings have been interacting with each other and nature, there has been environmental communication. However, a formal beginning of the cause can be traced back to the year 1969 that has been accepted by scholars concerned about the launch of an initiative in this direction.

Speaking about significance of the concept, the Centre for Science and Environment (Delhi) puts it in a convenient manner.

"There is a two-pronged challenge in this regard as on one hand, millions live within a biomass-based subsistence economy at the margins of survival for whom the environment is the only natural asset. But a degraded environment means stress on land, water and forest resources for survival resulting in increasing destitution and poverty. Here, the opportunity to bring about change is enormous. On the other hand, rapid industrialization is throwing up new problems for which the answers will be in reinventing the present growth model and find new ways of building wealth that will not cost us the earth (CSE Website).

Here comes the major challenge of informing and educating the global population in general so that they can be empowered on their way towards becoming active partners in the efforts for saving the planet from further environmental degradation.

6.4 ISSUES IN ENVIRONMENTAL COMMUNICATION

Issues on the environmental degradation front are multiple and newer ones are emerging with every passing day touching almost each and every aspect of our life across the globe.

For example, we have been hearing a lot about the major issues like – global warming, carbon footprints, deforestation, oil sleeks, wild fires and bush fires causing irreparable and long term damage by destroying forests and thereby disturbing the entire ecology of the world etc. many more.

The important issue is that most of these developments are so integrally linked to our life.

For example, in 1962 when the book '*Silent Spring'* by Rachel Carson was published, it created a major hue and cry around the world. There, the writer had correctly established the connection between the unlimited use of pesticides including DDT to the loss of habitat and life for many small species. And because of the close and delicate eco-system that we live in, in

this world, those steps by the pesticide companies and many other such works led to a major imbalance in the environment.

Similarly, the unprecedented pace of industrialization setting in since the coming of the Industrial Revolution, the scale of warming all over the world has grown to a highly- unfavorable level. It is bringing in a lot of associated negative developments like melting of ice in a unacceptable manner as well as adversely affecting flora and fauna everywhere.

Even the excessive usage of chemical fertilizers for farming and increasing production for feeding a huge population like that of ours has been adversely affecting the fertility of the soil where it is being in practice in a far broader way for so many years.

In the later part of the year 2019, the world had to go through the pathetic situation of the burning of the Amazon rain forests in Brazil that caused destruction of so many animals and plant species which are irreplaceable. Similarly, a major forest fire reaped through big areas including human habitats in Australia around the same time where also both people, flora and fauna had to pay a heavy price.

Further, the connection of one event or incident to many others should be noticed like the way it happened in Australia. There, because of the forest fire a big-scale water scarcity for human consumption was forecast. So, to conserve whatever source of water was available against the backdrop of the forest fire, the government of Australia came up with the idea of sculling many thousands of camels only because this animal drank a lot of water that they store in their body for several days.

There are many other examples like that of littering of the passageways and mountain peaks of the Himalayas by climbers and other tourists for which major efforts need to be undertaken from time-to-time for cleaning them.

Many a times, leak of natural oil and hazardous chemicals from huge cargo ships which are drowned or damaged in the sea itself is another major issue of environmental degradation among so many others.

Similarly, every time an Aeroplan flies, its carbon footprint is much more than any other mode of transport. That is why the young crusader Greta Thunberg of Sweden has been asking people to avoid air travel.

In addition to these, air pollution because of ever-growing industrial and similar activities, reducing forest cover on an yearly basis for accommodating housing and other construction works, polluted water bodies are a few of the numerous environmental problems and risks creating a gloomy situation all over the world. Because of defective planning, many of our natural water bodies are being transformed into sewage and waste treatment plants like the Ganges.

There are myriads of such issues confronting the society every passing day. Here the important question is – how to inculcate awareness among the people or masses about all these issues and thereby make them adopt lifestyle habits which would contribute positively towards improving the environmental condition.

And exactly at this point the significance of 'communication efforts' come in handy to effectively inform people about the intended messages for making them empowered and active in this direction.

The Science for Environment Policy, an European Commission newsletter (Issue 17, Oct., 2009 on Environmental Communication) reiterates that both the causes of environmental problems and possibilities for addressing them depend on human perceptions, attitudes and behaviour, which are linked to values, preferences and beliefs about the world and Communication is key for analyzing the relation among all of these aspects. It further declares that the media was a central arena for amplifying environmental issues and can influence the course of policy.

Communication is the key towards inculcating the understanding of environmental issues of degradation to the people in general and realization on their part for waking up to the call of the times for actively doing everyone's bit for conservation of the environment.

6.5 MEDIA'S ROLE IN ENVIRONMENTAL COMMUNICATION

Now, for carrying out or implementing this responsibility, how can we proceed ahead.

First of all, we need to develop a comprehensive 'media plan' identifying our target audience, the immediate problem they are facing in their localities, connect such locally-relevant problems and risks to the national and global environment, make people understand the dismal scenario set to emerge in the near and distant future etc.

However, the media's job does not get over just at that point.

Media and communication efforts also have the noble responsibility of showing the correct path to the people whenever it becomes necessary. Thereby, going by this logic, media also needs to provide the ways and means for looking for a solution to come out of such a mess.

This is why media is also termed as the 'leader of the nation' by many quarters. With its long years of experience in public affairs, it has to be able to function as a bridge between the public and potential alternative for further development.

At this level, an important question that may arise is which medium is the most suitable one for our cause here.

The answer to this question is that all kinds of possible carrier of messages for environmental conservation are the correct media for this purpose. This may include – print, electronic (TV, Radio, cinema), new media or social media on the internet platform, conventional, traditional media whichever may be available for the implementation of a particular media campaign.

It has been mentioned earlier that different types of media is required for approaching different categories of people for inculcation of a certain idea.

It needs to be reiterated here that the medium used for the purpose is also important as all the classes of the target audiences may not be subscribing to the same set of media without variation. Thus, media planning or selection of the right kind of media for reaching out to the maximum possible number of people is also equally important enough to achieve success in this field.

Media's role in environmental communication has always been important for all concerned. The most important single information source for the public about science and technology and newer innovations is the media. Thus, helping an environmental journalist or communicator to produce factual, intelligible, timely information is critically important for society. Now, as a science communicator the responsibility of the person would be two-fold.

One has to explain what this concept in reality means and what are the future potential usage of such a concept and related developments.

This is because a whole lot of research activities are currently going on in the laboratories of different universities, institutions etc. across the world in the field of improving our environment. The moot point is how to disseminate those findings to the people so that these knowledge can be applied for enhancing the living standard of a society and thereby enhance the quality of the environment.

In this regard the National Association of Science Writers (NASW) of the United Kingdom says, "No one can doubt the immense impact of science and technology on society today as we are faced with the challenges of not only understanding the current multiple revolutions in this field, but also how they affect the future of humanity and of the earth. (Bora, 2017). The same groups of people then become empowered to actively take up the activity.

The basic point is that the messages need to be disseminated in such a way that people at any level or category can receive them in a convenient manner. It needs to be reiterated here that while the basic facts and findings are the same for all kinds of media for presentation to the target audience, the approach would be different for each one of them. In an ideal situation, a judicious combination of all the media based upon the requirements of the audience is the most suitable approach to be taken for going ahead in this direction.

Further, there are many people and organizations which have been carrying on a lot of positive efforts in this direction that need to focused through an effective communication for the purpose of a better conservation of the

environment. These persons and communities need not necessarily be formal institutions of learning or research. These are highly-encouraging and moving episodes of human efforts which should be replicated as far as possible with local variations for suiting the regional differences in environment.

For example, there is this Khichan village in Rajasthan where the residents have been playing hosts to Saryu cranes for the last more than three decades – a story widely portrayed by *The Hindu* in late 2019. There, the villagers have made it a way of their life by taking all possible steps for making the cranes feel absolutely comfortable and safe during the season of their visit.

Then, there is the story of Mr Jadav Payeng, the Forest Man of India, a simple person from Jorhat district who had developed a huge forest area of more than 1300 acres from scratch without any help from any person or institution. He did this over a period of more than two decades and today that area of land is a full-grown forest effecting so many invaluable contributions to the society.

Tezpur town has an ambassador of creating environmental awareness among the people who specializes in rescuing wild animals, specially 'snakes' in and around his hometown. And while carrying out such works, he also tries his best to educate people on the need of preserving rather than killing or chasing snakes from their own natural habitats..

These inspiring stories need to be communicated to people so that they also become encouraged to take up environmental preservation in whatever small manner they can afford to do.

While many organizations and institutions are involved in activities this direction, a few including the one mentioned above – Centre for Science and Environment (CSE, Delhi), Centre for Environment Education (CEE, Ahmedabad), Greenpeace among others are quite prominent. They are actively pursuing the cause of environmental preservation with proactive steps in this area with a lot of effective communication works for educating and empowering the masses. They have been conducting series of workshops, participatory programmes of different kinds with youths and

children from schools and colleges, other volunteers since inception for spreading the message of environmental preservation. They are offering services creating awareness about bio-diversity preservation, climate change etc. and conservation

CEE publishes books, newsletters, special reports from time-to-time on these issues. CSE has been publishing a highly-popular journal called 'Down To Earth' in a simple language that common people can also understand without much of a difficulty.

At a local level, Aranyak in Assam has also been working relentlessly in this direction. It is engaged in conducting research and other developmental activities into different aspects of the broader theme of this discussion. Further, they have also taken up a novel scheme of late for partnering with institutions of higher education for providing in-depth field-orientation to the upcoming journalists in the form of students of these departments in various universities and colleges to begin with. It is expected that this step would go a long way in enhancing the awareness level of the people through such noble efforts in this direction.

While environmental communication can take any form devised by the fertile and creative mindset of human beings, the ultimate goal should be that it is simple, easy-to-understand, conveniently placed, logical, touching to the heart so that people can easily adapt to it and become active in their own manner.

And more importantly, if the messages and examples, episodes can be linked with a localized theme or event, activist, brand ambassador it would be that much more effective. So because as human beings always like to identify with issues happening in their immediate neighbourhood. Hence, efforts should be aimed at judiciously combining the national and global issues with the local ones so that the 'connection' about them can be established with the community which is the ultimate authority that would actually effect the changes.

SELF ASSESSMENT

1. Scan a local newspaper or magazine (three months for newspaper, six months for magazines) or one month's TV channel news bulletin regularly and find out the number of news items, features etc. on environmental issues, frequency of news items, areas they are focusing on in order of preference etc. and prepare a news report about it.
2. Look for environmental problems in your locality and think of a media plan or strategy about how to create awareness on them among the people. Find out innovative efforts, projects undertaken by individuals or institutions in implementing environmentally-positive projects successfully and think of a plan to popularize them among the people.
3. You can visit the local college, a HS school and a primary school and meet students and teachers (if possible) to see whether there is any effort for creating environmental awareness among the community.

6.6 SUMMING UP

Above, we have briefly discussed the concept and expanse of the idea of Environmental Communication for easy understanding of the issues. It is the activity of communicating or disseminating any meaningful message of preservation and conservation of our surroundings to the common people in a language that is conveniently understandable to one and all. The idea is to make them wise and empowered to be converted to active human beings. We have also discussed major issues and problems of environmental degradation in their different forms confronting the society today. This shall give you a comprehensive idea about the problems which need to be tackled with in

future as well as creating strategies for emergence of any untoward developments in near and distant future. This is important because every passing day, newer and newer complexities are facing us which have to be sorted out on an emergency basis. Besides, it is also to be kept in mind that despite creating a huge repository of knowledge base in this direction, these would have no meaning at all until and unless these can be informed to the people for applying them in their practical life.

We have also discussed the role of media in this regard which is of very high importance because it is only through 'media' that such messages can be disseminated to the people. A good and comprehensive 'media planning, implementation strategy, sincere implementation etc. are of high significance for working towards this direction across the world. Also, the success stories or sincere efforts of many unsung heroes and organizations like Jadav Payeng etc. need to be told to the world audience for inspiring so many others to follow suit or at least take up a small step in this regard. This is because communication is the ultimate trick or skill that is needed for expanding the horizons of this particular area.

6.7 QUESTIONS

1. What is your understanding of the concept of Environmental Communication ? Why is it important for humankind ? 2. Identify the major issues in the field of environmental degradation across the world. Can you establish a connection among them with local issues ?How ?

2. Describe the role of media in the broader activity of environmental communication

3. Which media do you think would be the most suitable one for a state like that of Assam or north-eastern region under present circumstances for creating awareness on environmental issues Also explain why ?

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UNIT 7 : HEALTH COMMUNICATION

Unit Structure

7.1 INTRODUCTION

Health is defined as the status of physical, mental and social well-being. Absence of any one of these doesn't complete health. On the other hand, communication is defined as the meaningful transmission of ideas or message or information from an individual to another, or from one place to another through a certain suitable medium. ***Shanon and Weaver*** (1948), have well defined this term in a more scientific manner by their model of SMCR (Sender-Message-Channel-Receiver). We know that health and communication –both are independent disciplines of education and research. While, health itself is a broad area of study, it consists of extending services of health related issues including medical treatments or healthcare, providing health benefits, promoting good health practices and healthy living, etc., however, it alone cannot go far without adequate support of properly drawn communication strategies. This idea of integrating these two, has generated the blended discipline, known as health communication. The health communication emerged significantly in the early 1970s with the advent of interest of some communication scholars into health related issues. Since then, the education and research endeavours in this particular field are going on.

Due to the multidisciplinary nature, this subject has gained significance in the medical and communication studies, especially in the western countries. Apart from the academic and research endeavour, health communication has become an integral part of international agencies who are working to promote health such as, WHO, UNICEF, Global Health Strategies, Knowledge for Health, Unite for Sight, to name a few. Professionals from the backgrounds of health communication are preferably hired by these agencies to carry out their projects and achieve their mandated goals. The demand and supply of trained professionals in the field of health communications is not adequate till now, creating thereby ample job opportunities in the global arena.

This course has tried to provide an overall perspective of health and communication as well as its various approaches. As all aspects of academic pursuits are driven by well-defined theories and models, hence the most relevant theories and models are discussed in this unit for better understanding of the core theme. Health Communication cannot be seen from one direction alone as it appears to be, because it has another angle too –which talks about the interpersonal communication in a healthcare settings. It takes place amongst healthcare professionals, patients, patient's families, etc. This aspect is also briefly touched upon for the benefit of the learners that might be useful for them -not only as the communication students, but also as the human being -who will certainly experience this in their day to day lives.

7.2 Objectives

This unit is designed keeping in view the recent trends and developments in the field of global health communication, and its importance as well as application across the world -in terms of education and research. The main objectives of this unit are :

- To explain the perspectives of health communication and its significance in the present day context
- To describe the various health communication approaches and its applicability.
- To develop health communication strategies.

7.3 WHAT ACTUALLY HEALTH COMMUNICATION IS ?

Health communication, in simple parlance, is the dissemination of health related information to the intended audience to inform, influence and change their health behaviours for better health outcomes. This may be exemplified by health promotion, health education and advocacy. The National Cancer Institute and the Centre for Disease Control and Prevention has defined health communication, as "the study and use of communication strategies to

inform and influence individual and community decisions that enhance health." There are end numbers of people in the society to whom the ***Cognitive Dissonance Theory*** is applicable. According to Leon Festinger (1957), this theory states that people do not easily like to accept or want to act in line with any new idea or behaviour as they are preoccupied by their earlier cognitive beliefs and perspectives on the particular subject. These types of people are required to be motivated and influenced to change their health behaviours for positive health outcomes. Hence, the idea of information-education-communication (IEC), which had been practiced by earlier healthcare professionals, needed to be substituted by a new approach called behaviour change communication (BCC). This approach not only tries to inform or educate people, but also put efforts to change their certain health behaviours. As the theory ***Diffusion of Innovations*** (E. M. Rogers, 1962) talks about the ways of broadly dissemination or distribution of new ideas or product or innovations or services to a particular set of people in a social system, it finds five groups of people or audience in terms of the ways of adopting new ideas or innovations, *viz.* innovators, early adopters, early majority, late majority and laggards. The characteristics of the people in each these groups are different as established by the earlier researchers. The idea of the policy makers is that all groups of people in the society should equally and simultaneously march forward in the direction of development. At this juncture, the idea and the need of health communication and its various approaches emerge.

7.3.1 Why health communication is important?

Health communication, in modern parlance, includes motivation to the intended audience to behave in a desired way on health related issues. Mere providing better health information and services do not ensure positive health outcomes. It needs integration of carefully chosen strategies or approaches that can influence people's attitude and motivate them to take certain actions to bring about positive social change. People usually do not like to believe or accept new ideas or services, if it is not clearly and effectively

demonstrated before them -which will be able to dig into their minds and encourage them for accepting the new idea or service. It will lead to behaviour change. The information dissemination, influencing people's attitude and motivating them for changing their health behaviour altogether require usage of different communication tools and approaches, like -mass media, interpersonal communication, new media, etc. If any content is frequently shown in different media tools at a time, then people are likely to believe such contents day by day. This idea or phenomena is well-described by *E S Herman and Noam Chomsky* in their Propaganda Model (through a book published in the year 1988). The another concept 'Agenda Setting Theory' also tries to establish that the content creators decide what to show to the audience and influence their thoughts by means of chosen or selected exposure of intended contents.

Another aspect of health communication is interpersonal communication related to health issues in a healthcare set up. Communication is crucial to human existence, and without good communication, the development or social change is not possible. Hence, it is very much important in the healthcare delivery mechanism too. However, it is often heard that the patients are not satisfied by the way of communication or interaction by the doctors and other healthcare professionals at all. This act can lead to negative health outcomes, as established by researchers. A doctor, on an average, interacts with around 1,50,000 to 2,00,000 patients in his or her entire career. This indicates the importance of interpersonal communication skill to be possessed by a doctor in particular, and any healthcare professionals, in general. Because, there are different types of patients in any social system depending upon their sociological, economic, cultural and political backgrounds. The nature of the patients may also vary from children to the adults or olds, according to their age group and level of maturity. Hence, the methods of interaction or interpersonal communication to be carried out by the healthcare professionals, should also be equally different, and it should be matching with the desired level of mind-sets of the patients. To this end,

the healthcare professionals need to be well-trained in the field of interpersonal communication. There is a big notion prevalent in the society that the doctors are usually reluctant to carryout interpersonal communication in healthcare set up. A good quality of interpersonal health communication will gratify patients and their families, which can bring about positive health outcomes.

Therefore, health communication is an integral part of any health beneficial programmes or in any healthcare set up. Keeping this in view, the academics and researchers have emphasized on the health communication studies, and have brought this discipline into the formal curriculum of the global education system.

7.3.2 History and evolution of health communication

The work of dissemination of health information and early works on health campaigns began by some communication scholars in 1940s and 1950s. The actual emphasis on health communication studies began at the 1950s as evidenced from the existing theories of health communication, *viz.* Health Belief Model, propounded by US psychologists Hochbaum, Rosenstock and Kegels. However, the development of this particular area under the school of communication was pioneered by the International Communication Association and became vibrant in the global scenario only in the early 1970s. Before the World War II, health was not considered as a value by the Americans, rather it was loosely incorporated into the other notions of well-being. As the importance of health emerged, relevant guiding theories related to health and health practices evolved more in number and became more prevalent in the western countries including African nations. Although there were many written documents on health during the middle of 20th century, but it was more significant only when the *Journal of Communication* which was published in 1963, devoted an entire issue on "Communication and Mental Health". Prior this, health and communication were viewed separately, i.e. people thought that both are totally different from each other

and has no mutual relationship. In 1967, a book "The Pragmatics of Human Communication" by Watzlawick, Beavin and Jackson got published which was impactful in developing the field of interpersonal and health communication. Mass Communication scholars who were interested in healthcare and health promotions came together to a platform and did set up the International Communication Association (ICA) in the year 1972. They started providing a platform in their annual conventions to the communication researchers to showcase their works and findings in the field of health communication. Simultaneously, the growth of literature on health, viz. books, journals, research articles, etc. dedicated to health communication had been significant afterwards. ICA took initiatives for publishing Newsletters, yearbook annual series, books, etc. on health communication and its related areas. In the year 1985, when the interested health communication scholars grown to a huge number, some members blended together to form Commission for Health Communication in which, many ICA members took memberships. Later on, these two bodies decided to work together and started publishing joint Newsletter in the name of *Health Communication* Issues in the year 1989. Since 1992, they have been giving away annual awards for outstanding dissertations and thesis on health communication to the students and researchers with scholarships to encourage their further research works in this field. Though the number of conferences and journals on health communication was less till the eighties, but as the time passed and emergence of health communication has become more potent, these numbers have reached to a very account today in the global scenario. In the year 1996, Scott Ratzan began another dedicated journal "Journal of Health Communication" which was published by Taylor & Francis. Both the journals (Health Communication and Journal of Health Communication) published high quality research works in the field and started getting high impact rates. This enabled them to get top 13 and 14 positions respectively amongst the 272 communication journals in the world which was determined as per the Google Scholar, Web of Science and Scopus in the year 2013. It's not that only communication journals are

publishing works related to health communication, rather many of the medical and nursing journals have also started their endeavour in publishing works from communication field inter-relating the importance of communication in health. Scholars from medical and communication backgrounds have begun working collaboratively in the blended field of health communication. Funding and financial supports are also coming from various government and non-government organizations encouraging the works of health communication.

SELF ASSESSMENT

Find out any journal or article related to health communication, may be from internet or any other source, and read thoroughly the same. Write your review on it, in not less than 300 words.

7.3.3 Agencies working in the global health communication

WHO and UNICEF are the international lead agencies who are dedicatedly working for the global health. They launched various projects in different states of the nations across the world for the benefit of the poor and underprivileged sections of the society. Their mandate is to create healthy world by providing better health services reaching the remotest corners of the world. These global agencies are spending huge budget for this purpose and at the same time, they are also spending sufficient amount of finances for carrying out various health communication approaches to ensure the success of their projects and programmes. Global Health Strategies, Knowledge for Health, Unite for Sight, etc. are some of the multinational and transnational agencies who are also carrying out various projects of their own and also by the support from the different national and international

bodies, mainly in the global health. All of these organizations are using health communication strategies to successfully implement their schemes.

Fig. 3 : Health Campaigns

SELF ASSESSMENT

Visit the webpage of any one global or national agency or organization (public or private) working in the global health. Try to find out its objectives, target groups, source of funding and the number of manpower (mentioning their positions) dedicated to health communication. _____

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7.4 MODELS AND THEORIES OF HEALTH COMMUNICATION

Like other disciplines, health communication is also guided by number of theories and models, with the help of which the phenomena are described in easily understandable ways. In fact, it is observed by studies that model in health communication was propounded much before the health communication was recognized as the discipline of academic pursuits. The Health Belief Model by Rosenstock, Kegels and Hochbaum emerged in 1950s, whereas health communication was considered as a discipline in

1985. There are good numbers of theories and models in health communication studies. Many sociological, psychological, anthropological, etc. theories and models are also used in health communication inquiries from time to time depending upon the considered areas of studies.

7.4.1 Health Belief Model (HBM)

In 1950s, the US Health Department started a health programme and through this, they offered various health services to the people of United States. However, they did not obtain better results or health outcomes from this programme. The three professionals, working in the department -Kegels, Hochbaum and Rosenstock analysed the situation and they came out with a model –***Health Belief Model***, to understand the reasons as to why the people in US were not actively participating into the health programmes offered by the department. The theory posits on six constructs (earlier four, and later on two more added) in terms of the perceptions or beliefs regarding any disease, *viz.* perceived severity (or seriousness), perceived susceptibility, perceived benefits, perceived barriers, cues to action and self-efficacy.

Perceived severity: a person's belief or perception about a disease, as to what extent the disease can be harmful or can affect him or her, or how serious is the disease.

Perceived susceptibility: the person's belief whether or not, he or she can adjust with the disease or susceptible.

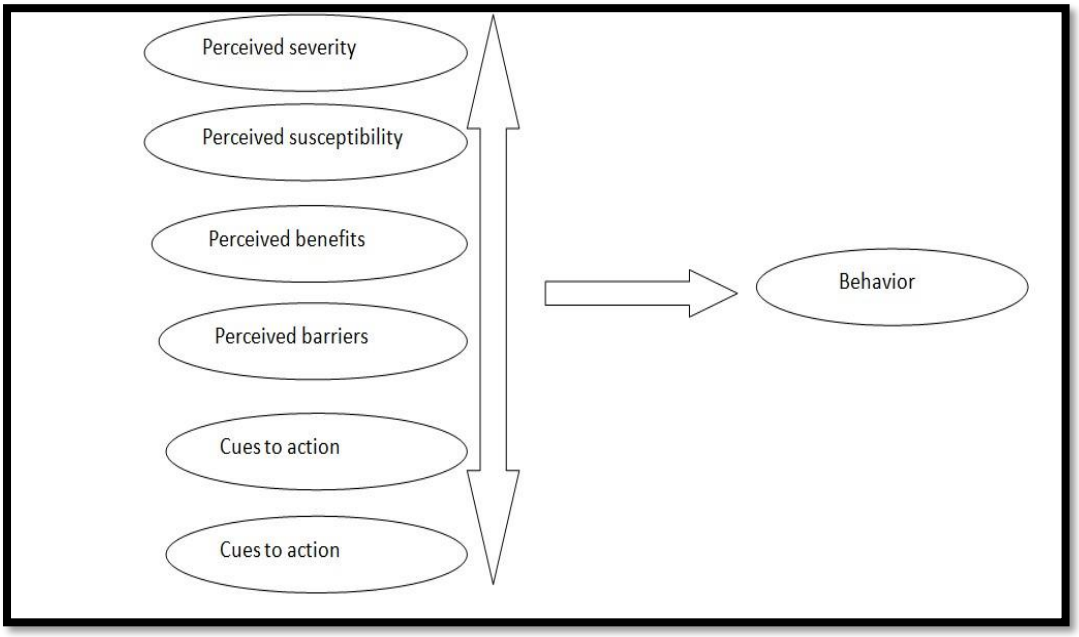

Fig. 5: HBM Model

Perceived benefits: the person's belief or perception about the probable benefits from taking certain action or behaviour, whether or not the disease can be removed from taking certain actions.

Perceived barriers: the person's belief or perception as to -what are the probable factors that will not allow him or her to take certain action towards eradicating the disease.

Cues to action: the motivating factors that will encourage him or her to take certain action towards eradicating the disease that he or she is suffering from.

Self-efficacy: the person's belief or confidence on his or her ability to perform any action.

Illustrations: *Taking the example of 'morning walk' as a good health behaviour, we can try to understand the Health Belief Model. The first step, i.e. the perceived severity or seriousness, describes about your thinking that if you don't go for morning walk, what will be the consequences and how serious this is or to what extent this will be harmful to your health. Secondly, the perceived susceptibility describes your belief that whether or not, you will be able to adjust or be susceptible with the diseases to be caused due to not going for morning walk. For example, you may think of lifestyle diseases. Third, the perceived benefit is your understanding about the benefits that you will get by going for morning walk. For example, you may imagine that your body figure will improve, feel active whole day, get rid of all kinds of lifestyle diseases, etc. Fourth, perceived barriers are the imaginary obstacles that will keep you away or stop you to not go for morning walk, for eg. inability to get up early, lack of proper dress for the purpose, etc. Fifth is the cues to action, i.e. the motivating factors like your family members, friends, neighbours, your environment, etc. which will encourage you to go for morning walk. Last, self -efficacy is nothing but, your self-confidence whether you will be able to get up early in the morning and go for morning walk, also continue to get proper benefits out of it.*

7.4.2 Northouse and Northouse's Model

This theory posits on the interpersonal communication process amongst the players in a healthcare set up. Usually the players in a healthcare settings include -health professionals (doctors, nurse, pharmacists, lab staff, etc.), clients (patients) and significant others (patient's families, relatives, attendants, etc.) and they are the key participants in the particular setting.

The interpersonal communication process in a healthcare setting is well described by Northouse and Northouse (1998) by their model as explained through the diagram shown below:

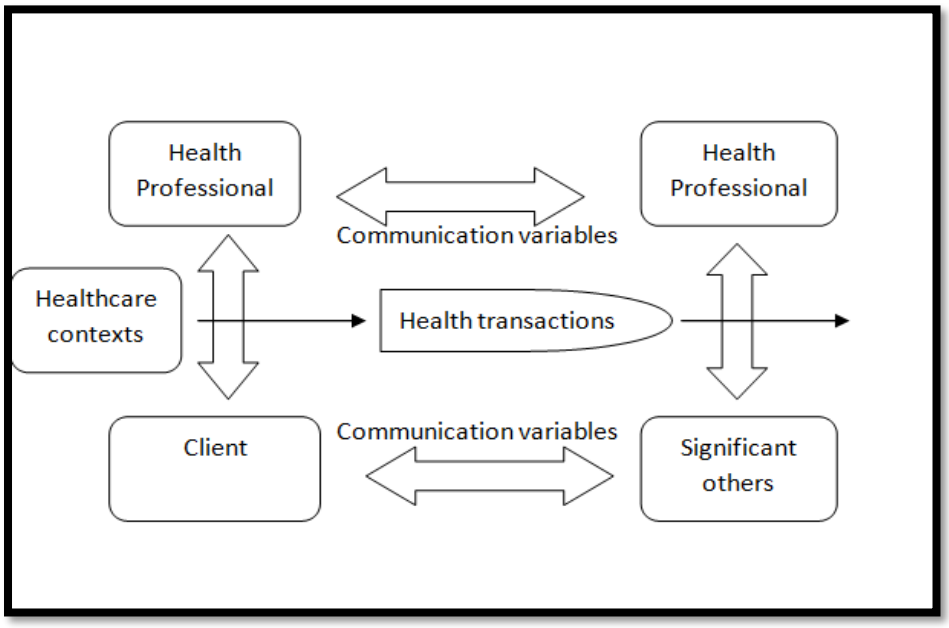

Fig. 6: Northouse and Northouse's Model

The communication process that takes place in the healthcare settings will vary depending upon the nature, age group, background, etc. of the participants. For example, the way of communication to a child patient will be different from that of the adults. Similarly, communication with the dying patients, or patients suffering from severe diseases will be of different kind from that of the normal ones.

SELF ASSESSMENT

Visit a nearby Govt. health centre and a private health facility, and interact with the health professionals as well as patients. Draw out your observations and also point out the differences of interpersonal communication methods, if any at your own.

7.5 APPROACHES OF HEALTH COMMUNICATION

The main intention of health communication is to generate awareness using some chosen or defined approaches/ messages/ information amongst the significant others and then to influence them with the approach or message that can or will ultimately lead to desired behaviour change of the significant others or the target audience. This ensures positive health outcomes. To this end, various approaches are used by the health communicators, and the most effective and popular ones which are discussed below in short.

7.5.1 Advocacy

This approach tries to inform and motivate leadership to create a supportive environment to achieve its goal. Advocacy influences with logical argument -policy level officials, political leaders and opinion leaders intending to change certain policy as per situational need. The target group of this approach is the policy level people and not the grassroot level people.

7.5.2 Social Marketing

It is an approach to change or sustain certain behaviors of the intended audience –an individual or a society –leading to social change. It is a blended idea of a social system and commercial marketing that generates the term social marketing. It is the process of marketing certain behaviors or services or idea, not any product, to popularize/promote and enable adoption of the same, by the society or any target group. This approach focuses not only on creating awareness or disseminating information/ knowledge, but also tries to bring about the changes. This concept was introduced in 1969 by Kotler and Levy, and was officially known in the year 1971.

This approach requires to be taken care of four P's, *viz.* product, price, place and promotion –known as the marketing mix.

(a) Product –is the main object which has to be marketed in a social system. This needs to be well-researched launch about any probable pre-existence, feasibility, acceptability, etc. The product refers to not only an object, but also services or ideas.

(b) Price –is a big factor which influences acceptability of any product. The price of the product should be nominal as much as possible, so that the target audience can easily afford the product irrespective of the social status of the audience. In addition to money, price also includes emotional, psychological and time cost.

(c) Place –is very important to be chosen for marketing the product or service as to whether the place is easily accessible by the audience and visible in different media platforms.

(d) Promotion –is the ultimate step to be observed, wherein many communication channels like television, radio, newspaper, hoardings, posters, banners, rallies, skits, etc. are used for promotion of the product or idea. To promote that, one can use also public relations strategies or advertising depending upon the need of the situation.

7.5.3 IEC/BCC

Information Education and Communication (IEC), now shifted to Behaviour Change Communication (BCC), is an effective approach to perform health communication in today's context of social change or development. It involves face to face dialogue with one and all -to inform and motivate to bring about change in knowledge, attitudes, intentions and behaviour as well as sustenance of the same. In short, it is an effort to change behaviour that will improve present status and long term outcomes by means of various strategies. This approach uses broad range of interventions like mass media, interpersonal communication and community mobilizations.

Fig. 9 : IEC/SBCC

Now, for carrying out the above mentioned different approaches or strategies, various media or communication tools are used, viz. traditional media (includes Television, Radio, Print, PSMs, Mobile SMSs, etc.), community media (includes street play, puppetry show, rallies or processions, door-to-door information, PSAs(known as *mikings*), gram sabha, opinion leaders, community radio, etc.) and new media (includes computer mediated communications, online news, blogs, social networking, MMS, e-mail, image and video sharing, DVDs, CDs, Pen-drive, etc.)

7.6 DEVELOPING AND IMPLEMENTING COMMUNICATION STRATEGIES

It is always very easier to presume that the chosen communication strategies will ensure positive outcomes. However, in practice, there are lot many other factors which influence the success of the strategies or approaches such as audience, budget, duration of the programmes, etc. The development and implementation of such strategies are very crucial. Hence, it is very much important to proceed to do this in a systematic manner in the steps: (a) defining objectives, (b) determining target audience, (c) designing message (includes pretesting and redesigning, if needed), (d) select channel (can be used more than one) (e) ensuring the match between budget and objectives and (f) measure the outcomes (by means of conducting field survey).

It is ironical that all media or communication strategies may not effectively work alone in certain environment, as all of the communication channels may have strengths and weaknesses. Likewise, the characteristics of the target audience will not be homogeneous. Hence, it is advisable to use two-three types of communication strategies at a time to get most effective outcomes. For example, while using television, one may also use radio and newspapers for wide publicity and impact.

SELF ASSESSMENT

Taking example of handwashing as a health behaviour, try to explain how to develop and implement the same, stepwise as mentioned above. _____

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7.7 SUMMING UP

Health communication has its own existence and importance in the medical field as well as in healthcare or health service delivery. Due to rapid and effective use of health communication approaches in various health schemes and beneficial programmes, the need of manpower from this background is increasing prominently day by day. National Health Mission (NHM) and many other health programmes in India are engaging good number of health communication professionals to carry out its activities related to creating awareness and influencing the health behaviours of the people. However, like many other fields, health communication is also driven or guided by different theories and models, and hence the study of theories and models are proportionately important in order to design and apply effective health communication strategies. If we see the growth and development of this very field of health communication, then we can easily understand that this field has been not very old, but it has gained its momentum only in the past couples of decades. Health communication is very much vibrant in the western countries, where the study and research are much popularly taking place than that is in India as of now. Advocacy, social marketing and IEC/BCC have been the widely used approaches, at the same time there are many other approaches or strategies by which health communication is practiced. To that end, there are some scientific or systematic ways to develop and implement health communication strategies.

7.8 QUESTIONS

1. What do you understand by the health communication?

2. Why health communication is important in a healthcare setting?

3. Under what circumstance, health communication has emerged?

4. Identify any one global organization which is working in global health, and discuss how it has applied health communication to achieve its objectives.
5. Discuss three approaches of health communication.

6. Elaborate the steps to develop health communication strategies.

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UNIT 8: SCIENCE COMMUNICATION IN PRINT MEDIA

UNIT STRUCTURE

8.1 INTRODUCTION

There is science in everything and therefore it will not be wrong to assert that it is in fact an integral part of our everyday lives. It is yet unfortunate that reporting in scientific matters continues to be relatively ignored in comparison to other beats. According to a recent study, science coverage in India is about 3 per cent which should be increased to at least 15 per cent for proper projection, as desired by the Indian Science Writers Association (ISWA), the only professional body comprising both scientists and journalists writing for science and technology promotion in the country.

The origin of science communication could be attributed to the William Crookes's who was a scientific correspondent. He had written an article titled "A Gale in the Bay of Biscay" which appeared in The Times on January 18, 1871. Notably, the appointment of James Crowther as the scientific correspondent of The Manchester Guardian by C. P. Scott in 1928 is when science journalism really took shape. Scott was of the opinion that there was no such thing as science journalism to which Crowther expressed his intent to invent and that is how he received his employment.

In India, post-Independence, in 1947, a number of government agencies and non-governmental organisations (NGOs) took their cue from the constitution and became involved in science popularisation. In this way, science communication was taken up at various levels, institutional as well as individual. Nehru was a major force behind this advancement of science in independent India. The first Prime Minister of India, Pandit Jawaharlal Nehru, introduced the concept of modern 'scientific temper' — a phrase taken to mean an enquiring attitude and analytical approach that leads to rational thinking and the pursuit of truth without prejudice. Accordingly, the constitution of India has a special provision "to develop the scientific temper, humanism and spirit of enquiry".

The National Institute of Science Communication (NISCOM) — previously the Publications and Information Directorate — began publishing of the Hindi popular science journal Vigyan Pragati (Progress in Science) in 1952. The Science Reporter (an English monthly) and Science Ki Dunia (an Urdu quarterly) followed soon after. Today, NISCOM also brings out 11 professional scientific journals and publishes various popular science books (often in Indian languages).

In 1980, science communication was given prominence in India's sixth Five Year Plan, and two years later the National Council for Science and Technology Communication (NCSTC) was established. The Council has a mandate to integrate, coordinate, catalyse and support science communication and popularisation, at the micro as well as macro level. NCSTC's programmes include training in science and technology communication, software development, research, field-based projects, and creating information networks and databases.

Other Indian government initiatives include Vigyan Prasar — an autonomous organisation of the Department of Science and Technology set up in 1989 — which plays an important role in coordinating efforts among various scientific institutions, educational and academic bodies, laboratories, museums, industry and other organisations for the effective exchange and dissemination of scientific information.

Vigyan Prasar also develops and disseminates software materials and organises popular science events including workshops, debates and lectures.

The National Council of Science Museums, based in Calcutta, is the coordinating body of 26 science museums and science centres across the country. Science City in Calcutta has more than 1,000 exhibits and attracts around 500,000 visitors a year. Based on the experiences and popularity of Science City, other such projects are being developed across the country.

Several NGOs have also pursued science communication programmes. The Indian Science Writers' Association (ISWA), for example, was founded in 1985 with a view to developing and nurturing the science writing profession in India. The association has around 200 members and undertakes a broad spectrum of activities including training courses, lectures and fellowships. ISWA also works with government agencies and NGOs in promoting science communication activities.

Scholars argue that the scientific beat requires more research and rigor. There is also the need for a fair understanding of scientific matters so as to accurately interpret details. It is because of this little extra work that journalists have to do, that there is relative under-representation of science in contemporary media discourse.

Science journalists often have training in the scientific disciplines that they cover. Some have earned a degree in a scientific field before becoming journalists or exhibited talent in writing about science subjects. However, good preparation for interviews and even deceptively simple questions such as "What does this mean to the people on the street?" can often help a science journalist develop material that is useful for the intended audience.

Beside Journalists, scientists themselves are also responsible for the under-representation of scientific news in the media. There have been numerous scholars who have argued that scientists are not aware of the implications their research could have on the lives of people and many a time they are also very reluctant to share

knowledge for fear of sensationalism and miscommunication. In such a debacle the profession of science journalism is what suffers the most.

Even so, it is very important to note that there have been numerous surveys which conclude that a vast majority of people get their preliminary information about science from the mass media. In the Indian context, whether it is the success of the 'Mangalyaan' or the crash of the 'Vikram' lander, all such news were transmitted to the general public with the help of the mass media.

The Print Media in India has the perception of being one of the most reliable sources of media and it is therefore that a lot of scientific reports that have been reported as the front page headlines have become instrumental in shaping the discourse on science. It will be very adept to assert here that the Print Media has in fact been a building block for the development of scientific temper in India and also elsewhere in the world.

8.2 OBJECTIVES

A thorough study of this unit shall enable you to

- Explain the idea of scientific temper
- Assess the role of the print media in developing scientific temper
- Describe the improvement areas to develop science journalism

8.3 SCIENTIFIC TEMPER

It is impossible to talk about science communication without really talking about scientific temper. So, what is 'Scientific temper'? To put it simply, scientific temper is an attitude, an attitude of seeking to be more precise. This scientific temper does not necessitate any collection or body of knowledge but it does promote rational thinking and logical coherence in our arguments. Scientific temper is in fact more of a social thing than any science thing.

Interestingly, a traditional society could have more scientific temper in comparison to a modern society. For instance, a traditional society that is more compassionate towards the ill effects of pollution on the environment probably has more scientific temperament in comparison to a society that is consumed by consumerism and uses what it does not actually need.

Scientific temper is an attribute of human mind and does not always mean that there needs to be a drive for a highly industrialised society. Scholars argue that inculcating scientific temper would in fact lead to a more egalitarian, democratic and a more tolerant society because it would make people more rational and objective in their approach. So, essentially scientific temper is the pursuit of a rational truth without pre-judgement and is therefore a philosophy.

The role of mass media should be inculcate scientific temper and in doing so it will be able to create a society that will seek more and judge less.

8.4 INDIAN PRINT MEDIA PUBLICATIONS FOR SCIENCE

While there are not many science newspapers in India, there are a number of science magazines that publish news related to science on a periodic basis. The National Institute of Science Communication and Information Resources, a government agency based in New Delhi, publishes two science magazines to keep its readers abreast with the current happenings in science across India. They are: The Science Reporter which is in Hindi and the विज्ञान प्रगति(Vigyan Pragati) which is in Hindi.

Science Reporter: It is a monthly science magazine that has been published in India since 1964. It is read principally in India and neighbouring countries. The publication has now become a popular science magazine that has a wide array of scientific news and also includes science fiction, puzzles, hobby projects and crosswords.

विज्ञान प्रगति(Vigyan Pragati): The Vigyan Pragati set a milestone in Hindi science reporting when it first started its publication in the year 1952. The publication started as a newsletter for circulation within the CSIR but later on the same publication was redesigned as a science magazine to be read by the general public for greater awareness of science issues across the country.

Among other publications that are available in India include: Popular Science, BrainWave, Discover, Astronomy, Scientific American and New Scientist.

ASSESS YOUR PROGRESS

1. List any two science publications available in India.
2. List down at least three eminent science journalists in India
3. What is the need for scientific temper?

8.5 EMINENT SCIENCE JOURNALISTS

While the rest of the world has seen its fair share of science journalists, in India not many choose the beat owing to the specialized training required for the same. There is also the problem of meagre wages which are not able to motivate the journalists enough to undertake quality science journalism. Even so, India has seen its fair share of science journalists who have made a name for themselves in the field. In this this section we discuss about some science journalists from India and the rest of the world along with their achievements.

Anil Agarwal (the environmentalist): He was trained as a mechanical engineer but worked as a science correspondent for the Hindustan Times. He was awarded the Padma Shri and the Padma Shri by the Indian Government for his work on the environment and development.

Anil Ananthaswamy: He was a consultant for the New Scientist magazine. Besides TED talks and talks on Google, he has also written three notable books: Through

Two Doors at Once, The Man Who Wasn't There and The Edge of Physics. He was also awarded with the Physics Journalism by the UK Institute of Physics.

K S Jayaraman: He is a very important person in the field of science journalism being the first science editor of the Press Trust of India (PTI). He is credited with the establishment of the Indian Science Writers Association (ISWA) in the year 1985. He was a Doctorate in Nuclear Physics and an MS in Journalism. He is one of the pioneers of science journalism in India.

Frederick Noronha: He is a journalist from Goa who predominantly writes about free/ open source software, technology and computing issues across India. He is also the founder of an alternate publishing house namely Goa 1556.

Nagendra Vijay: He is a science journalist in the Gujrati medium. He started the first Gujarati language science magazine called Scope.

Natalie Angier: She is a non-fiction writer and a science journalist for The New York Times who was awarded the Pulitzer Prize for Beat Reporting in the year 1991. She was also a Professor for the Now York University's Graduate Program in Science and Environmental Reporting which she quit to join The New York Times in 1990.

David Bradley: He is a British journalist specializing in science and technology. After graduating in 1988 with a degree in Chemistry from Newcastle University, he began his career in technical editing at the Royal Society of Chemistry in 1989 and built up a freelance writing business in his spare time before going full-time freelance in the mid-1990s. He has contributed to a wide range of popular science publications, including Popular Science, American Scientist, New Scientist and Science. As well as numerous newspapers and websites.

Wilson da Silva: He is an Australian feature writer, science journalist, editor and documentary filmmaker who has worked in magazines, newswires, newspapers, television and online. He is a co-founder and the long-serving former editor of Cosmos, an Australian science magazine in print and digital.

William J. Broad: He is an American science journalist, author and a Senior Writer at The New York Times. He has eight books to his credit as a co-author and has also shared two Pulitzer prizes.

Steve Mirsky is a writer for Scientific American and the host of the magazine's weekly science podcast, Science Talk. Mirsky has written Scientific American's monthly "Anti-Gravity" column since 1994 and has hosted its weekly Science Talk podcast since 2006.

8.6 CRITICISMS ASSOCIATED WITH SCIENCE JOURNALISM

In this era of hand-out journalism, a number of times, press releases that are provided by scientific institutions are full of jargons and most journalists, given their busy schedule do not put in the effort to totally understand the jargons. They simply publish what is provided to them. This is called hand-out journalism and the same is not limited to science journalism and even extends to every other beat.

As discussed earlier, a lot of journalists are not trained well enough to understand and therefore interpret news related to science. Although a lack of effort in this regard on the part of the journalists cannot be ignored yet one of the primary reasons that could be attributed to the quality of science journalism is a lack of skill. Most journalists are underpaid and lack the basic essential qualification to undertake specialized reporting. This creates a gap between the scientists who put out press releases with a lot of jargons and the journalists who cannot decode them and thereby publish them as is. The public on the other hand are not able to make sense these press releases and therefore are devoid of essential information about scientific matters.

Science journalists regularly come under criticism for misleading reporting of scientific stories. All three groups of scientists, journalists, and the public often criticize science journalism for bias and inaccuracies. However, with the

increasing collaborations online between science journalists there may be potential with removing inaccuracies. Science is based on experimental evidence, testing and not dogma, and disputation is a normal activity. Science journalism finds itself under a critical eye due to the fact that it combines the necessary tasks of a journalist along with the investigative process of a scientist. Most science journalists begin their careers as either a scientist or a journalist and transition to science communication.

Also, unlike other beats which are more general in nature, the understanding of news related to science requires the target audience to have a basic understanding of scientific matters. It is very possible for a particular target audience to lose interest in news related to science if they do not understand the same in totality. It is here that the two step model of communication comes into play.

Essentially, the two step flow of communication suggests that the flow of communication happens in stages. Firstly the opinion leaders receive information from the mass media and summarily disburse their versions of the news to other members of the mass. This means that the understanding of the matters related to science could be resolved if there are trained intermediates who are able to interpret the news in the media accurately.

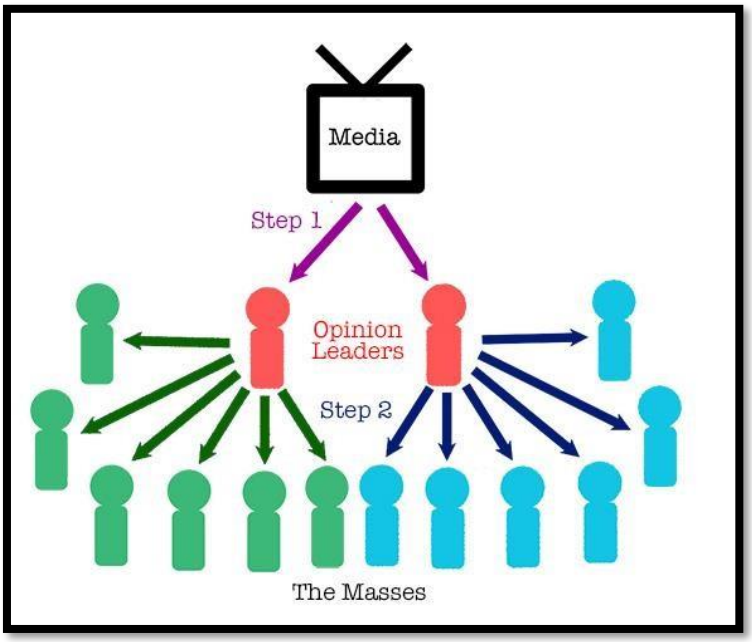

Fig 1: The Two Step Flow Model of Communication

Source: study.com

The aim of a science journalist is to render very detailed, specific, and often jargon-laden information produced by scientists into a form that non-scientists can understand and appreciate while still communicating the information accurately. One way science journalism can achieve that is to avoid an information deficit model of communication, which assumes a top-down, one-way direction of communicating information that limits an open dialogue between knowledge holders and the public.

One area in which science journalists seem to support varying sides of an issue is in risk communication. Science journalists may choose to highlight the amount of risk that studies have uncovered while others focus more on the benefits depending on audience and framing. Science journalism in contemporary risk societies leads to the institutionalisation of mediated scientific public spheres which exclusively discuss science and technology related issues. This also leads to the development of new professional relationship between scientists and journalists, which is mutually beneficial.

8.7 SUMMING UP

Science journalism requires special skill and a fair understanding of the working of science and this is probably the reason why the same is ignored in contemporary media discourse. The development of scientific temper will lead to a more plural and rational society that is more inclined to seeking and therefore more informed. Print Media being one of the most reliable sources of media in India, it has the capacity to create opinion leaders that will help in the cause of promoting science.

8.8 QUESTIONS

1. What is scientific temper?
2. Why is Print Media an adept source for the propagation of scientific news?
3. What improvements would you suggest for the improvement of science journalism through print media?

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UNIT 9: SCIENCE COMMUNICATION FOR TV AND RADIO

UNIT STRUCTURE

9.1 INTRODUCTION

Unlike science communication through print media, science communication through Television and Radio has been relatively more effective and more visible. Even before private channels came into the picture, the state-run broadcaster Doordarshan had produced 'Bharat ki Chhaap' in the year 1989. It was jointly produced by National Council for Science and Technology Communication (NCSTC) and Doordarshan. In a thirteen part series, the program aimed at highlighting the history of science and technology in the Indian sub-continent and its impact in the world. With the entry of private television channels in India dedicated channels like Discovery, National Geographic etc. were serving the audience across the country on topics of science.

With reference to the promotion of science and scientific temper, radio is also not far behind. The pioneer in this regard was All India Radio (AIR) which along with the NCSTC produced the 144 part radio series Manav ka Vikas (Human Evolution). This program was simultaneously broadcast from 80 stations in 18 languages with 100,000 children and 10,000 schools as dedicated listeners. There are also other

programs like Science Today, Science Magazine and Science News that is run by AIR.

Vigyan Prasar is an organization that has been set up by the Department of Science and Technology, Government of India. Since 1989, when it was established, the organization has been instrumental in the propagation of science related news among audience across India. A detailed discussion on the organization and its role has been discussed in a following section.

9.2 OBJECTIVES

A thorough study of this unit shall enable you to

- Evaluate the potential of TV and radio for science communication
- Assess the role of Vigyan Prasar for science communication
- Identify the gaps for science communication through TV and radio

9.3 TELEVISION FOR SCIENCE COMMUNICATION IN INDIA

Officially, television started in India on 15 September 1959 on an experimental basis from Delhi. At the time, the infrastructure for this experimental transmission was only a low power transmitter with a make shift studio and only 21 community television sets. The technical know-how was provided by All India Radio (AIR) with both programme professionals and engineers. Gradually, in the year 1965, a daily one hour service with a news bulletin was started. The service was then extended to Mumbai in 1972 and then to Calcutta, Chennai, Srinagar, Amritsar and Lucknow in the year 1975. At the same time, the Satellite Instructional Television Experiment (SITE) brought television programmes for people in 2400 villages in the most inaccessible and least developed areas through a satellite lent to India for a year.

At the moment the production of programs related to science are being handled by Vigyan Prasar for Prasar Bharati. Science on Television, a programme of Vigyan Prasar is one of the major activities of the respective body. The main aim of this programme is to demystify science and inculcate scientific temper by producing video science programmes on the various aspects of science and technology. With a view

that Television is a medium with a relatively higher impact, Vigyan Prasar has been continuously producing several science and technology programmes since its very inception. With the philosophy that "Science is everywhere and for everyone" is the guiding principle, Vigyan Prasar's productions attempt to bridge the gap between science labs and the people. Vigyan Prasar also boasts of a wide array of target audience which includes both rural and urban population.

With the signing of a memorandum of understanding (MoU) between Vigyan Prasar and Prasar Bharathi in 2007, the former has been instrumental in the telecast of science based programmes through 17 different channels. Under this arrangement, Vigyan Prasar produces the respective programs and Doordarshan through its expansive array of channels telecasts them. There is also similar MoU(s) with Rajya Sabha TV (RSTV) and Lok Sabha TV (LSTV) for its weekly science programme. Vigyan Prasar's weekly science news programme Science Monitor in English and Gyan Vigyan in Hindi were initially telecasted from LSTV. Subsequently the same program is now being telecasted on RSTV. To its credit, Vigyan Prasar has over two thousand episodes on various aspects of science and technology. It has produced these programmes not just in Hindi and English but also ten other regional languages. At the moment, Vigyan Prasar has the capacity to produce about 150 hours of science programmes per year.

Recently in January 2019, two exclusive new platforms with the aim to promote science have been launched. DD Science is a traditional channel and venture of Vigyan Prasar while India Science is a brand new online channel. Both the platforms aim to enhance the scientific temperament. With an increase in the ownership of cell-phones in both rural and urban India, there has been an evident increase in the penetration of the internet. Under such circumstances, the launching of an online platform like India Science is inevitably a great idea which will be able to procure more audience for the cause of science.

ASSESS YOUR PROGRESS

1. What is the role of Vigyan Prasar in science communication through television?
2. What is the advantage of Television for science communication over other mediums?
3. How has the entry of private channels affected science communication?

9.4 RADIO FOR SCIENCE COMMUNICATION IN INDIA

Radio is an even older medium in comparison to television and if we were to put into perspective the effectiveness of the medium through the frame of Marshall McLuhan's Hot and Cold media – Radio is categorised as hot medium and therefore has a spoon feeding effect on its audience with very little participation from the audience in the message making process. This kind of messaging does have its disadvantages but to think about it, with reference to science communication there are more advantages than disadvantages.

Science communication through radio therefore has the advantage of avoiding aberrant decoding which is a nature of communication in itself. Interestingly, according to a survey on science communication in India undertaken by Manoj Patairiya in the year 2007, the status of science coverage in various media is as follows:

Science coverage in print	3.4%
Science coverage on radio	5.84%
Science coverage on TV	1.8%
Science-based research papers	2.1%
Science-based books	0.2%

Table 1: Science Coverage in Various Media

(Source: Patairiya (2007), Status of science communication in India)

Although the survey is relatively old but it depicts an interesting trend. It reflects a very high percentage of science communication being carried out through radio and therefore it is only adept to conclude that there is an already existing base to carry out science communication through radio. Keeping this in mind, it is worthy again to note that Vigyan Prasar has been instrumental in the dissemination of Science & Technology broadcasts through Radio. Beside Hindi and English, Vigyan Prasar has been producing programs in Telugu, Nepali, Punjabi, Bengali, Assamese and Oriya among others.

The introduction of private FM radio stations on the other hand has not had a significant impact on the scenario of science communication through radio. FM radio primarily caters to the fast paced entertainment hungry audience and hence the program design is as such. Even so, the launch of Gyan Vani in the 2000, transmitting at 105.6 MHz is an educational channel that is filling this existing gap of the lack of science communication through FM radio.

Gyan Vani stations operate as a media cooperative with the day-to-day programmes being contributed by various educational institutions, NGOs, government and semi-government organizations, UN agencies, ministries such as Agriculture, Environment, Health, Women and Child Welfare, Science & Technology, etc. besides national level institutions such as NCERT, NIOS and state open universities. Each Gyan Vani station has a range of about 60 km and covers an entire city including the adjoining rural areas.

It is a matter of concern though that the private players in the FM band do not cater to educational content and hence have little or no scope for programs on science. This is primarily because of the Government's policy which restricts the kind of content that could be relayed from private FM channels. For instance the broadcast of news is only limited to All India Radio with provision for broadcast by FM stations without scope for modification of the content.

9.5 NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY COMMMUNICATION

As per the official website of the National Council for Science and Technology Communication (NCSTC), the organization is mandated to communicate Science and Technology to masses, stimulate scientific and technological temper and coordinate and orchestrate such efforts throughout the country. The organization aims at capacity building for the promotion of scientific thinking and informed decision making. With the dissemination of scientific knowledge the NCSTC also aims to bring about societal upliftment cutting across all social hierarchies and sections of society.

For the fulfilment of its objectives, the NCSTC also focuses on outreach activities by conducting training science and technology, motivating students and teachers, spreading environment related awareness among others. NCSTC has over the years developed a multi-platform approach to enhance the communication of science and science related activities. In doing so the NCSTC has been communicating science using folk media, using mass & digital media for the popularisation of science and using of social media in science and technology for keep the public updated on the issues of science.

9.6 SUMMING UP

While television is a medium with the highest impact, not enough time is set aside for the communication of science or matters of science. With the introduction of two new channels across different platforms to cater to the need for the communication of science, there seems to be a gap being filled in this regard. Even so, in an era of entertainment where crime, politics and action take primary role, there needs to be a shift in the way programs are produced for the communication of content related to science. With reference to radio, there is an already existing

base for the effective communication of science through the medium but definitely gaps which need to be carefully analysed and filled. In the Government's effort to bring 'lab to land' which will be beneficial for farmers there has to be the introduction of even more radio channels to cater to the needs of the rural folk. With a cell-phone in their hands which has access to FM radio, there is definitely a lot of scope for the promotion of science communication through radio. The regulations that have been put forth by the Government on the kind of content that could be broadcasted through the FM band by private channels needs to be relaxed with measures for proper verification of content before it goes on air.

9.7 QUESTIONS

1. What is the role of Vigyan Prasar in the promotion of science communication through radio and television?
2. Why aren't there enough science based programmes on the FM band?
3. What is the primary aim of the National Council and Technology Communication?

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The Centre for Distance and Online Education was established in 2011 with the aim of disseminating knowledge and imparting quality education through open and distance learning mode. The Centre offers various post-graduate, undergraduate, diploma and certificate programmes in emerging areas of science and technology, social sciences, management and humanities with flexible system to cater to the needs of the learners who otherwise cannot avail the regular mode of education. The basic focus of the centre is to prepare human resources of the region and the country by making them skilled and employable.

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