

Unit 1 : Science Communication

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1.1 Objectives :

This unit is designed to achieve the following learning objectives ---

- Explain the overall concept of Science Communication
- Growth and development of the domain in our country
- Why Science Communication is important for the society
- How does it differ from communication of other modes

1.2 Introduction

In simple everyday language the term Science Communication means ‘communicating various aspects of scientific developments for the benefit of the common people in a language they would be able to understand.’

In other words, making people aware of the different inventions, discoveries, innovations in science and technology so that people can understand them in a simpler way and can lead a better life by applying the same to their own lives.

Besides, Science Communication also entails inculcation of a scientific temperament among

the masses so that one can go forward dropping various rituals, activities, habits etc. which are counter-productive towards leading a healthy life.

Generally, science and technology are expected to be the domains of laboratories, research and development centres, universities, technological institutions, etc. First hand information about such discoveries and developments come in the form of research papers, theses and patent specifications prepared by experts preferably in a highly-technical composition of texts, graphics, illustrations, photographs, tables, etc. This form is replete with scientific terminology, generally in English. This kind of writing, publication and communication is termed as technical or research communication. (Patairiya, 2002).

Similarly, science journalism is the key to the real treasures of the scientific research, by virtue of which scientific knowledge and concepts could be carried to the common man. Thus people benefit with new advances in science and technology and are able to fight against hunger, drought, diseases, and social evils, like superstitions, etc., with self-confidence, courage and faith. Seen in this context, science journalism in India has yet to come out of its present stage of infancy. (journet.unesco.org, 2005)

Thus, science communication is nothing but communicating about latest scientific developments to the people for enhancing living standards by utilizing the knowledge gained in this way.

Science communication, being a complex network of social channels, serves as a mechanism for bridging the gap between the scientific community and the lay public. It is also an effective tool for extending scientific boundaries and gaining wide public support for important research and development, which are indispensable for society's development. (Mochahari, 2013)

1.3 Concept

At this point a question is expected to arise – why do we need to communicate various developments in science and technology? With every passing day, as in other fields of study, in science and technology a lot of new inventions and discoveries have been made by people dedicated to this discipline in the laboratories across the world.

Let us think of examples nearer home. In our country we have several agriculture universities including veterinary institutions, a network of high-profile laboratories engaged in different types of medical research under the Indian Council of Medical Research (ICMR), Indian Institute of Science (IISc), Defence Research Development Organization (DRDO), Indian Space Research Organization (ISRO) to name just a few. This is in addition to general universities, deemed universities and other academic and research institutions of humanities and social sciences, where learned scholars are carrying out both applied and theoretical research studies.

Out of all these research studies some of them would be directly applicable to the improvement of

our lives. On the other hand the remaining ones may not affect our lives directly but nevertheless are equally important from the point of view of expanding our horizon of knowledge in the near and distant future. This is because both these aspects are never inferior to each other and must be encouraged on an equal footing by the society and the state.

Now, all these research studies led by respective scholars either individually or in groups are definitely going to deliver at least some research findings which can be utilized by human beings for improvement of their lives. And unless these findings are useful or beneficial for the human beings in different manners, what is their utility.

For example, the development of high-yielding variety seeds like Ranjit and Bahadur in rice or Sonalika in wheat will directly improve the living standards of the common farmers in the society. At the same time the Chandrayan Research Mission of the country costing several thousands of crore of rupees is also equally important for its future potential benefits for the people in terms of various applications.

Let us discuss another example here to illustrate how simple discoveries can benefit us. Some of you may know that in the culture of a few ethnic communities in Assam there is a belief that eating 'dried fish' is a preventive of malaria. However, so far this writer has not come across any scientific study which has transformed this 'belief' into an established fact.

Now, if it would have really been a preventive of this disease it would be a big boon for the masses as it is cheap, easy to procure and does not require much preparation. Thus it will not be financially taxing for the people in the lower strata of the society and those living in remote areas where modern medical care is always a problematic aspect.

On the other hand if it would have been proved 'negative' that would also be a major relief for people. Since one would not depend upon it and visit the modern healthcare system, thereby saving the lives and financial resources of many people.

Similarly, on a broader level, for a few years now there is a controversy going on about use of Genetically-Modified seeds for various purposes in the country. At this point, there is an urgent need for the persons and institutions concerned to inform the masses (the target audience) for whom these seeds are targeted about the pros and cons of such using seeds so that people can take a wise decision about whether to use it or not.

It usually seems that the researchers in science and technology including social sciences may not be very apt in communicating their findings to the public which would bring about a lot of benefits if utilized in our day-to-day life. It is fortunate if the researcher is also a good communicator. In those cases where it is not so, the tribe of science communicators have to bear the responsibility of carrying those developments to the masses so that they can utilize them and benefit from them in the long run.

At this point it is highly important to observe a few salient points of the profession such as – language, medium among others.

The target audience of such communication efforts may be several and the communicator has to prepare the communiqué in a language that is conveniently understandable to them rather than the highly-scientific language the researcher is used to and understands. The communicator must be able to rephrase the developments in simple and easily-understandable language for the lay man. This shall ensure that the benefits do trickle down to the maximum possible number of people in the long run.

Secondly, 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.

1.4 Contents

1.4.1 Science Reporting

As you all know the concept of science is very broad and covers a whole range of subjects, themes, topics and every passing day newer and newer concepts are emerging in the world. Thus Science Communication includes in its fold subjects and themes like pure sciences, medical, agriculture etc. The term Science Reporting is one of the modes of communicating scientific developments.

There are two important aspects to be discussed in Science Reporting.

First of all, science reporting means communicating about anything related to some aspects of science as the name itself suggests. It usually includes presentation of discoveries, inventions, programmes, activities relating to various aspects of science.

Secondly, in addition to simply reporting about the activities mentioned in the previous paragraph, science reporting also entails making people aware about the potential benefits and outcome of such scientific developments.

For example, during last few years ‘nano technology’ has become quite a household word, at least in the academic circles across the world. There has been lot of research studies being undertaken by researchers in different institutions about the future possibilities in this field.

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.

Science reporting is an important specialization in the media with many newspapers, magazines, TV / Radio channels having dedicated columns, pages for this domain on a regular basis. *The Hindu* has a

weekly full-page coverage on scientific developments with different fields on that specific day of the week. At the same time many others sponsor special programmes in TV / Radio.

The programmes, special pages with information, suggestions, consultation facilities on agriculture, medical health issues in the media are also in reality science communication as these are science disciplines.

While in case of science reporting all the normal steps, procedures and precautions of journalism need to be maintained if one wants to be a successful and genuine science communicator, a few additional aspects also need to be observed strictly in this regard.

First of all – whenever a scientist or a researcher in any field of science like medicine, pure sciences etc. comes out with a claim that a new invention or discovery has been arrived at and approaches the media, communicators must ascertain whether the claim is valid or not. For this, one has to approach established and recognized scientific bodies related to that domain like ICMR, DRDO, CSIR etc. to confirm about the authenticity of the claims.

This is so because a science communicator cannot be a judge of the veracity of such a claim unless of course he or she is an expert in that specific field. This additional verification process is all the more important because in the field of science and technology also, there have been quite a few instances when people tried to cheat by making tall claims. Also, such a claim involves the risk of endangering the lives of so many human beings or the society in general.

Let us cite two examples here. In the 1980s decade, one day there was pathbreaking news item in most of the major news media outlets of the country that a student of higher secondary level has successfully invented a system for converting plain water into petrol. While it created a major excitement in the scientific community and also among the masses, yet within a few days it was found out that the claim was a fake one. In this case, even when reporting about it, the media should have consulted at least one scientific body about the authenticity of the claim.

Further, about a few years ago, a prominent medical practitioner in Assam called a press conference and claimed that he has successfully invented medicines for serious diseases including cancer. The media of the state and few from the metropolitan cities published it in a big way. However, the negative point in this regard was that the claims were not authenticated by any established medical research body like ICMR at the national or international level.

Moreover unless the drugs are tested on a specific number of people over a period of years and close observations made for side effects, a researcher is not expected to claim such findings. It is the responsibility of the media persons or the science communicators in this connection equally with the researcher who makes such a claim.

As already mentioned, another major responsibility of science reporting is to inculcate a sense of a scientific temperament among the people. Thus, at times of events becoming more of an emotional issue it is the science reporters or communicators who have to shoulder the task of telling the masses the right thing.

For example, in the first half of 1990s there was a major sensation caused by the phenomenon of Ganesha idols drinking milk. With no disrespect to any religious sentiment or rituals, it was also proved that this has happened because of a certain scientific cause. However, media was used to a big extent in making it an issue of religious sentiment and exploitation by some vested interests.

Similarly, there has been a lot a debates and discussions going on about the big dam issue in Assam and also the Narmada river in Madhya Pradesh and Gujarat. Now, it is the responsibility of the media in the form of science communication to inform the people about the various pros and cons of both the claims – big versus small dams so that people can become enlightened and aware about the reality.

In a way science reporting or science communication as such can also act as a means of ‘diffusion of innovation’. That is, it is one of the major responsibilities and tasks of media to spread information about good practices in any field of life among the masses so that others can also take advantage of the development. For example, somewhere a farmer has managed to get a good crop by adopting simple innovations to his farming techniques or practices, or maybe a community somewhere may have taken a lead in keeping its environment sanitized and clean. One example is the Mowlynong village, near Cherrapunji in Meghalaya which has been recognized as the cleanest village in Asia. These are also grassroots-level scientific innovations and information about them which should be disseminated among the people to inspire others to follow similar paths, if not exactly the same.

1.4.2 Science Writing

Compared to investigative journalism, which strives to reveal truths and expose unethical behaviour, science journalism strongly identify with its sources (scientific results) without questioning. According to Meyer, the contract between scientists and science journalist has always been very strong, which is also the main root for those who criticize it (Meyer, 2006, cited by Barstad, 2011). Today, this definition aligns more with the view of ‘traditional’ science journalism, which views journalists simply reporting about science. But as science is no longer a disinterested activity and increasingly involves political and corporate agenda, its relationship with science journalism is changing. Thus, science journalism is an evolving concept and there are more definitions on what it should be rather than on what it is. (Barstad, 2011)

Science writing may be mainly of two types.

One – writing about general aspects of science and technology issues, explanation of complex happenings etc. for popular awareness among others.

Secondly, to educate people about usage and applicability of scientific innovations in our day-to-day life.

Further, depending upon classification of the target audience of science writing, the themes, sub themes etc. may differ widely in their treatment of the subject or simply presentation of the issue to the masses.

There are a few varieties of science writing that we experience in our society.

One is science fiction – stories, novels, films based on imaginary events based on some unusual and maybe unique possibilities in the fields of science and technology.

Secondly, publication and discussion of results of some research findings of science and technology in reputed journals like *Science*, *Nature*, *Lancet*, *British Medical Journal* etc. to name a few. These journals are mainly research-oriented and targeted at the fellow practitioners of the profession. Publication in these journals is a highly rigorous process with several levels of cross checking by renowned experts in that specific field of activity so that no bogus or artificial claims may be published.

Besides, even after their publication, they are subject to wide scrutiny by interested readers among the target audiences. Thus the entire process calls for a higher level of expertise by the persons intending to publish their findings in them.

Thirdly, there is this category of popular magazines, columns of newspapers etc. where both general awareness and new discoveries, inventions are written about which are important enough to be noticed and taken cognizance of, but usually ignored by the people most of the times.

One such special news magazine is *Down to Earth* published by the Centre for Science and Environment (Delhi) which is dedicated for fighting for improvement of the natural environment of the country. Nearer home, *Bigyan Jeuti* (Assamese), the journal of Assam Science Society (ASS) has been doing yeoman's service since several decades in popularizing different emerging aspects and developments of science in general. It is doing so in a language suitable for a target audience who may not have a background of higher education in science and technology but may be interested in day-to-day happenings in this field.

Attention given to science in most news media is small in comparison to that accorded to business, politics, or even sports and entertainment. In an era of unprecedented technological and scientific advances, many of which have the potential to radically improvise human existence, science news is highly important. Communicating about science and the scientific enterprise is an important responsibility of public science organizations. Although many organizations have communication specialists to help with this responsibility, managers are frequently called upon to decide what information is to be provided

to whom, by whom, and in what form. Indeed, they are often called upon to be spokespersons for their organizations. Yet they are often unprepared to meet journalists' demands for non-technical language, conciseness, and short deadlines. Much science news does not get covered in the mainstream press and may not reach science-interested audiences. (Weigold, 2002)

1.8.1 Evolution of Science Communication in India

Noted science communicator from India, MK Patra, says that various classical scientific texts were created in ancient India, which still form a huge treasure of our scientific and cultural heritage. However, a remarkable gap between scientific knowledge and the common man remained during the entire span of time and almost no efforts were made to bridge this gap. These scientific texts were generally written in technical and classical forms and not in common man's language. Medieval age, however, saw a remarkable phenomenon. Classically-coded scientific literature was made comparatively simpler and written in the popular forms of commentaries and analyses.

One can observe a great tradition of such commentators in our country, who contributed such secondary scientific literature for generations. Our history is replete with this tradition. This was indeed an exceptional attempt towards presenting science in comparatively simpler form. Many of our ancient works, be it 'Aryabhatiya' of Aryabhat or 'Leelavati' of Bhaskar, are available in these forms.

This situation is continuing more or less even today and the gap between scientific knowledge and lay persons is still very wide. Scientific knowledge is still confined around the ruling class and it is very difficult to access such information in common man's language especially from state of the art laboratories.

There have been a few people in various parts of the country, always eager to take science to commoners through their uncommon efforts and with limited resources in more recent times before Independence. The formation of Asiatic Society in Bengal has historical significance. Vigyan Parishad was established in United Provinces (now Uttar Pradesh) at Allahabad in 1913, which brings out Vigyan, a monthly since 1915 without discontinuity. Several other voluntary organizations continued to follow suit. Apart from organizations, several enthusiastic individuals also joined the movement. Some of these were Sir Syeed Ahmed Khan in Aligarh, Ruchi Ram Sahni in Punjab, Swami Satyaprakash in Uttar Pradesh, Shivram Karanth in the south, Hargoo Lal at Ambala, and several others.

After Independence, a number of government organizations also came forward for science popularization. Publication and Information Directorate (now National Institute of Science Communication) began publication of *Vigyan Pragati*, a Hindi monthly in 1952. *Science Reporter* (English monthly) and *Science Ki Dunia* (Urdu quarterly) followed this. National Research Development

Corporation started *Awishkar*, a Hindi monthly and thereafter *Invention Intelligence*, an English monthly. Besides that, institutions like National Council of Educational Research and Training, Central Institute of Educational Technology, Consortium for Educational Communication, Directorate of Agricultural Information and Publication, Indian Council for Medical Research, Developmental Education Communication Unit (SAC), etc. also started spreading scientific knowledge concerning their areas of interest. Indian Institutes of Technology also began their periodicals. Thus, science communication was being taken up at various levels, institutional as well as individual.

With a view to integrate, coordinate, catalyze and support the efforts of science communication and science popularization at micro as well as macro levels in the country, Government of India established the National Council for Science and Technology Communication (NCSTC) in 1982 as an apex body. NCSTC began its activities in 1984. The prime objectives of NCSTC are – to popularize science amongst all the sections of the society, to inculcate scientific and technological temper amongst masses and to promote, catalyze, support and orchestrate such efforts in the country.

In 1989, the Department of Science and Technology established an autonomous organization Vigyan Prasar, which undertook the task of mass scale development and dissemination of software for popularization of science and technology, such as TV programmes, audio cassettes, CD-ROMs, publications, etc.

The National Council of Science Museums (NCSM) under the Ministry of Tourism and Culture (Government of India) is also contributing in this direction through setting up of science centres, science exhibitions, science fairs, science city and science museums, etc.

The Ministry of Environment and Forests (MOEF) of Government of India has planned to create environmental awareness through ecology clubs in schools. All India Radio, Doordarshan, and other TV channels broadcast and telecast various science programmes. Central and state governments, Birla Group and Jawaharlal Nehru Memorial Fund have established several planetariums at various places in the country. Diverse other attempts towards science communication and popularization are being made at governmental, non-governmental, voluntary, private and individual levels.

Further, in order to make India more scientifically advanced and ingrain a scientific temper in people, science communication must reach to the audience. So, there is an urgent need for the development of scientific materials in Indian languages to reach every corner of our country.

Several programmes and initiatives have been launched to promote and communicate science by bridging the gap between science and common masses through diffusion of information. The primary concern is to help science and scientific cultures penetrate India's diverse society, and to transform it into a nation of scientifically-thinking and scientifically-aware people (Patairiya, 2002).

Science writing or science journalism remains undeveloped in India though it had a good beginning in the early 1950s, and there are many dimensions to the problems of science communication. It has not progressed to a desired stage yet. The larger segments of the population do not even have access to scientific knowledge due to illiteracy. Also because of absence of seriously-planned agenda for disseminating scientific knowledge to a traditional community. (Mochahari, 2013)

The concept of scientific temper is well known in India. Developing this concept is one of the fundamental duties of a citizen of the country and is enshrined in the Fundamental Duties of the Constitution of India. But the concept is far from known to the Western world. (Malhotra, 2012)

1.4.4 Importance of Science Communication

Think about the places where you find science. For most people, science is something they learn most about in school; after that, most of the science people see or hear about is in the mass media. In other words, science is something one does at school when one is young and is something one sees on TV or read about in newspapers or online when you are older. If one's job involves science one will become a specialist in that area, but probably will know no more about other areas of science than anyone else. But science plays an important and complicated role in our lives, so being able to understand, learn about, question and critique science is an important part of modern life. Most people only spend a small part of their lives at school. This means that the science one learns there will probably not be enough to help one to understand and contribute to the scientific debates of one's life. From personal decisions about health care, which car to buy or whether it's ok to eat the chicken that has been out of the fridge all day, to bigger, societal decisions about military technology, online privacy or stem cell research, helping people to understand the science involved is crucial. Science Communication has an important role to play in helping people to learn about science, to understand science issues when they hit the news and to have a voice in debates (Dawson, 2013)

Carl Sagan's saying that it is suicidal to create a society dependent upon science and technology in which hardly anybody knows about science and technology is indeed a profound statement. In today's world, we can't afford to have people who are science-illiterate. They require a minimum level of science knowledge even for their (and others') routine lives. Science & Technology (S&T) is essential to lead a healthy and happy life apart from being able to handle gadgets comfortably but the question of scientific temperament (also enshrined in our Constitution) is more important. Hence S & T communication should be taken in a wider sense here (Nautiyal, 2006).

Keeping several related issues in view the National Association of Science Writers (NASW, India) has prepared a comprehensive handbook on science communication primarily to increase understanding of journalists' needs. Its target audiences include - scientists, engineers, physicians and others who head

committees to handle media arrangements for meetings, conventions, conferences, and symposia — especially those who do not have professional public relations help. It is also intended as a guide for public information officers (PIOs) to help them cooperate effectively in telling the story of science.

NASW says that 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. The most important single information source for the public about science and technology is the media. Thus, helping science journalists to produce factual, intelligible, timely information is critically important to society.

Also, publicity helps communicate scientific information among researchers. Experience has shown that after a piece of research is publicized, a scientist usually receives a significant number of requests for further information from fellow researchers, many of whom may have missed the published scientific paper or meeting or talk. Particularly important in this era of interdisciplinary research, such contacts often come from colleagues outside the scientist's discipline. These may result in useful collaborations or new insights into the scientist's work. (NASW)

Cooperating with the media also makes it far more likely that the resulting stories will be accurate. As research becomes more complex, even the most expert science journalist finds it extremely difficult to keep up with the fields one covers. Regardless of the scientists' cooperation, journalists will cover a significant piece of research news. So, issuing carefully-worded releases and explaining the work in interviews will help make that coverage more accurate. (NASW)

1.4.5 General Communication versus Science Communication

At this point the question that arises is how to approach Science Communication for a better and improvised understanding of the issues being wanted to be communicated to the target audiences at any given point of time. We have already mentioned that communicators involved in this field have to maintain a few additional responsibilities than compared to usual communication efforts. This is because science communication requires much more gate-keeping and filtering before anything should be published or broadcast.

Here a few critical questions have to be answered before proceeding for the job if the communication is to be successful and meaningful.

First of all, in the process of science communication, there is an urgent necessity and presence of a breed of communicators who may be termed as 'professional communicators'. They have to be apt in performing as a bridge between the researcher, research institution or repositories of knowledge from where the knowledge or information have to be taken to the masses in a language they are comfortable with.

The problem is made more complex by the fact that majority of researchers, whether in pure sciences, social sciences, humanities may not be quite good in expressing or presenting whatever they have found out in a lucid language.

So, presenting things in the field of science communication is a far-more challenging job than general communication.

Next in question is the educational background of the communicator – whether one is from science background or otherwise. And whether the person possesses at least some basic understanding of science and technology among others. As in most of the cases journalists are generalists assigned to specific beats, here also it is not absolutely necessary that one must have a science education background for communicating science and technology issues for a media organization.

But it is expected that if the communicator possesses it, it would be convenient for the person to carry out the job.

Further, consideration of background of the target audience is also highly significant here. Depending upon whether it is children, adults, professionals with a pure science and technology background, or amateurs interested in learning about scientific phenomena, the presentation style must differ.

For the specialized audience like people with high education in the field in a specific domain, there is no need for writing in popular language digressing from one's pure science language.

But, if it is a programme or a write up for children things have to be explained in a different language from that of the one to be employed for adults.

Further, we know that in case of general reporting if a prominent personality or organization says something on record that can be quoted as an authentic source of information. However, in case of science and technology communication including medical, agriculture etc. unless the claims about a specific invention or discovery has been authenticated by a higher body of research or a peer group, it can't be accepted as true to be reported.

Here, responsibilities lie on both sides of the coin. The researcher on his or her part has to furnish adequate supporting documents about the research findings or results being recognized as original and innovative. The journalist or communicator on his or her part has to insist upon such proof or cross check and verify such claims on their own. This is because 'mis-informing' unsuspecting target audiences is a criminal offence which is very much against the ethical standards of communication.

1.5 Summing Up :

In the discussions above, we have come across ideas and concepts on the following aspects –

- Science communication has a two-fold idea – informing people about innovations and developments in the fields of science and technology in a language that common men can comfortably understand and thereby improve their lives by applying this knowledge in real life. And also inculcate a scientific attitude in the minds of the masses.
- Science communication can be carried out in different styles including programmes in TV / Radio, news and features in print media, films, science fiction in its different forms etc.
- Science reporting and writing involves a lot of gate-keeping, scrutiny and cross checking and minute verification of the information to be broadcast or published as these information have the potential to influence the lives of so many people in the society.
- Further, depending upon the personal and educational profile of the target audience, the communicative approaches in this domain shall be different from each other.
- Inculcation of a scientific attitude and at least some amount of basic knowledge about science and technology are highly important for a society's overall development in the near as well as distant future.
- It can help us improve our living standard, discard myths, superstitions, unhealthy practices in our day-to-day life and thus it is so important for society to be called modern in the proper sense of the term.
- Our country has an impressive history of science communication in different forms. Though there was a fall in the smooth flow of the domain at some point of time, things are improving in the last few decades with serious efforts at both government and non-governmental levels facilitating its gaining momentum over the years.
- Communicating science and technology requires some additional precautions, checks and balances than general writing. This is essential for establishing authenticity of the information and claims of findings and research results need to be ascertained from an independent body of experts always.
- Both the researchers and communicators have a mutually exclusive responsibility of presenting only those findings, knowledge which have been recognized by reputed and established research institutions in their respective fields of study.

1.6 Suggested Readings:

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1. 6 Probable Questions

2. What is your understanding of the term 'science communication'? Why is it important for our life?
3. Describe the growth and development of science communication in India. Is it in a satisfactory status at present?
4. What are the aspects that science communicators and researchers involved in the domain need to observe while making an effort to communicate science and technology to the masses? Does it differ from that of general communication? If so, how?

1.7 Assignments:

1. Take three daily newspapers of these types – one in Assamese or any other regional language, one English regional newspaper, one English National newspaper from either Delhi or Kolkata. Analyze them for one full month and try to find out the total number of science communication items in each one of them. Also, try to find out the number of different issues or themes addressed by these items. State if you are satisfied with such a result (whatever finding you arrive at).
2. Try to figure out how would you carry out the task if you are assigned to teach scientific phenomena like the mysteries behind the forming of the rainbow, lightning, international date line etc. to students of class IX and X. Further, how would you measure the success of your communication efforts in this regard?

Unit 2 : Reporting for Science Communication

1.1 Objectives

1.2 Introduction

1.3 Skills required for science communication

1.4 Science Popularization activities

1.5 Science Communication for woman, children, literate persons and illiterate persons

1.6 Reporting for medical issues

1.7 Summing up

1.8 Suggested Readings

1.9 Probable Questions

1.1 Objectives

This unit is expected to make the learners familiar with the following aspects ---

- Skills required for science communication
- Various science popularization activities and efforts undertaken at different levels
- Different aspects of science communication for various target audiences
- Nuances of reporting for medical issues

1.2 Introduction

In the very first chapter of this course we have learnt what science communications is about and its significance for the modern day world along with many other aspects related to the domain. Here, we are going to discuss about the skills needed for the purpose. While the skills necessary here are more or less common with those required for reporting for general purpose mass media, yet a few additional ones are necessary to be possessed by the person interested in this profession.

Thus, we can safely say that the following additional skills or techniques are required in this connection -

- at least a general if not deep understanding of scientific issues and matters, particularly for those we need to deal with on a day-to-day life basis,
- overall understanding of scientific innovations in the present day world
- ability to convey in simple language – whether electronic or print or new media – complex scientific data or information which have the potential for bringing in improvement of our living standard in future

In the last about two decades science has delivered dramatic results relevant to health, survival and lifestyle. In many cases the pace of scientific change has accelerated beyond what the public can keep up with, let alone comprehend and accept.

Within the international scientific community there is an increasing awareness of the duty and responsibility of publicly-funded scientists to make their work more accessible to the general public. For many scientists public communication does not come naturally, and even when they are willing to get involved, they need some help.

Journalists, on the other hand, are often intimidated by science and don't know where to find credible science stories and media-friendly scientists.

Within a democratic society where science must be answerable to the public, there is a real need to find new and innovative ways of more effective mass communication about the benefits of science, and also areas of concern to the general public.

Mass media undeniably is the major role player in stimulating public debate and shaping public opinion on scientific questions and issues. If scientists don't engage the media effectively, people with opposing views will do it. Silence and avoidance on the part of scientists will fuel ignorance and mistrust of science.

Thus, scientists have to accept that they must operate within the parameters and news values of the media. Worldwide science reporting is moving towards debate and issues around the impact of science on society.

Just like good science, good communication requires commitment, planning, skills and appropriate levels of resources. {The South African Agency for Science and Technology Advancement (SAASTA), 2014}.

On the other hand the www.currenteventscience.net defines science reporting as that branch of journalism employing the art of reporting to communicate facts regarding science topics which is known as Science Reporting. Spreading scientific information through mass media requires specialists from scientific communities and the news world.

The most basic task of a science journalist is to take detailed and often jargon-laden facts put

together by scientists, and turn it into readable and easily-understandable content. The test is to present the facts fittingly while allowing the lay person to comprehend the information accurately.

Science journalists are inducted after training in disciplines that they cover. Besides a degree in the scientific field, reporters have to exhibit talent in writing about science subjects. The fundamentals then get them to decipher scientific content to what it will mean to a common person. Scientific news and interaction between the scientific community and news media has increased tremendously. Care needs to be taken to dissuade journalism from sensationalizing speculative theories about science. Facts need to be stated as they stand.

Since science focuses entirely on facts and empirical measurement, science journalists should be cautious in their reporting. Very often the public gets confused with disagreements within the scientific community and so reporting must be specific for the intended audience

The world needs awareness on current science happenings and events. People need to know and be updated on issues of vital importance about the state of living sciences to be able to abide by fundamental aspects of life and living situations. More so about issues that directly or indirectly affect their well being.

A positive trend being observed is that media encourages the public to be aware of and participate in understanding the world in which they live. It becomes important to create awareness and assimilate current science events that have a bearing on sustenance of life and living itself.

A whole lot of scientific areas are under the media scanner. By involving the public at large, a deeper understanding is created that allows everyone to learn to take a closer look at vital issues affecting them. Many issues of importance thus knock at the doors of common people seeking their active understanding.

Science journalism takes current events like environment education, stem cell research, DNA testing or cancer research etc. to the public at large. They learn to observe the world around them and understand how scientific deductions participate in governing the world better.

Getting people to thoughtfully reconsider current science events not only allows them to develop an interest in themes affecting their life in general. It also allows them to look at life from a scientific perspective even if only in layman terms.

1.3.1 Skills for Science Reporting :

The universal skill ‘nose for news’ needed even in general reporting life is again quite important here. This is because the science communicator must be able to pick up a hint for a better and cracking

news the moment one gets to know something that has been developed in the science circles across the world.

For example, in the field of agriculture an innovation was adopted called ‘swallow tube wells’ which is nothing but tube wells not too deep from which water can be easily sourced for irrigating one’s paddy field. This innovation led to a bumper rise in rice crops in Assam about 15 years back which was apparently a good development.

However, a science communicator or reporter needs to look deeper into the issue and raise questions about how sustainable this system was. And also how feasible this would remain in future for irrigation purposes as this resource was used without any rational usage thereby leading to the probability of fast-depletion of the existing water table.

Similarly, the price of diesel has been kept lower than petrol for quite sometime now. Also, because of fuel cost economy, prices of diesel vehicles – both commercial and private ones – are higher than petrol versions. In this regard, the reporter in a science communication establishment has to look at issues of the future – how long this differential price policy may continue, how far diesel reserves would last. And most importantly, what is the level of polluting capacity this variety of diesel used by the motor vehicles in such large numbers.

Besides, the persons getting ready to communicate scientific matters to the public must himself or herself be satisfied and clear that the innovations being planned and to be carried out are sustainable and feasible enough without any negative development which may be experienced only after long years of their implementation in public domain.

The attitude of the science reporter must be to open up both positive and negative aspects of any issue involving our life and let the people – or target audiences decide which of these are to be adopted for a better living standard.

Further, one must always question any new claim for developments in science and technology with a promise of enhancing our lifestyle. The reporter must make independent inquiries about its various pros and cons, whether the relevant authorities in this field have certified it or not, if there is a possibility of any hidden agenda behind such announcements etc.

1.3.2 Science Popularization activities

This is one area which is highly important for igniting a sense of scientific attitude in the minds of all the target audiences. More so among children with tender minds as they are the ones who would be tomorrow’s citizens and thus have a claim on priority in addressing them. This is one interesting form of communication of science as it requires simple ways of showcasing scientific developments to

people with hands on experiences many a times. And thereby instilling the sense that is wanted to be ingrained into the youngsters' minds.

The final report of an international workshop on Popularization of Science and Technology (February 2-5, 2004) at Rio de Janeiro (Brazil) quite aptly sums up the whole issue. The popularization of science and technology is broadly understood as the system of measures aimed at the dissemination, appropriation, and valuing of science and technology goods, which include critical thought, ideas and values, the history and sociology of scientific knowledge, how science is practiced, and the results of scientific research and technological development. In this broad spectrum, the popularization of science and technology plays a central role in the socio-economic, cultural, and environmental development of the countries in the Americas. In socio-economic terms, the popularization of science and technical vocations encourage talent for scientific research, technological development, and intellectual endeavors in general.

It fosters creativity and innovation, further contributes to producing better trained human resources, expands social opportunities, and strengthens the educational system. Culturally and environmentally, the popularization of science enhances the critical sense of the population, by increasing its involvement in decision-making and contributing to democratic stability and sustainable development.

Lastly, the popularization of science helps to enhance personal satisfaction and self-esteem in the population. At present, with the growing importance that science and technology have taken on in all arenas of social life, the popularization of science is increasingly becoming a very significant strategic issue. It fosters creativity and innovation, further contributes to producing better trained human resources, expands social opportunities, and strengthens the educational system. Culturally and environmentally, the popularization of science enhances the critical sense of the population, by increasing its involvement in decision-making and contributing to democratic stability and sustainable development. Lastly, the popularization of science helps to enhance personal satisfaction and self-esteem in the population. At present, with the growing importance that science and technology have taken on in all arenas of social life, the popularization of science is increasingly becoming a very significant strategic issue.

“We live in a world dominated by science and technology, but a world in which people are increasingly isolated from it. Science grows ever more specialized, yet, if we are to understand the changes we see in the world's environment and be part of the drive for a more sustainable future, science must speak in a language that is understandable, compelling and inclusive. That's what Popularizing Science is all about: Seeking better ways.” Centre for Science Communication, University of Otago, New Zealand.

As science popularization has assumed a major importance over the decades quite a few organizations, institutions at national and global levels have adopted various innovative measures for achieving success in the purpose.

For example, this is one of UNESCO's oldest programmes, with the UNESCO Kalinga Prize for Popularization of Science celebrating more than 60 years of its establishment. This is in addition to the World Science Day for Peace and Development that is celebrated worldwide on 10 November each year since 2001.

Another significant activity by this world body is the adoption of international years. That is - at a time when so many decisions are being made on the basis of science, it is becoming increasingly important to inform the public about the issues at stake. Within the United Nations, UNESCO has taken the lead for a number of international years in order to alert the public to key issues, such as sustainable water and land management or the need to embrace 'green chemistry'. Few others include - International Years for Freshwater (2003), Physics (2005), Deserts and Desertification (2006), Planet Earth: Earth Sciences for Society (2007), Astronomy (2009), Biodiversity (2010), Chemistry (2011), Water Cooperation (2013) and Crystallography (2014) etc. The next International Year in which UNESCO will play a major role will be on Light (2015).

Besides, in October 2002, UNESCO launched a quarterly journal, A World of Science, to popularize issues relevant to the organization's work and draw attention to the themes of international years. Stories cover the full spectrum of UNESCO's science programmes, including bio-diversity and land management, earth sciences, freshwater, oceans, research for health, natural disasters, astronomy, physics and chemistry.

Science journalism : A UNESCO initiative :

Quality communication of science to the public demands rigorous reporting by science journalists. Since 2004, UNESCO's Communication Sector has teamed up with various partners to organize training workshops for media professionals to improve reporting on HIV/AIDS. For example - the training workshop for journalists in Central Asia in 2008. UNESCO has also set up a Global Network of Television Producers; the African branch of this network produced short documentaries on HIV and AIDS in 2005. Five years later, a series of eight films (DVD) on HIV and AIDS, entitled Positive Life, were produced in Asia by UNESCO's Network of Young TV Producers on HIV and AIDS, in collaboration with the Asia Pacific Institute for Broadcasting Development.

Science museums :

UNESCO provides technical assistance for the development of science centres and museums.

Since 2004, it has been actively involved in setting up centres in Bahrain, East Jerusalem, Malaysia, Morocco and Yemen, among others.

Science exhibitions :

Periodically, UNESCO contributes to international exhibitions designed to build public awareness of science and technology. Examples of travelling exhibitions are Experiencing Mathematics (2004) and the Biodiversity Exhibition (2010).

At the national level also, several similar initiatives have been taken up for furthering the scope of the domain over the decades.

We can mention about the efforts of National Council for Science & Technology Communication (NCSTC) – a unit of Department of Science and Technology, Government of India, Vigyan Prasar (VP), National Institute of Science Communication and Information Resources (NISCAIR), Assam Science, Technology & Environment Council (ASTEC), National Council of Science Museums (NCSM), National and State level Children's Science Congress among others.

VP has a whole lot of audio-visual programmes broadcast regularly on various issues of the theme for the benefit of both children and others interested. It also regularly organizes workshops, seminars for resource persons in related themes, publishes books, booklets, monographs and initiated VIPNET clubs in schools across the nation etc.

The science and technology departments in various state governments have also undertaken similar activities over the years.

The NCSTC promotes the theme through awarding detailed research projects in various aspects of science communication, annual prizes for books on science communication both in Hindi and English among other schemes.

The NCSM has a series of science museums across the country where any person irrespective of whether being a child or an adult can experience different scientific aspects of nature and the physical world. They can also participate in the experiments so that their understanding can be enhanced with a practical demonstration of the activities that they may have been only reading about in the textbooks.

1.3.3 Science Reporting for various target audiences – woman, children, literate, illiterate persons

In any kind of communication a few basic tenets can be summarized as ---

- Having a prior idea about the media that a specific target audience uses on a regular basis so that communication efforts prove to be suitable to that media.

- A communication strategy and a combination of media outlets for addressing that particular target audience
- Correct choice of suitable contents, language for matching the intellectual level of that target audience etc.

For example, if we need to address woman for science communication efforts, we need to keep in mind the fact that a considerable portion of our woman folk are housewives who need to remain at home for most part of the day with a lot of household work leaving them with a very less amount of time to devote for anything else.

Again, a much bigger percentage of young women today are attending formal educational institutions at different levels from high school to universities than compared to earlier years. Science communication for woman must also take into consideration these facts while preparing contents targeting this section of our society.

Similarly, for addressing children, a science communicator must take into consideration the usual channels or media which they patronize or like, such as cartoons, comics in printed form, TV or cinema if one wants to become successful in this field. For dealing with children in this regard, magic is one interesting aspect which they like and can be roped in to create a deeper interest in their minds about various practical aspects of science communication.

For literate persons, this is somewhat easier to be carried out as the person can be expected to have a basic minimum understanding of scientific themes which are to be discussed at various levels. Of course, literacy does not proportionately mean an equal level of understanding of different issues on offer. Also, there are quite a few media available which can be utilized for targeting this segment of audiences like – print media, electronic media, new media etc.

However, addressing the segment of illiterate community may prove to be somewhat tricky as this would entail employing different media like mainly the electronic media, cinema, folk or traditional media to explain a certain issue to them. This is because as the communicator shall not be able to utilize the benefits of the written words in this field.

Thus, we can see that it is a huge challenge for science reporters or communicators alike in devising suitable contents and strategy of communicating different issues to the specific target audiences in an effective manner.

It is yet another uphill task to present common science communication contents which would be universally acceptable for all these categories of target audiences alike.

Hence, it is a better option to take up suitable strategies for different target groups separately depending upon their specific requirements and level of understanding among others.

Besides, although large news organizations often have reporters with some scientific education to specialize in writing about science and technology, in most smaller newspapers, radio and television stations, this task is left to general reporters. Whether you are a specialist or a general reporter, you should remember the following basic principles :

- You are a bridge between the world of science and your community. You do not need to know as much as the scientists. You simply need to be able to put the relevant parts of their knowledge into words which your audience can understand.
- You do not have to understand the whole of any field of science yourself, but you must not write anything you do not understand. If you write something you do not understand, you risk making errors.
- Although the aim of scientists is precision, and the aim of journalists is simplicity, there should be no conflict between the two. You must be able to express the precise details of science accurately in simple terms. That is the real challenge of reporting science and technology.
- Most science and technology will have human applications. For every story, you must ask yourself: "How will this affect my readers' or listeners' lives?" Your job is to describe what those affects are. Some science, such as astronomy, has no impact on our everyday lives, but is interesting in what it tells us about our universe. The task here is to report it in an interesting and informative way.
- You must always be accurate. Science is built on accuracy.
- Your readers or listeners usually trust science. Often, in fields such as medicine, their lives may depend on it. You should not alarm them by making sensational claims which may not be true.

Guidelines by Royal Society

Further, a comprehensive set of guidelines on science and health communication (November, 2001) was prepared by the Social Issues Research Centre in partnership with the Royal Society and the Royal Institution of Great Britain.

At the outset, while admitting that – no guidelines will ever be ‘perfect’ in the sense that they cover all eventualities and eliminate all types of misrepresentation, even when followed to the letter. Thus this special set of guidelines shall consider amendments and additions to the guidelines from time to time, in the light of on-going consultation with members of the media and the science communities, to be published as updates. Through this process of open and non-confrontational exchange, we very much hope to achieve not only more balanced and accurate reporting of health and science issues, but also much improved working relationships between scientists and the media.

It provides the following checklist to be adhered to by those involved in this profession. These are made to ensure that various aspects of reporting in this regard are followed effectively such as -

1. Credibility of sources

- Have the findings been published in a peer- reviewed journal?
- Do the researchers have an established track record in the field and are they based at a reputable institution or organization?
- What are the affiliations of the researcher?

2. Procedures and methods

- Were the research methods appropriate?
- What do other professionals in the field think of the methods?

3. Findings and conclusions

- Is this really a 'breakthrough'?

4. The significance of findings

- Are the findings preliminary or inconclusive?
- Do the findings differ markedly from previous studies?
- Do these findings appear to contradict mainstream scientific opinion?
- Are these findings based on small or unrepresentative samples?
- Do these conclusions generalise to humans from animal studies?
- Have the researchers only found a statistical correlation?

5. Communicating risk

- Has the risk been expressed in absolute as well as relative terms?
- Can the risk be compared with anything else?
- Have the researchers been asked 'how safe is it' instead of 'is it safe'?

6. Anticipating the impact

- Will the report cause undue anxiety or optimism among audiences or readers?
- Have important caveats been prominently included?

7. The role of specialist correspondents and editors

- What do specialist journalists think about the report?

8. The role of sub-editors

- Is the headline a fair reflection of the report?
- Is the caption a fair reflection of the report?

9. Expert contacts

- What do other professionals in the field think of the research?

Further, the website www.mediaforscience.com in its report datelined Madrid, May 12-13, 2010 has the following to present to the audiences concerned in the field of science reporting ---

Communication between science and society is crucially important: it informs the broader public about issues related to science and technology, it informs science about societal perceptions and expectations, it makes scientific expertise publicly available, it has an impact on policy-making and agenda-setting, it affects the legitimacy of research, and it plays a major role in the governance of science, technology and risk.

Science communication may be able to help to establish a transparent and open form of communication in both directions that contributes to defining the role of science in society, and to enabling society to make the best use of scientific knowledge.

The internet has the potential to change dramatically the relationship between the providers of information and the general public bypassing gatekeepers in traditional media. The internet offers the possibility for scientists and science research centres to be in direct touch with the general public interested in science. Many think of the internet as a gigantic encyclopaedia on all subjects and this certainly applies to scientific information. However, the internet itself is a highly structured medium, and people need training to understand how and why some information is easier to find and how this can change over time and across different platforms.

A new study by the Pew Research Center's Project for Excellence in Journalism, which takes a close look at the news ecosystem of one city came up with an important observation. It says that while the news landscape has rapidly expanded, most of what the public learns is still overwhelmingly driven by traditional media - particularly newspapers.

Significantly, an article titled "Science Communication Reconsidered," published in the journal - Nature Biotechnology (June, 2009) has outlined eight steps in making science communication more effective and productive. It presents the collective recommendations made by a college of international experts in science, media, and policy at a science communication workshop in Washington, D.C., USA, organized by the Health Law Centre at the University of Alberta.

These steps are as follows:

- 1) Scientists and science organizations should pursue a trust and dialogue-based relationship with the public. More forums, conferences, and other public dialogue initiatives should be held.

- 2) The goal is not to persuade or sell the public on the importance of science, but to “democratize” public input about scientific issues so that members of the public can meaningfully participate in science-related decision making.
- 3) Scientists and science organizations need to recognize the importance of framing science-related issues. Science communication efforts need to be based on careful audience research.
- 4) Different frames of reference that better communicate the nature and relevance of scientific issues across a diversity of audiences should be identified and tested. This research on framing can be used to structure dialogue and to move public discussion beyond polarized arguments and entrenched positions.
- 5) Graduate students (those at Master’s degree level) at science institutions should be taught the social and political contexts of science and how to communicate with the media and numerous publics. These students are future spokespeople and decision makers. They need to understand the significance of research in the field of science communication. These programmes should include specialized electives for doctoral students but also new interdisciplinary degree programmes that combine scientific training with course work in communication, ethics, and policy.
- 6) Factors that facilitate media hype and errors should be recognized and addressed. Researchers should resist the temptation to describe their studies using inflated metaphors and terminology, such as “groundbreaking,” and remain true to the significance of a study.
- 7) Research funding and methodological details need to be included in media coverage so that the public may better assess credibility. Short term gains in media credibility should not be valued above longer-term relationship building with journalists, decision makers, and the public.
- 8) Science communication initiatives should investigate new forms of digital media and film to move beyond traditional popular science outlets, such as science newspaper columns, science magazines, and television programmes like PBS’s NOVA. This includes finding ways to create opportunities online for incidental exposure among key audiences not actively seeking news, information, and science-related content. Scientific organizations need to track science-related media coverage (news, entertainment, etc.) to be aware of the numerous cultural contexts through which the public interprets science.

It needs to be mentioned here that National newscasts, talk radio, blockbuster films, entertainment TV, and late night comedy provide broader audiences with alternative messages about science topics and can be important outlets for science communication.

Journalism schools and news organizations should develop a science policy beat to address the gap between journalists covering science and those covering politics. Developing such a beat and training journalists to understand both science and policy would provide important background for science policy debates.

Also, a study of the following table shall make it convenient and clear about the advantages and disadvantages of different types of media while presenting science communication contents for target audiences concerned ---

Medium	Advantages	Disadvantages
Traditional journalism (both print and broadcast) e.g.: <ul style="list-style-type: none"> • Newspapers • Magazines • TV • Radio 	Large potential audiences (potentially millions of people) High quality due to being Overseen by professionals (e.g. journalists). Traditionally recognized as agenda setting Audience selection is possible through appropriate choice of publication / programme	Scientists lack control of how the media covers their work tends towards one - way communication frequently provides a limited or superficial focus
Live or face-to-face events e.g.: <ul style="list-style-type: none"> • Public lectures • Science Centres And Museums • Debates & dialogue • Science busking • Sci---art • Science cafes • Science Festivals 	More personal – Involves a direct interaction between scientists and publics Scientists are able to better control the content engenders two-way communication Can involve partnering with other external organizations with complementary expertise	Limited audience reach (tens to Thousands of people) Resource intensive, leading to low sustainability of activities Can be criticized for only attracting audiences with a pre- existing interest Online interactions e.g.: <ul style="list-style-type: none"> • Internet sites incl. online journalism • Blogs, wikis and podcasting • Facebook, twitter and other social media • Citizen Science Large potential audiences (potentially millions of people) Can allow direct interaction between scientists and publics Initial content can be controlled by the scientists... Caters for both one-way and two-way communication, depending on audience's preference Always accessible; suits the

		audience's time preferences
<p>Online interactions e.g.:</p> <ul style="list-style-type: none"> • Internet sites incl. online journalism • Blogs, wikis and podcasting • Facebook, twitter and other social media • Citizen Science 	<p>Large potential audiences (potentially millions of people) Can allow direct interaction between scientists and publics Initial content can be controlled by the scientists... Caters for both one---way and two---way communication, depending on audience's preference Always accessible; suits the audience's time preferences</p>	<p>Can encourage superficial or 'jokey' interactions ...but it is very difficult to control how the content is picked up by others Requires regular attention to maintain profile Requires key communication skills that may not be immediately apparent</p>

Adapted from Bultitude (2010)

Bultitude, K. (2010). Presenting Science. In Brake, M.L. and Weitkamp, E. (Eds) Introducing Science Communication. London: Palgrave MacMillan.

1.6 Summing up

In this unit we have come across the following important points ---

- A science communicator is a bridge between an institution or organization and the masses for the benefit of the society by making precious information easily available which possess the potential of enhancing the living standard by their application in the day-to-day or future life.
- A science communicator needs to be extra cautious and to some extent skeptical in nature so that anything and everything does not get published or broadcast as innovative scientific developments. Rather, only those findings which satisfy a broad spectrum of evaluation panels before something is comprehensively established should be passed on for presentation to the people.
- Organizations even at a global level are engaged in the business of popularization of science and technology for the benefit of the people including the UNESCO.
- Many state governments and agencies of Indian government are actively engaged in this activity so that a scientific attitude can be formed amongst the masses in a constant endeavour.
- While reporting for specific target audiences like woman, children, literate and illiterate persons alike, the approach must be definitely different from each other while carrying this out. However, it may not always be possible to approach different ways and means to address such a diverse and wider range of target audiences.
- Under the above circumstances, it would be a challenge to devise a suitable and effective means for addressing these target audiences at any given moment of time.
- The guidelines prepared by the Social Issues Research Centre in partnership with the Royal Society and the Royal Institution of Great Britain as mentioned above apply to most of the reporting jobs including science communication. So these principles and aspects should be strictly adhered to while reporting science and technology matters.

1.7 Suggested Readings

Report from the Workshop on the Popularization of Science and Technology, February 2 to 5, 2004, Rio de Janeiro, Brazil,

Science Communication & Science Journalism, Meta-Review. www.mediaforscience.com, May 12-13, 2010,

Bultitude, K. The Why and How of Science Communication. University College, London. European Commission (2011),

Eperen, LV, Marincola, FM, Strohm, J. Bridging the Divide between Science and Journalism. Journal of Translational Medicine 2010, 8:25. <http://www.translational-medicine.com/content/8/1/25>

Guidelines on science and health communication. Social Issues Research Centre in partnership with the Royal Society and the Royal Institution of Great Britain

1.8 Probable Questions

1. Briefly discuss the skills necessary for the profession of science reporting.
2. Describe a few efforts in the field of science popularization by national and international organizations. Which among them do you feel are more effective and productive ? Why ?
3. What approach should be adopted by a science reporter in communicating different aspects to various target audiences ? How would you prepare yourself in this regard ?
4. What kind of precautions one should take when reporting on medical issues ? Why ?
5. What are the advantages and disadvantages of various media in reporting for science communication contents ?

Unit 3 : Writing for Science Communication

1.1 Objectives

1.2 Introduction

1.3 Contents

1.3.1 Language for Science Communication

1.3.2 Coverage of Science and Technology Events

1.3.3 Creating a scientific attitude among masses

1.3.4 Science communication for people without a science background

1.3.5 Developing a suitable language for communicating high end knowledge for mass consumption

1.4 Summing Up

1.5 Suggested Readings

1.6 Probable Questions

1.7 Assignments

1.1 Objectives

A thorough study of this unit shall make you well-versed with the following aspects ---

- Basic tenets of writing for science communication
- Principles and guidelines for covering science and technology events for the benefit of the target audience
- Establishing a scientific attitude in the minds of the general public
- Communicating scientific developments for target audience without the advantage of science background
- Developing a convenient and comprehensive language in different aspects for the masses in the domain of high end knowledge findings

1.2 Introduction

A judicious integration of communication and science has many benefits. For teachers, it enables them to better utilize time while making natural connections between subject areas. For students, they are able to recognize these connections and see the purpose in what and why they are learning communication skills and the application of these skills to all aspects of their learning.

Science is rich with opportunities for communication. This includes among others, scientists' meetings to discuss ideas and investigations, science journals to record observations and data, or the use of trade books to help illustrate concepts. Science also lends itself to student research, especially with topics such as the solar system that tend to be less hands-on and more content-based. These research-driven topics allow students to pose questions; research ideas and concepts using a variety of print and internet-based resources; write a report, procedure or persuasive essay; utilize the writing process to edit and revise; and then present what they have learned. (Lavallee, 2010).

The essence of effective science communication is the development of content-rich, jargon-free, communication-based materials. Content-rich refers to communication which is replete with data and ideas. Jargon-free refers to the elimination of shorthand notation that scientists use to communicate within their peer groups - this means removing acronyms and maintaining a common language basis for explanation of concepts. Communication-based refers to focusing on the intended audience and providing an even broader base of accessibility for a wider audience.

Effective communication is an important part of doing science. There are several ways in which attention to the communication aspects of science can also improve science. Completeness envisions the 'story' that is being conveyed and can lead to a more comprehensive research programme, in which each element of the story is addressed. Having conceptualized the 'storyline' for the science communication product, holes or gaps can be filled-in in order to make the story complete. Context is - identifying linkages and developing comparisons that can lead to important insights. The search for explanations of temporal or spatial comparisons often leads to a fresh perspective on the data. Visualization is a powerful communication tool which can provide unique insights.

Today, communicating is considered a strategic function by the majority of organizations which interact in our social system. It identifies and justifies them, allowing them to gain consensus and to work to achieve the objectives that all systems have - to survive, to protect themselves, to obtain resources, and to grow. (AnnamariaTesta, Europa).

The vast majority of scientists will agree that, spoken or unspoken, it is absolutely natural to desire the dissemination of research, be it one's own or from one's field of study. Whatever the reason for deciding to communicate, if you are not able to transmit your own passion it will be very difficult to obtain good results.

In addition to spreading knowledge, telling science stories helps convey the value of a scientific way of thinking and a rational attitude to problems, even to those which have nothing to do with science.

Historically, one of science's most important cultural contributions was its example as "good training for democracy". In fact, it was also through science that the West learned to defend its own reasons with rationality and an assessment of reality, distrust towards established moral and cultural authorities, tolerance for others' ideas.

Occasions for friction between science and society continue to multiply due to the influence of new technologies, the choices new advances force us to make or the impact new knowledge has on the beliefs and values at the base of our identities and culture.

Thus, if until recently communicating with society was an optional activity, today it has become a necessity. And no one, in the scientific world, can afford to ignore this. (The Royal Society, 1985)

1.3.1 Language for Science Communication

Effective science communication entails successful dissemination of knowledge to a wide range of audience, from specialist scientists through managers and politicians to the public. Many scientists believe that doing excellent science is enough and that this knowledge will be found and used at the appropriate time. Unfortunately, the public, politicians, and even environmental managers rarely-read journal articles or highly-specialized books. Thus, these media alone do not constitute effective science communication. Increasingly, scientists are called upon to comment on current environmental problems and search for solutions - however, they are often left lacking tools to communicate the knowledge that they have, especially in the face of the uncertainty inherent in the scientific process.

A scientist usually cannot be fully certain of one's research findings, unless it is authenticated or approved by appropriate bodies or individuals concerned. This is problematic to those responsible for decision-making. However, with appropriate communication tools, it is possible for scientists to better explain their messages to a broader audience - creating greater understanding and demystifying both scientific knowledge and the scientific process. Only when this is achieved by effective science communication, will the relevance of science increase to society in general.

The idea behind the vast majority of communication activities was the concept of Public Understanding of Science (PUS). This expression became a label for every type of initiative (books, articles, exhibitions, museums, events) launched by the scientific community for the general public, and an explicit objective for programmes, committees, foundations, agencies, scientific associations and institutions in every developed country.

It has been a kind of "standard model" of the interpretation of relationships between science, technology and society. According to its basic premise, known in the specialist literature as the "deficit model", the root of public controversies on science or technology is the fact that citizens lack an understanding of

scientific knowledge, theories and methods. Thus, if these were translated from specialist terminology into more popular language, the controversies would automatically resolve themselves.

As far as communication is concerned, the public is considered a basically-homogeneous and passive audience for the “pure” knowledge produced by scientists, who are the sources of the flow of information, and to some degree the censor as well. The choice of what knowledge ought to be given is therefore based on the presumed cultural and cognitive gaps in the public, rather than on their questions, interests and skills.

The PUS model also recognizes one important part of the problem. With rare exceptions, a vast number of surveys in almost all developed countries have actually found low levels of scientific literacy in the population. But is this really the most important statistical data ? If citizens knew more about molecular biology, would they really be less diffident about genetically modified foods? At the end of the 1990s, this rather simplistic approach to relationships between science and society, and therefore, to the communication of science, began to show clear signs of its shortcomings. The strongest signals were felt in Great Britain, the very country that in 1985 launched the “movement” with the famous Bodmer Report and that had invested more than others, even through a special financial organization, the CoPUS (Committee for the Public Understanding of Science). In the year 2000, an important report “Science and Society” was prepared by the Chamber of Lords, with the help of important fact-finding surveys. This report recognized that despite the efforts made, the British population not only continued to be scientifically-illiterate, but the much hoped-for appreciation had changed into an aversion to research.

1.3.2 Coverage of Science and Technology Events

Communication of science helps, to continuously re-construct the bridges between what we knew and what has just been discovered, up-dating the social representations in circulation.

Yet, from our point of view there are two ways to remain in the race. The first is routine communication, an ever-open channel with society to be used to construct, over time, the indispensable basis of reciprocal knowledge and trust. This form of communication is carried out with updates, activities in schools, offering useful information and services for the media. We are talking about communicating through various social players, including the media, local institutions, interest groups or individuals.

The second is, instead, crisis communication, which is used for expressing opinions on issues at hand.

It should be very clear because without routine communication, crisis communication is of no use. If the public that you want to convince do not know you, do not think you have ever offered anything useful, or have never been able to test out their trust in you, they will not listen.

It is not the public who must take interest in science, but science that must try to make itself interesting to the public. The rule of thumb is that something becomes news if the public finds it new and unusual, but

above all, interesting. For this reason it must touch a fundamental human need, or a subject which has already caught public attention.

In public communication, the quality of the discussion or data is not enough. The same data that for scientists are another piece to add to a well-known picture of knowledge (and emotions), for the public is only an isolated fragment of information, with almost no meaning.

Whatever the means, the format, the aim and the content, communicating science to the public means knowing how to turn it into a story. Never, ever try to manipulate the audiences, not even for a good reason. If people realize what you have done, they will feel humiliated, and where health or safety are concerned, this can mean wiping out your credibility for who knows how long. A policy made to exploit your credibility is a sure recipe for disaster.

The first objective of a scientist's public communication policy is to earn a reputation as a credible speaker. As remarked by Hans Peter Peters, an expert on the problems between science and society:

“It is always better to inform and explain your reasoning as honestly, clearly and completely as possible. Even if we will not convince our readers or listeners, at least we will have given them the impression that we respect them. This too can play a part in forming their opinions, since information does not stand alone.

Many scientific institutions including big ones like the National Aeronautics and Space Administration (NASA) of USA have their own strategy for communication. No communication, in fact, should be improvised, least of all science communication.

One of the most common errors in this field is that you can't make yourself heard. This occurs when you are unable to access a channel of communication, because no newspaper shows interest in your topic. But also when you turn to the wrong people, perhaps because you have used a channel which does not reach the audience you are interested in. You can also manage to talk to the right audience, but without being understood. Comprehension is a crucial aim when you talk about science, unlike, for example when you talk about politics or literary criticism. This error might even backfire.

You can also be clear but not interesting, usually because the content or reasoning selected, represent priorities for you as a scientist or the institution you belong to, but not for the public. This category includes information on congresses or expensive experimental apparatus, what scientists hold citizens should know.

Today, however, as in many other sectors the consumer is the focus of attention - communication must therefore be, first and foremost, a service offered by those who do research to citizens, and not to themselves.

There are also content errors, like suggesting the wrong message or contradicting earlier statements, thus irritating or alienating somebody. Even when these errors have been avoided, a more subtle, but not less serious error may remain - lack of an objective.

It should also be kept in mind that communication which has something good for everyone has almost always something bad for everyone.

And it is more difficult. The public, in fact, are heterogeneous in sex, age, socio-economic level, interests, needs, background knowledge and cognitive abilities. For a series of reasons which concern the transformations that the society is undergoing, the public tend to be increasingly divided into cultural “tribes”. As it is common knowledge in advertising, communication functions best for each segment of the public, when it is cut to size: each audience needs the message, means and language which work best. Today, there are truly few generalist media (actually, a few TV channels and they are more expensive and difficult to access, while usually specialized media (scientific magazines for example), which are easier to reach, are a way to enter the cultural market, gain attention and eventually approach other more important and influential channels. If necessary, it is better, then, to multiply and diversify your contributions, packaging them for a homogeneous segment, whether it is for schools, policy-makers, the local community or journalists.

Once your audience have been identified, you should be able to answer at least three questions:

- Who are they?
- What do they already know about the topic?
- What do they think about it?

When doing this, the researcher has the opposite problem from the journalists. While the journalists must learn the scientific knowledge, the researcher needs to learn the “lay knowledge”, including which media their audience receives their information from. This information can be found personally, or if possible, in the press and through specific surveys.

In fact, very few studies on the publics of science exist, except for the fields of biotechnology and information technology. Even if the stakes are just as high, there exists nothing similar to the very sophisticated surveys used in advertising. Identifying a segment of the public means understanding how complex your explanation can be, as well as what their expectations, motivations and interests are. Different means are better for reaching out to diverse audience; for example adults might prefer TV; teenagers, internet; children, museums and exhibitions; and the establishment, influential newspapers.

To know a specific public means choosing the right media for the target audience. Everything that is news has a built-in appeal, just like everything that has to do with popular issues. Often, in science, the news in itself, is not as important as the maturation of a line of research. In this case a curious piece of news might represent the opportunity to talk about the rest as well. The detachment of a particularly large iceberg

might represent the opportunity to talk about climate warming at high latitudes, and perhaps the activity of a national laboratory in Antarctica. For the same reason those researches can be linked to a subject of current events.

The ten laws of human communication :

Before getting down to work, it might be useful to check the planning of your communication in the light of a small decalogue that recalls a few psychological truths. (Mackay, 1994).

1. It's not what our message does to the listener, but what the listener does with the message, that determines our success as communicators.
- 2 Listeners generally interpret messages in ways which make them feel comfortable and secure.
- 3 When people's attitudes are attacked head-on, they are likely to defend those attitudes and, in the process, to reinforce them.
- 4 People pay the most attention to messages which are relevant to their own circumstances and point of view.
- 5 People who feel insecure in a relationship are unlikely to be good listeners.
- 6 People are more ready to listen to us if we also listen to them.
- 7 People are more likely to change in response to a combination of new experience and communication than in response to communication alone.
- 8 People are more likely to support a change which affects them if they are consulted before the change is made.
- 9 The message in what is said will be interpreted in the light of how, when, where and by whom it is said.
- 10 Lack of self-knowledge and an unwillingness to resolve our own internal conflicts make it harder for us to communicate with other people.

Public communication should never be a simple list of information, like an instruction manual, even if it is translated into simpler language. Our mind, faced with new information, always looks for a meaning, an underlying theme to latch onto. At the very least, the line of reasoning presented should be introduced with an opening question, followed by an exposition of facts and then a discussion and answers. The most effective solution, however, consists in “disguising” the line of reasoning inside a story. This story acts as the audience’s guide through the thick forest of unfamiliar subjects, so that they will not feel lost, and will actually encourage them to continue onward. Turning a scientific discussion into a story means making a discussion that is not natural, making the abstract concrete, or rather, turning what the author wants to say into what the audience prefers to hear. The point is not to communicate with the media, but to use the media to communicate with certain categories of people: the media are the means, not the end.

Scientists vs. Journalists are your way into the media. Not only do they know how to pick out the right words and arguments, but their professional experience has also made them experts at listening to society, and consequently identifying its interests, opinions, moods and values. For this very reason they should be considered as potential, extraordinary allies, rather than intermediaries that must be put up with, or even worse simple targets of cutting remarks.

The main aim scientists have is to produce new knowledge about the natural world, and their success is measured by the approval they receive from other scientists. The main aim journalists have is, on the contrary, to entertain and inform, and their success is predominantly measured by the number of copies sold or audience share.

The media, in fact, are above all economic enterprises, and the news they report is what sells the most.

It is common knowledge that scientists and journalists often have very different opinions on how important a fact is. If you want to communicate through the media, then, you should identify what might make a news item valuable to a journalist. In the newsroom, much is based on the perception or “instinct” developed with experience and handed down from generation to generation, but some studies have attempted to identify the components of a “good” piece of news more precisely. Here are the main ones:

First of all, there is a size threshold. Something “big” must really be big, or at least look so. “A small earthquake tremor in Sicily” does not make for much news, while “Thousands of people seek safety from an earthquake in Sicily” is a little better. Where journalists tend to magnify, scientists tend to tone down: this is fine for academic environments, but it does not help with the media. Meaningfulness, relevance, and consonance To the public, good news also has meaningfulness, relevance and consonance. It must have a meaning in relation to what they know; it must be pertinent and possibly not contradict what they already know or think. A new measure of Hubble’s constant, for example, is a problem that the general public does not know or understand; it has no impact on their life, and perhaps contrasts with their religious convictions.

A title like “Cellular phone waves are hazardous to your health” responds to the requirements: it refers to something very familiar, raises a problem that concerns owners of cellular phones, thus all of us, and is in tune with the climate of suspicion surrounding new technologies.

The radio : An equal must talk to an equal, a free citizen to a free citizen, a thinking brain to a thinking brain. The radio contributor must not present himself as a teacher to the radio listener, nor as a pedagogue, much less a judge or a prophet, but as an informer, a pleasant interlocutor, a friend, said Carlo Emilio Gadda, Italian essayist, short-story writer, and novelist outstanding particularly for his original and innovative style compared with that of James Joyce.

To talk about the press means talking about a boundless world, diversified and not sufficiently studied. Even if true investigations on the subject are lacking, it is not far from the truth to say that the generalist press deals with science infrequently and badly. It is also very difficult to access.

This can be explained by the evolution of editorial processes developed over the last fifteen to twenty years. Since the use of wired news, and fax or email for the transmission of press releases, newspapers no longer look for the news but the news pours in on them, and there are increasingly more pieces to choose from.

The first consequence is that scientific news has to face strong competition. In large newspapers, in fact, there can be thousands of number of news items to choose from every day, between wired news and press releases.

The second consequence is that newspapers have a diminishing number of internal experts, such as the science editors who had the contacts and knowledge to find and judge the news. Today the most frequent figure is the desk-reporter who re-writes the news provided by agencies or press releases. This news is then selected by a hierarchical organization of managing editors, feature directors, assistant directors who are usually just as badly-informed in sectoral knowledge. Not only is there less available knowledge provided by specialists (science included), but specialist voices are also disappearing from Creating social change and solving environmental problems requires power and knowledge. Scientists have high knowledge but little power, whereas politicians have a lot of power but often no knowledge of many environmental problems. Effective science communication can facilitate this link between knowledge and power, informing and empowering the public to produce social change.

Effective science communication also requires attention to the messages that are to be conveyed that depends on the “art” of communication. This allows adequate time to produce science communication products that includes time for feedback and revision. Good science communication requires attention to both the science and the presentation. In general practice, the vast majority of the effort by scientists is in collection and analysis of data, with little time or resources devoted to communication of science. Rather than science communication being an afterthought, factoring in the time and resources that are needed for developing a quality communication, product is recommended.

Visual elements can be combined to provide unique information. For example, a combination of a photo and a conceptual diagram can effectively orient the audience to your study site, or explain methodology. Photos and graphs together can help with the visualization of your results which can be overlaid onto maps, helping the audience envisage the overall context of your results.

If scientific knowledge is to be applied to help deal with environmental issues of the real world, then communicating the information effectively is an essential step in the solution. It is important that in addition to acquiring good scientific information, scientists should adopt the practice

of using appropriate tools for disseminating the information, as this is also important in the communication process. These simple practices can be applied to make science relevant to a wide audience, from school-going children and the general public to the top decision makers of the country.

1.3.3 Creating a scientific attitude among masses

It needs to be mentioned here that inculcation or infusion of a scientific attitude among the people is one of the main objectives of the entire domain of science communication so that the day-to-day life of an individual can derive the benefits of a scientific temperament. This can be achieved by various modes of communicating the right information and knowledge to the people.

Any effective change in this direction will take place only when a science communicator shall encourage the audience to investigate some common superstitions and beliefs practically.

Further, a scientific attitude comprises the qualities of – curiosity to know about new things and explore the universe, a logical and systematic thinking, open-mindedness and impartiality, intellectual honesty, never jumping to any conclusion without exhausting all experiments and thought processes, a critical thinking, rationality, newer approaches when other experiments may fail to deliver results, In addition: A scientist must have an open mind and be curious. It is fine to have an idea about how or why something is the way it is. But the scientist should then seek to prove or disprove this "hypothesis". Also, he or she should then be willing to change their ideas depending on the results of their experiments, rather than to continue believing in their original idea even if the evidence of their experiments is sticking up against it. In fact, this exercise should be a top priority for any effort in science communication so that in the long run the masses can develop this attitude which would convert the society into a rational one. This is important because when we would be able to be free from any bias, superstition etc. the overall growth of the society would be far more comprehensive than it is otherwise.

Again, you must all be well-aware of growing incidents of killing and torture of human beings in our country including Assam terming them as witches (practitioners of black magic) often in the recent times. This is happening only because of prevalence of superstitious and unscientific beliefs in the minds of the people even at the beginning of the twenty-first century of life. Spread of an adequate scientific attitude among the masses would not have allowed this to happen at all. Not only this, issues like animal sacrifice, stray incidents of killing of children as devotion to gods and goddesses etc. are also nothing but examples of superstitions driving illiterate and irrationally-thinking human beings to do such heinous crimes.

Also, human beings with a scientific attitude would not indulge in abnormal activities of unplanned earth-cutting, rampant use of polythene bags without proper use, encroachment over water bodies, marshes, build houses with no respect to drainage and sewage treatment and flow etc. we have become quite familiar with in most of our towns and villages led by the gateway to the north-eastern region and the biggest city here – Guwahati. A deeply-embedded scientific attitude in the minds of the people would not have allowed their conscience to carry out such irrational works ever.

So you can adequately realize the far-reaching importance of creating a scientific attitude in the minds of the population.

1.3.4 Science Communication for people without a science background :

It is through some of the pressing global issues, such as energy, population growth, and food that Marcus du Sautoy, Simonyi Professor for Public Understanding of Science University of Oxford believes. This eminent science communicator also believes that a joined up approach within the humanities and sciences will be beneficial and lead to exciting progress.

One of the primary job briefs of the Professor was to communicate scientific research widely to a public audience in which he is considered an expert. “When I took over from Richard, my immediate thoughts were on clearly communicating to the public what was happening in science,” says du Sautoy. “Science has such a big impact on humanity. In order for people to feel empowered and for them to be able to make decisions on where they want science to go and the long lasting effects it has on society, they must first fully understand the surrounding issues.”

Named one of the UK’s leading scientists by *The Independent on Sunday*, this academician has become the true face of mathematics popularizing the subject through BBC television and radio programmes including a succession of Horizon documentaries, newspaper columns in the *Times* and *Guardian*, books such as the bestseller *The Music of the Primes*, and inspired talks and school tours.

Du Sautoy admits that universities need to do a much better job at training scientists to communicate and become storytellers. “I think in recent years, there has been a definite push from universities towards increasing scientific dialogue with the public and dedicating positions to promote the idea of science in society,” notes the Professor.

“I think communication should be a fundamental part of any scientists training as frankly it benefits your own science. Science, in my mind, has always been about two things, discovery and communication. As scientists we have to learn how to emphasise with a public audience for them to fully understand and to acknowledge the ideas we are seeing. The broader audience science can reach, the bigger the benefit in terms of the new ideas you are transmitting as a scientist,” he added.

“I think we’ve managed to capture this well, people are not turning on BBC programmes about science or reading the books that we write because they feel they have to, because it’s important, they are doing it because they find it fascinating and entertaining and want to understand. The knock on effect is that the public is then in a much better position to make judgements on what we should be doing about the energy crisis or whether we should give the okay to stem cell research.”

1.3.5 Developing a suitable language for communicating high end knowledge for mass consumption

Developments in science and technology affect virtually every aspect of our lives, from our physical health to the kinds of cars that we drive. Improvements in technology have contributed substantially to increased productivity in any society. Yet in recent years, political pressures to balance the federal budget have eroded the proportion of the budget devoted to basic research, the underpinning of scientific and technological advances.

Scientists have understood the potentially-debilitating consequences of this, but many citizens have not.

It may be mentioned here that a comprehensive survey was conducted with 2,000 journalists and editors and 2,000 scientists and engineers at the Freedom Forum's First Amendment Centre at Vanderbilt University, USA, a few years ago, to determine how the two groups felt about each other. It was also designed to find ways to improve their relationship and thus increase the amount of accurate and useful scientific information in the media.

The results of the survey, published in the report - *Worlds Apart*, showed that neither scientists nor journalists think the media do a good job of explaining science to the public.

We asked both groups to rate how effectively the major media communicate scientific news. Both groups gave national newspapers such as *The New York Times* and *The Washington Post* the best ranking, but neither of them considered any of the media to be doing a particularly good job.

The results also revealed a serious lack of confidence by both scientists and journalists in the media's understanding of how science is done and how to interpret the results of research studies. That lack of knowledge means that journalists have a hard time reporting scientific and technological discoveries in a readily understandable and useful way. Examples include journalists' frequent confusion about how to interpret statistics, probability, and risk. Journalists in general also do not understand the peer-review process in science, hence may report findings that have not been subjected to an independent review. And they tend to look for sensational results, whereas science usually advances by a series of incremental steps.

Improved communication must begin with scientists themselves, of course, even though some still feel that talking to the public is a waste of their time.

If scientists hope to improve their communication of science, they need to change their own culture. They must stop disapproving of colleagues who take on and even excel at this task.

As a first step in improving communication with the public, then, scientific societies and other organizations should make better use of the World-Wide Web to disseminate information about major advances in science. For instance, a scientific association could make readily available on the web, for journalists and the public alike, several clearly written paragraphs about important new developments, indicating which new papers and discoveries were the most significant. The groups also could use the web to make it easier for the news media to contact scientists with the ability to discuss new findings in terms that non-specialists could understand.

Journalists could use introductory information available either in the organizations' websites or their booklets, brochures etc. to decide which stories to pursue. The gatekeepers of the media -- editors and producers -- would find the information valuable in their efforts to understand the relative importance of various developments. That, in turn, would help them make decisions about whether to allot space to the stories. Further, interested members of the public, including policy makers, could use the information to help them interpret media coverage of recent research and to find other sites on the Web with relevant information.

Colleges and universities also need to do a better job of training scientists to explain their work. Students who are majoring in science should be required to take courses in how to communicate scientific research to the public. Those courses could include information on technical writing, but also should teach communication skills helpful in addressing the public, such as how to present an article about a scientific discovery as a detective story, and how to present new knowledge in graphic terms. In addition, universities should offer more workshops to train scientists who have already begun their research careers to communicate with the media more effectively.

Education for journalists also needs improvement. The best way to train science reporters is to create an undergraduate, interdisciplinary curriculum, half of which would be devoted to courses in science, engineering, and mathematics, and the other half to classes in communications, English, and other liberal arts. Existing programs to train science journalists, including those at the master's level, too often are designed to teach a little science to journalism majors. That approach is inadequate. Instead, we need to keep all of those who will communicate scientific information to the public -- such as journalists, publicists for industry, and policy makers -- involved with science throughout their education.

For those journalists already in mid-career, are recommended workshops that expose them to scientists and the research process. The workshops might give the journalists a taste of actual research, through case studies that show the incremental nature of scientific discoveries or the way that research into one problem often sheds light on another issue. Media gatekeepers also should participate in workshops that help them

gain a broad understanding of what various scientific fields are focusing on and what the ramifications of those developments are likely to be.

1.4 Summing Up

In this chapter we have briefly learnt the following aspects ---

- Writing in a simple language about various aspects of science and technology is important for understanding by the common people
- Society has to understand science and the situation would be fine if only citizens had an adequate scientific knowledge
- Communication of science helps to reconstruct the bridges between our earlier knowledge and new and emerging developments in the horizon of knowledge in all aspects of the society and life
- In the absence of routine communication, crisis communication would be of no use
- Public communication must always be carried out with reasoning rather than like being a simple list of information
- While for scientists the main aim is to acquire and arrive at knowledge which would be beneficial in some way or other for the society, for a journalist the same information must be presented to the masses with an interesting angle to make it attractive and catchy
- An effective science communication is basically development of content-rich, jargon-free, communication-based material to make it more acceptable and convenient for masses to understand
- Good science communication requires attention to both the science and the presentation

1.5 Suggested Readings

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1.6 Probable Questions

1. What are the basic tenets which need to be followed while writing contents for science communication ? How can we use the same for inculcating a scientific base in the minds of the masses ?
2. What do you understand by the term ‘effective science communication’ ? What are the components required for this purpose ?
3. Explain how to carry out science communication for people without a science background.
4. What are the similarities in communicating general events and those from science and technology ? Is there any difference also in this regard ? How ?
5. Discuss in brief about the role of both scientists and journalists in preparing effective and successful science communication contents in the society.

1.7 Assignments :

1. Observe the science and technology contents pages of two English dailies, two magazines (either English or Indian languages), two Television channels, and All India Radio for a month. In your opinion, are these communication efforts effective enough to be successful for the targeted audience? Explain your answer with suggestions for improvement if required.
2. Observe any news item, views, articles, features about big dams published in newspapers and magazines over a period of one to three months. Find out how justifications both for and against the issue are being presented and with what kind of success, according to your opinion. Would you like to suggest some changes in the coverage ? Why and how ?

Unit 4 : Institutional Efforts in Science Communication

1.8 Objectives

1.9 Introduction

1.10 Concept

1.11 Contents

1.11.1 ISRO

1.11.2 DRDO

1.11.3 SITE and Kheda experiments

1.11.4 NCSTC

1.11.5 Vigyan Prasar

1.11.6 National Science Communication Congress

1.11.7 Science Communication – a bridge between research institutions and masses,

1.11.8 Conventional mass media for science communication

1.11.9 Community media for science communication

1.11.10 Advantages and disadvantages of conventional mass media versus community media for science communication

1.11.11 New media for science communication

1.12 Summing Up

1.13 Suggested Readings

1.14 Probable Questions

1.15 Assignments

1.2 Objectives

The learning objectives of this unit is to make one adequately familiar with the following:

- Efforts of various institutions at government and other levels in popularizing science communication and a scientific attitude among the people
- How science communication can function as a bridge between research institutions and people
- Pros and cons of various types of media utilized for expanding the scope of this particular field of study
- Explore the scope for community media in taking science communication to the people at grassroots level of the society in the future
- Study how the immense scope of new media can be utilized for this purpose

1.2 Introduction

It is important to note that the Government of India had realized the significance and far-reaching impact of creating a scientific attitude among the masses soon after our Independence and thereby several steps were taken up for working towards achieving this goal with a futuristic view. This is why the Satellite Instructional Television Experiment (SITE) and Kheda communications projects were implemented. Both became highly successful models of utilizing the combined benefits of science and technology with media and communication for bringing in far-reaching developmental inputs for uplift of the common man. This is because the Space Application Centre and Development and Educational Communication Unit (DECU) of Indian Space Research Organization (ISRO), Ahmedabad were actively involved in both these experiments.

In due course of time the government set up further institutions specifically for expanding the cause of science communication in the country. A few of these include National Institute of Science Communication and Information Resources (NISCAIR) under Council of Scientific and Industrial Research (CSIR), Vigyan Prasara under Department of Science and Technology (DST), Government of India and National Council for Science and Technology Communication (NCSTC) among others.

These institutions have taken up a series of ambitious and innovative projects and programmes at different points of times for reaching out to the targeted audience in a convenient manner so that people can enjoy the benefits of science and technological inventions and innovations. That too, in a language and manner that is easily understandable to the masses without much difficulty.

1.3 Concept

Many a times, for achieving something important, an institutional effort is deemed necessary in addition to efforts of society and people at individual level. This is why the government had come up with the institutional support for the cause of science communication. The primary role of these institutions is to function as the link between sources of knowledge of science and technology acquired as a result of various discoveries and inventions and the masses. The ultimate goal is to make knowledge available to the people so that the latter can take advantage of it and thereby improvise their living standards on its basis.

1.3.1 Indian Space Research Organization (ISRO) :

The primary objective of ISRO is to develop space technology and its application to various national tasks. Accordingly, it had successfully operationalized two major satellite systems namely Indian National Satellites (INSAT) for communication services and Indian Remote Sensing (IRS) satellites for management of natural resources.

In addition to all these services, ISRO has the Development and Educational Communication Unit (DECU) which is involved in the system definition, planning, implementation and socio-economic research and evaluation of satellite-based societal applications.

The major programmes of DECU at present are to - promote satellite-based communication systems to support development, education & training.

1.3.2 Defence Research Development Organization (DRDO)

DRDO was formed in 1958 from the amalgamation of the then Technical Development Establishment (TDE) of the Indian Army and the Directorate of Technical Development & Production (DTDP) with the Defence Science Organisation (DSO). At that time it was a small organization with 10 establishments or laboratories. Over the years, it has grown multi-directionally in terms of the variety of subject disciplines, number of laboratories, achievements and stature.

One motto of DRDO is to make India prosperous by establishing a world class science and technology base and provide our defence services a decisive edge by equipping them with internationally competitive systems and solutions.

1.3.3 Satellite Instructional Television Experiment (SITE)

The Satellite Instructional Television Experiment (SITE) was an experimental satellite communications project launched in 1975, designed jointly by National Aeronautics and Space Agency (NASA, USA) and the Indian Space Research Organization (ISRO). The project made available informational television programmes to rural India. The main objectives of the experiment were to educate the poor people across the country on various issues via satellite broadcasting, and also to help India gain technical experience in the field of satellite communications.

The experiment ran for one year from August, 1975 to July, 1976, covering more than 2400 villages in six Indian states and territories. The television programmes were produced by All India Radio. It needs to be mentioned here that during that period television was not a separate entity as such and All India Radio was responsible for television broadcasting in the country. Doordarshan was yet to be established as a separate unit. The project was supported by various international agencies such as the United Nations Development Programme (UNDP), UNESCO, UNICEF and International Telecommunication Union (ITU). The experiment was successful, as it played a major role in helping develop India's own satellite programme, INSAT. The project demonstrated that our country was also capable of using advanced technology to fulfill the socio-economic needs of the country. SITE was followed by similar experiments in various countries, which showed the important role satellite TV could play in providing education.

The general objectives of the project included:

- demonstrating the potential value of satellite technology in the rapid development of effective mass communications in developing countries;
- demonstrating the potential value of satellite broadcast TV in the practical instruction of village inhabitants; and
- stimulating national development in India, with important managerial, economic, technological and social implications.

The primary social objectives from an Indian perspective were to educate the populace about issues related to family planning, agricultural practices and national integration.

The secondary objectives were to impart general school and adult education, train teachers, improve other occupational skills and improve general health and hygiene through the medium of satellite broadcasts.

The SITE transmissions had a very significant impact on the Indian villages because thousands of villagers gathered around the TV set and watched the shows throughout the year. Studies were conducted on the social impact of the experiment and on viewership trends. It was found that general interest and viewership were highest in the first few months of the programme and then declined gradually due to several factors. But the impact on the rural population was highest in the fields of agriculture and family planning with nearly 52% of viewers reported themselves amenable to applying the new knowledge gained by them

This landmark experiment showed that India could make use of advanced technology to fulfill the socio-economic needs of the country which led to an increased focus on satellite broadcasting in India. The Indian National Satellite System was launched by ISRO in 1982. The Indian space programme remained committed to the goal of using satellites for educational purposes. In September 2004, EDUSAT was launched which was the first satellite in the world built exclusively to serve the educational sector. EDUSAT is used to meet the demand for an interactive satellite-based distance education system for India.

Kheda Project :

The Kheda Communication Project or KCP is a field laboratory that aimed at the development and local communication in Kheda district of Gujarat. This project began in 1975 and continued till 1990. The site chosen for the experiment was Kheda district near the Space Application Centre (SAC) of ISRO in Ahmedabad. It is believed to be a milestone in the history of Indian television. The Development and Education Communication Unit (DECU) 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 had some special features that made the project truly special in the realm of Indian Television. It could broadcast either local television programmes or national satellite television programmes.

The KCP collaborated with extension agencies working in dairying, agriculture, and health services, and with local banks, cooperatives, and employment exchanges. Thus, the development in Kheda district facilitated the use of information transmitted by the television broadcasts. It was independent of commercial interests, as it depended mainly on government funds for financial support. Managed by the SAC, KCP greatly depended on audience research by conducting assessments of village audiences and by carrying out formative and summative evaluations of these television programmes.

The venture promoted rural development and social change at the local level with audience participation vastly encouraged at all levels. Villagers were involved as actors, writers, and visualisers in the production of television programmes dealing with such local issues as exploitation, caste discrimination, alcoholism, minimum wages, co-operatives, local and national elections. Television serials, folk drama, puppet shows, and other popular local formats were used to continue issues such as family planning, gender equality, and village sanitation. A campaign approach was followed, thus, synchronizing television programmes with local efforts by the development agencies.

It was also instrumental in decentralizing television broadcasting in India and went on to receive the prominent UNESCO Prize in 1984 for rural communication efficiency.

1.4.4 National Council for Science and Technology Communication (NCSTC) :

As the name itself suggests NCSTC, a constituent institution of the Department of Science and Technology (DST) was established with the sole mandate of communication and popularization of science and technology among the masses, stimulating a scientific and technological temper as well as coordinate and orchestrate such efforts.

Its goals are to create excitement concerning advances in science and technology, enable informed decision-making at grassroots level and encourage intelligent debate on developmental issues.

The agency undertakes quite a few ambitious and encouraging programmes for achieving its goals. These include – financial and other assistance for organizing conferences, seminars, workshops on the broader areas of the theme, research projects, implementing an ambitious scheme of introducing courses on the subject in colleges and universities, annual awards for books in Hindi and English for popularizing science communication among others. (Website dst.gov.in/scientific-programme/s-t_ncstc.htm / www.dst.gov.in)

Vigyan Prasar (VP) :

VP is an autonomous organization under Department of Science and Technology, Government of India. Its objectives are to take up large-scale science popularization tasks and activities, to promote and propagate scientific and rational outlook, to act as a resource-cum-facility centre for Science & Technology communication. This institution is also dedicated towards a multi-pronged strategy of activities including videos and radio programmes on various issues of science and technology, publication, HAM Radio, VIPNET clubs in schools and colleges among others. (website www.vigyanprasar.gov.in).

NISCAIR :

National Institute of Science Communication and Information Resources (NISCAIR) came into existence on 30 September 2002 with the merger of National Institute of Science Communication (NISCOM) and Indian National Scientific Documentation Centre (INSDOC). NISCOM had been in existence for the last six decades (first as two Publication Units of CSIR) and in 1996, as NISCOM). Over

the years, it has diversified its activities, and through a host of its information products, comprising research and popular science journals, encyclopaedic publications, monographs, books, and information services, it had been reaching out to researchers, students, entrepreneurs, industrialists, agriculturists, policy planners and also the common man.

With the formation of NISCAIR, the multi-faceted activities have been now amalgamated. At present, it is an institute capable of serving the society using modern Information and Technology (IT) infrastructure in a more effective manner and taking up new ventures in the field of science communication, dissemination and S&T information management systems and services. Broadly, the core activities of NISCAIR are to collect and store, publish and disseminate S&T information through a mix of traditional and modern means, which will benefit different segments of society.

1.4.5 Science Communication – a bridge between research institutions and masses

It has been mentioned earlier that the ultimate goal of all kinds of knowledge in each and every field of study is one – that these findings be beneficial to mankind in the final analysis. In this regard, it may be mentioned that scientists and technocrats involved in the pursuit of knowledge in the laboratories may not be very apt in communication of their findings to the common persons – the target audience for their knowledge. Here comes the importance of professional mediapersons or media organizations as intermediaries for making these bits of knowledge available to the people in a reasonable language understandable by the latter.

Thus, with this goal in mind, science communication can also be termed as a bridge between research institutions and masses under any circumstances.

Similarly, simple things and ways of life like washing of hands before eating anything, living in a clean environment, particularly for children, not destroying vegetation covers without a matching effort for replenishing the same etc. need to be inculcated into the minds of the people. Unless this can be achieved successfully, no amount of scientific knowledge from any high profile research institution would be of any help in improving the status of our living standard at all.

Thus, science communication is entrusted with huge responsibilities to be implemented for the betterment of mankind.

Besides, the term target audience is also a tricky one since it includes audiences whose **backgrounds may vary**. For example, approaches for the target audience who are literate cannot be the same as the one to be adopted for an illiterate person.

The professional communicators engaged in this activity must prepare campaigns for the purpose keeping in view these aspects so that the activity becomes effective in the real sense of the term rather than becoming a waste by preparing a flat programme for one and all alike.

1.7.6 Conventional mass media for science communication

The term conventional mass media means the electronic media (radio, television) and the print media through which we endeavour to reach out to the maximum number of people possible. The institutions and also many individual scientists, science communicators regularly use these media outlets for sending their messages to the targeted audience. Hence, we have had TV programmes like Turning Point, documentaries on various aspects of science and technology, broadcasting of channels like Discovery, Planet Earth etc. which demonstrate scientific knowledge for the benefit of the masses.

Mass media refers to communication devices, which can be used to communicate and interact with a large number of audiences in different languages. Be it the pictorial messages of the early ages, or the high-technology media that are available today, one thing that we all agree upon, is that mass media are an inseparable part of our lives. Entertainment and media always go hand in hand. But in addition to the entertainment, mass media also remain to be an effective medium for communication, dissemination of information, advertising, marketing, and in general, for expressing and sharing views, opinions, and ideas. Mass media is a double-edged sword which means that there are positive as well as negative influences of media.

Print Media encompasses mass communication through printed material. It includes newspapers, magazines, booklets and brochures, house magazines, periodicals or newsletters, direct mailers, handbills or flyers, billboards, press releases, and books.

Electronic Media is the kind of media which require the audience to an electronic connection to access it. It is also known as 'Broadcast Media'. It includes television, radio, and new-age media like Internet, computers, telephones, radio etc.

Role of Mass Media:

Right at this point, let us cite the findings of a study done by a communication expert from the USA about exploitation of mass media tools by big time terrorist outfits throughout the world. It concluded that those organizations were quite actively exploiting mass media as tools for reaching out to the masses. This is a novel means of a 'psychological warfare' indulged in by interested parties for getting their messages across to the masses. A similar 'psychological fight' can also be waged to create popular awareness leading to wider public opinion and activism. This activism can be either at group or community level or at an individual level. If mass media can rise up to the extent of transforming even half the target population and if every member of this population lives up to the expectations and contributes one's bit effectively then almost half the battle is won. This will have to take the shape of a

development communication mode of activity, which is deliberate, goal-oriented, calculated and aimed at achieving a certain purpose.

Responsibilities of Media:

Like any other meaningful profession in this world, media also has to shoulder some definite amounts of responsibility towards the society. Mass media is an open university and an able platform where virtually any issue under the sun can find a place for debates, discussions and deliberations so that both positive and negative aspects of them can be arrived at.

People can pick up their choice, whether the positive or negative whichever suits them in the end. Academically and also practically, we can say that media performs quite a few important functions for society while discharging its normal duties. In addition to disseminating relevant information to the target audience concerned, other functions include persuading, influencing, educating and transforming people by the sheer convincing power that it possesses in abundance.

Then again, one of media's most important roles is not only to disseminate information to the people but also to make or convert them into thinking 'human beings'. This is because we all know that 'information is power'. But mere possession of information will not yield anything much worthwhile and one has to process this information and apply them to relevant aspects so that something can be achieved out of them.

It is a well known fact that the general awareness of the people of our society about any public issue of concern is not so good even today. Yet, there always is a time when one has to sit up and take cognizance and then act decisively to prevent any wrongdoings about them. And, in this direction mass media is the most ideal tool for creating awareness about it to the people anywhere in the world.

Advantages of Media:

Now let us look at the prime advantages of mass media.

First of all, it is a magic multiplier. It means that the original source that has something to inform to the people only needs to pass it on to media. And the moment this message is airborne unlimited number of people can access it provided they have the right tool to do so. Not only access it, but also get influenced by this message. Thus this is called magic multiplier.

And you can imagine the influence it can exert over the people. In other words we can also term this as a 'force multiplier'.

Secondly, the original source need not even be a very communicative one. Once he or she has something to say to the people one just needs to contact media and the 'professional communicators' take over from this point. This breed of professional communicators is the editorial people in a news organization / media or anchor persons in an entertainment or infotainment mass media organization.

These people are professionally trained and experienced in the art of communicating and passing on relevant information to the people in the right perspective. The success of a certain message or information depends to a very high extent on the experience, talent and tactfulness of this species of communicators. This is because their expertise in this field will matter highly towards making the people easily understand what is being broadcast or aired or printed by the media.

Mass media also has to perform the 'Agenda-Setting function. This means putting up certain issues of importance in front of the public in such a manner that they become the concerns of the masses. And they in turn are moved to think and deliberate on them seriously and finally act on them.

Whatever media promotes almost instantly becomes a hit – whether it is something popular or otherwise. This advantage can be put to a positive usage with a coordinated effort of both sides of the stakeholders involved – the public / masses / readers / target audiences and media on the other. Media plays the pivotal role of a 'whip' and leader at times of crisis. Mass media is a very important component of our society. Being the 'fourth pillar of a democratic society', it has to perform the role of a 'watchdog' of anything that is evil in the society.

Mass Media Options – An Insight:

In view of above discussions, what can be our alternatives to carry forward the messages of scientific awareness to the target audience in this vast country of continental proportions?

Let us consider the options one by one. In case of the print media, more than 65,000 journals and newspapers of varied kinds are in circulation in the country today with a combined circulation figure of 20 crore copies daily at present. And the very encouraging fact is that this figure is growing annually at an impressive 18 %.

This apart, over the years, there has been a steady and remarkable growth of the vernacular newspapers across the nation. This phenomenon is led by Hindi newspapers with almost 50 per cent of the total circulation figures followed by those in several prominent Indian languages. This means that an ever more number of people of the country living in the remotest parts are being able to read the newspapers in their own language. From a mass communicator's point of view this is highly important as every person feels much quite at home in one's own language. A journalist in today's age has to necessarily function as a social judge day in and day out and decide which issue to be taken up and supported in an all out effort and which to be dropped.

A journalist also has to decide about the kind of treatment to be given to the different issues keeping in view the prevailing necessity.

On the other hand, radio stations' listenership is supposed to be around 60 million on any given day – that too in 24 languages and 146 dialects cutting across the length and breadth of the nation. By

another estimate right from the AIR Audience Research Unit statistics, this figure is put at a mind-boggling 32 crore on any given day. One important fact regarding radio coverage of the country is that AIR broadcasting network covers almost 100 per cent of the nation's geographical areas. If utilized properly, this is a landmark and dream-development for any mass media organization and anyone who may desire to send across their messages to the larger masses.

1.7.7 Community media for science communication :

Bruce Girard (man.communica.org, 2007) opined that there is no single definition of community media and there are almost as many models as there are stations. Each community radio station is a hybrid, a unique communication process shaped by a few over-arching characteristics and by the distinct culture, history, and reality of the community it serves. Nevertheless, there are some characteristics that all community radio stations have in common. Among these are that they are community-based, independent, not-for-profit, pro-community, and participatory.

Though Girard basically spoke about Community Radio, yet his views also hold good for other community media including traditional ethnic festivals of every community which can be traced to their original roots as a nation or community etc.

They are based in its community and accountable to it. This community is usually defined geographically, although its size can range from a small town, to a city, or a vast rural area covering thousands of square kilometres. Stations can also serve particular communities of interest such as women, youth or linguistic and cultural minorities. Community media are owned and controlled by the community. In some cases the legal owner is the community itself, via an association established for the purpose. In others the legal owner is a not-for-profit group, a cooperative, an NGO, or a municipality, acting on behalf of the community. Regardless of the legal structure, the policies and objectives of media are articulated with a strong input from stakeholders within the community. Also, the community members have both a sense of ownership and a real ability to shape the station to suit their wishes and needs.

They are independent regardless of ownership, government, donors, advertisers and other institutions. This does not mean that they do not have relations with these institutions or that they cannot receive funding from them, but the nature of their relations must be transparent and cannot compromise their independence. Where there is a potential for independence to be compromised, which often happens when money is involved, the relations must be governed by clear and transparent agreements that guarantee the non-partisan community-service nature of the medium, while operating within the boundaries defined by the law and by the constitution as well as the guiding principles of the station.

Yet, as community media exist to serve communities and it cannot be independent of the community itself. Transparent governance structures, such as an elected board of governors, ensure that the station is responsive to community needs and interests.

Not-for-profit that doesn't mean that it can't carry advertising or that it has to be poor. It means that the money it makes is reinvested into the station and the community. The Italian Radio Popolare, for example, is financed with a combination of advertising and listener subscriptions. With annual revenue of one million euros it's one of the wealthiest community radio stations in the world. The station's shareholders are thousands of its listeners and supporters and rather than expect profits, they make donations to help the station fulfill its mandate.

These media outlets finance themselves in many ways: advertising, listener donations, concerts, international donors, government grants and so on. In France, where community radio stations do not carry advertising, a tax on advertising is put into a fund to support community radio. As one Ecuadorian broadcaster put it, "We're not for profit, but we're not for bankruptcy either."

They are also pro-community as they exist to support and contribute to their communities' social, economic and cultural development, but each station will have its own specific answer. Many stations describe what they stand for in a mission statement, a short text that describes why they do what they do.

They are participatory which is a common strategy that involves community participation at all levels – programming, running and even financing the station. This can be exercised in a wide variety of ways depending on the specific nature of the station, its objectives, and the characteristics of the community.

Participation in programming can be assured with participatory production formats, by encouraging and supporting programme production by organisations from within the community, by broadcasting public forums, and generally by enabling the free and open exchange of views.

The community must also be able to participate in the management and direction of the station, for example through a board of governors or directors with members representing various interests within the community.

Many communities support their stations with cash or in-kind contributions. Financial support can come from individuals, local businesses, community organisations, or municipal governments. In some

cases the community supplies the building the station is housed in, even contributing its own “sweat capital” to build it.

Participatory radio allows long-neglected people to be heard and to participate in the democratic process. Having a say in decisions that shape their lives will ultimately improve their living standards. Many stations also recognise and value the change that volunteers often experience in their own lives as they become more confident, capable and active members of the community as a result of their association with the station.

The Community Media Association (CMA, UK) recognizes that it is rooted in an ethos of inclusivity and universal access to opportunity, and that it is sourced and produced by organisations, individuals and informal groups, whether characterised by geography, interest, ethnicity, age, gender or social background. The production, practice and content of Community Media foster greater understanding among communities, including those most marginalised and support peace, tolerance, democracy and development;

Thus, CMA believes that community media should promote the right to communicate, foster freedom of expression and freedom to form and confront opinions, assist the free flow of information and opinions, encourage creative expression, contribute to the democratic process and to a pluralist society, provide access to training, production and distribution facilities, encourage creative talent and foster local traditions and culture, provide services for the benefit, entertainment, education, engagement and development of the wider community, seek to have their ownership representative of local geographically-recognisable communities or of communities of common interest etc.

Besides, it should be editorially independent of government, commercial interests, religious institutions and political parties, honestly inform an audience on the basis of information drawn from various sources, and provide a right of reply to any person or organisation who is or may be subject to serious misrepresentation, ensure a right of access to production facilities and platforms for minority and marginalised groups, in order to promote and protect cultural diversity, recognise and respect the contribution of volunteers, affirm the right of paid workers to join appropriate trade unions and provide equally satisfactory working conditions for all, promote and foster improved communication and partnership working in the community media sector, building networks at all levels to further develop good practice and strengthen communities.

1.7.8 Advantages and disadvantages of conventional mass media versus community media for science communication

Mass media enjoys a very prominent role in our lives. There are various effects of mass media on the society at large. Media tends to influence and it's obvious that there are positive as well as negative influences. However, it also depends upon the way audience perceive things. The power of media is by far recognized by everybody in terms of advertising, marketing and as a medium to broadcast information to people at large. Since mass media is used to communicate and interact with people from various walks of life, it can often result in a conflict of options. Print media (magazines, newspapers, brochures, press releases, newsletters, etc), electronic media (television, radio etc) and the internet are all part of mass media. Today, it can give a person phenomenal exposure and this can result in various effects on the society. However, have we paused to think about its pros and cons? Well, one cannot blame a particular medium because of outside influences. Here, we shall take a look at such advantages and disadvantages.

Advantages –

- A highly wider reach that is phenomenal. It can target a global audience.
- In terms of newspapers and magazines, it can reach a specified target group. Besides, it is easily accessible. For example, the newspaper lands on the doorstep and we have the latest news in our drawing rooms due to the television set.
- Certain types of media have a loyal fan following. This would mean that an advertiser, publication or news channel would have a ready audience.
- We have the latest news and information at the click of the mouse! The internet is such a medium that it can give many options for the kind of information required.
- Television, movies, internet and the radio are some of the best forms of entertainment. It can be used for educational purposes in an effective manner.
- While audio and visual media individually has its own advantage, if combined or when it is audio-visual medium like TV, film, its impact on the masses grows to a very high degree.

Disadvantages :

- The information reported may not be authentic from every angle. Hence, there may be a misinterpretation of a situation.
- News can be manipulated to influence the minds of the audiences. For example - a particular political party may manipulate reports in their favour, which would indicate the political control in the media.
- Media bias can occur due to various issues. A journalist or an editor may give personal preference to an issue.

- A particular event or a celebrity may receive undue importance and set wrong ideals before the youth. It may present an ostentatious lifestyle, which may inculcate wrong ideals amongst youngsters.
- Unnecessary sensationalism of an issue may project wrong information to the public.
- Misleading messages may again divert young minds towards a wrong path.
- Wrong interpretation of news may even blow things out of proportion. This would create further unrest in any place or even violence in case of extreme situations.
- At times, a particular event or news item may receive too much attention simply because of the lack of other important news or snippets. This would again present a wrong idea before the public.
- Certain mass media such as newspapers or leaflets have a very short shelf life.
- Mass media is a highly ‘impersonal’ media which usually can’t have a personalized impact upon the masses under normal circumstances.

On the other hand, community media has a major advantage of its being participatory in nature which makes it unique and thereby involves all the members of the community in any programme or event being performed. Further, as it is more democratic than mass media with a horizontal dialogue in the process it is taken more closely by the people in any society. People feel the community media as one of its own and so its effect on the minds of the people is quite high than mass media.

However, one major disadvantage of community media is that it can reach or influence a limited number of people on one occasion. For example, while a community radio can reach about a few lakh of people at one time, a folk or traditional art performance can reach not more than a few hundred people. This requires the performances or programmes to be enacted repeatedly for reaching out to a wider target audience whereas with conventional mass media many lakh of people can be reached at the same time.

This needs to be mentioned that while both these types of media have their advantages and disadvantages, depending upon a particular situation, we have to make a judicious mixture of some components from both of them and apply to the emerging situation for taking the optimum advantage out of both.

1.7.9 New media for science communication :

A news item in *The Hindu* (2013) informs that India now has the third largest number of internet users next to USA and China. Further, with latest developments in the field of Information and Communication Technology an almost 200 % increase in information exposure has been registered over

the last few years as we are passing through a media and information revolution. Information is among the most enlightening and empowering tools of the modern day society

Further, TV plays a major role in the flow of information and is equipped with the power to influence people, their beliefs and their opinions. Being a visual medium, its impact transcends the social and educational background of its viewers; more so, in a diverse country like India, where TV dominates the media & entertainment landscape as the preferred choice of entertainment.

By October 2013 the nation had crossed the 200 million mark, says a report released by the Internet and Mobile Association of India (IMAI) and Indian Market Research Bureau (IMRB). The report estimates 243 million internet users in the country by June 2014, overtaking the US as the world's second largest internet base after China. The US currently has an estimated 207 million internet users, while China has 300 million. The 205 million internet users that the IMAI reports for India are not all active users (those who use the internet at least once a month).

While Indians primarily use the internet for communication, largely in the form of email, social media is also an important driver of internet use in India. This facet of the IMAI report can be corroborated with data from other sources such as Facebook, according to which India had 82 million monthly active users by June 30, 2013, the second largest geographical region for Facebook after the US and Canada. Facebook does not operate in China.

Internet penetration in India is driven largely by mobile phones, with some of the cheapest and most basic hand-sets today offering access to the internet. India has 110 million mobile internet users of which 25 million are in rural India. The growth of internet penetration in rural India is driven largely by the mobile phone; 70% of rural India's active internet population access the web via mobile phones.

While these numbers seem to be rather on the higher side to take cognizance of, it is better left to imagination only the amount of information or messages generated by such large media outlets on a round-the-clock basis 365 days a year.

Alan Rusbridger, Senior Editor of *The Guardian* of the United Kingdom a few years back opined that the future of journalism would depend upon to a great extent on hand-held devices – that is one or the other kind of a mobile phone handset or an iPod, tablet PC among others as these devices are nowadays used for accessing the internet.

Further, the social networking sites (SNS) are becoming a major craze among the upcoming generations. Thus, for a proper dissemination of science communication, inputs to this category of target

audience should also be a priority for the communicators. Lack of attention to this category shall lead to exclusion of a considerable portion of the populace.

A publicity write up in the website of the Centre for Science and Environment (CSE), Delhi states: “Twitter, Wikipaedia... You may or may not be using these, but the age of new media has arrived. Organizations cannot afford to ignore "new media" and need to reinvent their information dissemination, communication and outreach strategy accordingly . . . ”.

Thus, today’s breed of science communicators have to be comfortable with the following attributes at the minimum - understand the new media landscape and appreciate its influence on communication and social change, identify communication channels and new media tools for effective outreach, learn to integrate the best of both - new and print media into the communication plan, develop web strategy based on “new media”, acquire skills and improve capacity to make the most of new media tools in advocacy and activism.

Some of the channels and devices in the New Media world useful for our purpose are as following:

Mobile Phones: Mobile phones have become a boon to mankind. It has made communication possible at anytime, and from anywhere. About a decade ago, who would have thought of having internet on mobiles? Today, we can stay in touch with the whole world via Internet on our mobile phones.

Internet: This is the most important channel of the new age media. The discovery of Internet can be called the biggest invention in mass media. In earlier days, news used to reach people only with the morning newspaper. But today, live updates reach us simultaneously as the events unfold. Internet has inspired interaction and connectivity through its social networking medium. It has become one of the core means of mass communication. We cannot think of leading our lives without it.

Let us look at how internet impacts mass communication through the following media ---.

Websites: Internet has a plethora of websites dedicated to various people, companies, brands, causes, activities, etc. The most significant utility of these websites is for providing information, search engines, downloads through libraries, and interaction through the social networking sites. Because of these websites, carrying out e-commerce transactions has also become easy.

Podcasts: Podcasts are media of communication that include short video or audio files. They can be seen and heard on mobiles, computers, and portable media instruments. They are engaging devices of communication.

eForums: These are bulletin boards on websites where people start threads on topics. These are usually hosted on a website. These forums are open platforms to discuss any range of topics. People give their opinions and share experiences on various topics.

eBooks: These are a number of websites which have hosted eBooks and online libraries. The main benefit of having eBooks is that you don't have to carry bulky books. One can read them on one's eBook readers, mobiles, computer screens, or other devices. One can even adjust the font size to suit your requirements.

Blogging: A blog is a space on the Internet where a single person or a group of people record their information, opinions, photos, videos, etc. It is an interesting and free platform to talk about any topic. Interaction happens in the form of comments or feedback.

Internet TV: It is also known as online TV. It usually has an archive of programmes. One has to only choose the programme that one wishes to view from the list. One can either view it directly from the host server, or download the content on one's computer. It is an effective means of communication.

Facebook: It is the most popular social networking website with several applications which people utilize. It is the best platform to meet old friends, or make new ones. Advertisers also like this forum for communicating about their products.

Twitter: It is also a famous social networking website. It is a microblogging site which allows interaction and feedback of different people. There was a time when it was very popular among celebrities and individuals. Today, the governments of various nations have understood the importance of "tweeting" information to the public, and regularly share information through it.

YouTube: It is a website which uploads content in a video format. It houses a range of interesting videos that appeal to people of all generations. From films to educational videos, you will find everything on YouTube.

1.8 Summing Up

In this chapter we have briefly learnt the following aspects ---

- Indian Space Research Organization (ISRO) though was set up for a specific purpose (through the Development Educational Communication Unit - DECU) was instrumental in planning and implementing the SITE and Kheda communication projects for educational purposes which have been models for such experiments across the world.
- NCSTC, Vigyan Prasar, NISCAIR are institutions established by the government of India under Department of Science and Technology and Council of Industrial and Scientific Research (CSIR) with the specific purpose of passing on the benefits of scientific and technological developments, innovations etc. to the masses.
- In an effort to ‘catch them young’ Vigyan Prasar has established many clubs even at schools for popularizing the concept of a scientific temper in the minds of the masses from a young age and nurture them later on.
- The Indian Science Writers’ Association (ISWA) along with NCSTC and other like-minded organizations dedicated to the theme of science communication regularly organize the National Science Communication Congress for spreading awareness and discussion of new ideas and development in this field every year.
- For becoming successful in disseminating its messages across the largest cross section of the masses, science communicators have to adopt all forms of media in its capacity – from conventional mass media to new media including community media.
- While conventional mass media’s reach is too wide yet because of its impersonal nature, many a times it fails to have the desired impact upon the human beings.
- Community media though has a limited reach is a highly personal media and thus possess the potential of having a major impact upon the human beings.
- While all the different types of media have their individual advantages and disadvantages, science communicators have to find out the best possible combination of such media and their components for reaching out to the widest possible range of target audience and reaping maximum benefits.

1.9 Suggested Readings

Websites of the following institutions –

- DRDO, ISRO, NCSTC, Vigyan Prasar, NISCAIR, Centre for Science and Environment, Delhi
- Community Media Association, UK
- man.mommunica.org

1.10 Proable Questions

1. What do you understand by the term 'institutional efforts in science communication'? Write about its status in our country.
2. How would you differentiate between conventional mass media and community media? Compare the advantages and disadvantages between them? Which one would you prefer for your efforts?
3. Do you think the new media in its different forms is important for the purpose of science communication? If so, how? How does communicating in this medium differ from that of doing so in other media?

1.11 **Assignments :**

1. Observe any content on science communication in any media available to you which may include radio, TV, newspapers, film etc. and find out what are the methods or media being adopted by the communicators in disseminating the messages.
2. Have you ever come across a community media communicating anything about science and scientific mentality so far? If yes, write how the media has tried to implement the theme for a better understanding of the target audience. If not, what do you think is the reason behind this lack of available material in this regard?

Unit 5 : Environmental Communication

- 1.16 Objectives
- 1.17 Introduction
- 1.18 Concept
- 1.19 Contents
 - 1.19.1 Significance
 - 1.19.2 Issues in Environmental Communications
 - 1.19.3 Media's Role in Environmental Communication
- 1.20 Summing Up
- 1.21 Suggested Readings
- 1.22 Probable Questions
- 1.23 Assignments

1.1 Objectives:

The learning objectives of this chapter are ---

- Make the learners well-versed with the concept and related aspects of Environmental Communication in relation to the larger domain of Science Communication
- Familiarize learners with key issues in this field and future potential developments
- Create an adequate amount of awareness about the media's role in this field

1.2 Introduction :

In the simplest of terms Environmental Communication means communicating about the environment which is of vital importance to us. It is needless to say that nature has an intrinsic relationship with human beings since time immemorial. It is because a balanced environment or ecological balance to the optimum level is absolutely necessary for survival of mankind and all living things. Thus, it is not surprising that nature or its' various manifestations have been respected and worshipped in almost all the ancient civilizations. This worship is nothing but concern for nature and causing minimal disturbance to it etc.

Since we are so dependent upon the environment for our survival we need to constantly monitor the developments which cause disturbances to it resulting in major disruptions in the natural occurrence or happenings. These developments are highly dangerous for the normal survival of all living beings in the world.

Thus, whenever any such alarming development is experienced in any aspect of the environment it is the natural duty of those aware of it to create awareness about them among the people. This would help people to take adequate steps for reversing the trend and put the engine back on its rails by all necessary means. This is why Environmental Communication is becoming so important nowadays.

In the pre-historic days, environmental pollution started in a meager way when fire was invented and people started using it for cooking and other purposes. As civilizations grew more and more modern to the days of the industrial revolution in the 17th century, the various material requirements of an ever-growing population across the world put a very heavy pressure on natural resources which were scarce and precious.

This has resulted in massive exploitation of natural resources like wood, fossil fuel like crude oil, coal, livestock and fish, use of pesticides and chemical fertilizers for better crop production, construction of houses and establishment of human habitats cutting down forests even including encroachments on river beds and what not. Thus, an unprecedented growth of global population and consumption pattern went on to cause huge imbalances in the world of environment. Things have gone to such an extent that even the weather of many areas around the world has changed towards extremes and this process is continuing.

Environmental communication is communication about environmental affairs. It includes evaluation of how the media covers environmental issues, the rhetoric of environmental debates and decision making, and the discourse around how to solve environmental problems. Environmental communication includes all the different forms of communication (interpersonal, group, public, organizational, mass, etc.) that intersect with the social debate about environmental issues and problems." (Meisner)

Media is a primary tool for magnifying environmental issues and can influence the course of policy. (Carvalho, 2009).

In any discussion regarding environmental communication, it would not be complete without referring to Rachel Carson's unique contributions to this field.

Rachel Carson cared deeply about the natural world about her. As a marine biologist, her work focused mainly on marine life and on the dangers of chemical pollution; it laid the foundation for the modern environmental movement. When it was released in 1962, her book *Silent Spring* had an immediate, profound impact that still resonates today. She wrote about technical issues in a beautiful and accessible style, thus reaching a broad audience.

Carson's legacy is manifold. She became an international voice for the public understanding of science through her sea trilogy: *Under the Sea Wind*, *The Sea around Us* and *The*

Edge of the Sea, an exploration of the whole of ocean life from the shores to its depth. *Silent Spring* helped shape the modern idea of environmentalism, and she is a role model for scientists around the world.

Environmental Communication is the planned and strategic use of communication processes to support effective policy-making and project implementation geared towards environmental sustainability. Embedded in a well-defined communication strategy, it makes efficient use of methods, instruments and techniques which are well established in development communication, adult education, social marketing, agricultural extension, public relations, non-formal training and other fields. Despite its acknowledged impact, Environmental Communication is rarely integrated in development cooperation programmes as a strategic tool.

It is closely related to non-formal environmental education (NFEE), i.e. learning processes encompassing knowledge, values, socio-economic and technical skills related to procedures that facilitate the change of norms and practices towards sustainable development through problem solving action. From a long-term perspective, both Environmental Communication and NFEE build on the factual knowledge of formal education regarding complex ecological systems and their interconnection with human interventions on the local, regional and global level.

Cox (2006) defines environmental communication as “the pragmatic and constitutive vehicle for our understanding of the environment as well as our relationship to the natural world; it is the symbolic medium that we use in constructing environmental problems and negotiating society’s different responses to them.” He states that environmental communication educates, persuades and helps in solving of environmental problems, and this communication inherently also is *constitutive*, thereby helps to compose “representations (and perceptions) of nature.”

Another book that explores environmental communication is *Communicating Nature: how we create and understand environmental messages* by Julia B. Corbett. Corbett (2006) defines environmental communication as “expressed in values, words, actions and everyday practices; individually interpreted and negotiated; historically and culturally rooted; ideologically derived and driven; embedded in a dominant societal paradigm that assigns instrumental values to the environment and believes it exists to serve humans; intricately tied to pop culture, particularly advertising and entertainment; framed and reported by the media in a way that generally supports the status quo; mediated and influenced by social institutions like governments and business.”

Jurin, Roush and Danter (2010) provide their definition of environmental communication as “the systematic generation and exchange of humans’ messages in, from, for, and about the world around us and our interactions in it.”

Environmental communication, hence, constitutes all the ways in which we communicate about our natural world; it helps shape our perceptions of the natural world and of our relationship to the earth; it is persuasive and educative. It is also “culturally rooted,” shaped by cultures, authority” and is interpreted individually. (Mishra, 2011).

Sustainable development always requires consideration of the environmental factors in development processes. Natural environment and social welfare have a coherent and mutual relationship, i.e. the natural environment, including natural resources, provides materials and space for all social production sectors. The prosperity of a country is strongly dependent on its natural resources. In fact, many countries only exploit natural resources and export raw materials for foreign currencies and advanced technologies etc. Therefore, natural resources reserve in particular, and natural environment in general, play an important role in the sustainable development of each country, territory and region as they do not only provide the “inputs” but also contain the “output” for all livelihood and production processes. Environment relates to the stability and sustainability of the socio-economic development and environment determines the future of country and people. (UNDP, 2007)

1.3 Concept :

Following your introduction to the subject of study in the first unit here you should know that there are two important aspects of environmental communication in the society.

First of all, it is expected to inform us about the degradation of the environment at any given moment of time so that we can become conscious of the future dangers involved and take necessary steps for correcting the wrongs being done.

Secondly, creating a deep sense of sensitization among the masses and particularly in children about the urgent necessity to adopt a way of life in which damages to the environment remains the minimum.

Public awareness and concern about environmental and social issues is growing. The fact that the world has become more and more transparent, due largely to the mass media and the rise of new information technologies, has undoubtedly contributed to that. The impact of our consumption patterns is no longer vague and invisible. People are beginning to understand the

effect they are having on this world – our only home – and that they have a responsibility to look after it. (Töpfer, 2009)

History & Origin :

Along with the growth of environmental studies, educational and professional opportunities that stress the role of human communication in environmental affairs also have emerged. In many colleges environmental communication courses study a range of related topics such as environmental news media, methods of public participation in environmental decisions, environmental rhetoric, risk communication, environmental conflict resolution, advocacy campaigns, “green” marketing, and images of nature in popular culture.

Besides, a growing number of scholars in communication, journalism, literature, science communication, and the social sciences are pioneering research on the role and influence of environmental communication in the public sphere.

Besides, on a practical level, the study of environmental communication helps to prepare a person to enter many professions in which communication is central to an entity’s involvement in environmental affairs. Indeed, some scholars predict that like the Internet, “the green economy will create a massive new set of opportunities” for professionals in new technologies as well as businesses (Martini & Reed, 2010, p. 74). For example, business, government agencies, law firms, public relations (PR) firms, and non profit environmental groups employ consultants or staff in environmental communication. As one organization noted, “Environmental communication professionals are working in every sector of the economy. . . . The field is becoming more and more important as the stakes have become greater . . . and the tools for communicating have become more diverse.” (EnviroEducation.com, 2004).

As a result, our beliefs and behaviours about nature and environmental problems are mediated or influenced by such communication.

Also, the public sphere (or spheres) emerge as a discursive space in which competing voices engage us about environmental concerns.

Growth of the Field :

Communication scholar Susan Senecah (2007) has observed, “Fields of inquiry do not simply happen by wishing them into existence. The field of environmental communication is no different” (p. 22). In the United States, the field grew out of the work of a diverse group of communication scholars, many of whom used the tools of rhetorical criticism to study conflicts over wilderness, forests, farmlands, and endangered species as well as the rhetoric of

environmental groups. Christine Oravec's 1981 study of the "sublime" in John Muir's appeals to preserve Yosemite Valley in the 19th century is considered by many to be the start of scholarship in what would become the field of environmental communication.

At the same time, the subjects that such scholars studied widened to include the roles of science, media, and industry in responding to threats to human health and environmental quality.

Early studies investigated issues such as industry's use of Public Relations and mass-circulation magazines to construct "ecological" images, the nuclear power industry's response to dramatic accidents at Three Mile Island and Chernobyl, and risk communication in conveying the dangers of recombinant DNA experiments (Waddell, 1990).

Scholars in the fields of journalism and mass communication began a systematic study of the influence of media depictions of the environment on public attitudes. In fact, the study of environmental media has grown so rapidly that many now consider it a distinct subfield, and journalists practicing in this area formed the (Society of Environmental Journalists, www.sej.org).

By the 1990s, a biennial Conference on Communication and Environment began to attract scholars from a range of academic disciplines in the United States and other nations. Also, a new Environmental Communication Network and website were launched to provide online resources for scholars, teachers, students, and practitioners. And, new journals in communication and environmental topics began to appear, including *Environmental Communication: A Journal of Nature and Culture*.

In 2011, scholars and practitioners established the International Environmental Communication Association (<http://environmentalcomm.org>) to coordinate research and activities worldwide. Interest has grown not only in the United States, but Europe, particularly, has seen "ample signs that environmental communication has grown substantially as a field" (Carvalho, 2009).

Professional associations linking communication or media with environmental topics now exist in China, South-east Asia, India, Russia, and Latin America. The Environmental Communication Network of Latin America and the Caribbean, for example, offers support for environmental reporters in fifteen countries in the regions.

Study and Practice of Environmental Communication :

Environmental communication can be traced to folklore, where communities - "indigenous groups that include the Native Americans, the Africans, the Indians, and the Chinese communicated with their people about the Earth. This can be seen in folk culture and traditions,

which teach the young about environmental values, creating their perceptions and understanding of the natural world, and of the earth as mother.” (Mishra, 2011)

Dilemma and Debate :

From the overall experience of the world society in general a major dilemma and debate arise in the minds of the people. That is, as all developmental works cause at least some amount of environmental damages always should we proceed with any developmental works or not. Or if we do indeed proceed how to do so in this regard.

Now let us look at the pros of the issue of construction of multipurpose dams on rivers, a popular way of harnessing the power of water all over the world. If a dam is constructed on a river or if a series of dams – both small and big – are constructed on the same river, it can produce major amounts of electricity, help in reduction of risk of occurrence of floods, irrigation can get a big boost etc. if planned properly.

However, let us look at the cons. Whenever a dam is constructed and water is controlled, the natural flow of the river is controlled or blocked which results in problems for the flora and fauna dependent upon that water body both upstream (on the part prior to the dam) and downstream (on the part down the dam), huge reservoirs are required for storing the water which also needs big chunks of land etc.

It may be of interest to you all that because of the construction of a dam in the Garhwal region of Uttarakhand and providing for a water reservoir several villages and a subdivision level town was submerged in the water causing a lot of hardship to the people of the area. Also, many species of flora and fauna may have been destroyed forever in the process.

Similarly, the issue of big dam construction in the Narmada river has also been a topic of relentless debates because these kind of issues are yet to be settled with a convincing answer.

Further, construction of buildings for any purpose, roads etc. are also potential destructive agents of the environment. For example, because of expansion of population we need far more numbers of houses for families, schools, colleges, industries, expansion of railway lines, airports, bus stations and what not. But with each and every such construction we are reducing the limited amount of forest cover in the world.

Do you know that even sound and light in excess of a certain permissible level cause environmental pollution? A few years ago, when the government of United Kingdom wanted to construct the second international airport in addition to Heathrow airport in London, there was a major protest against it by the residents of the area where it was to have been constructed. This is

because the sound to be caused by the constant movement of aeroplanes would be a big source of irritation causing mental and physical discomfort to the people living nearby.

Let us take a look at a few real life examples nearer home. You must be familiar with increasing news items about elephants causing a lot of trouble by destruction of property, food grains in the field, destroying houses and even killing of human beings quite often. More so in the recent days. Monkeys are also not left behind. Though they can't destroy houses or kill human beings yet in many places of cities and also rural areas they just swarm into human habitats and eat as well as destroy vegetation, enter and disturb households etc.

This is also an indirect result of environmental destruction caused by unplanned developmental works by which we are reducing habitats for wildlife and thus they are forced to express or communicate their anger, frustration towards us.

Of late there has been a debate about allowing a four-lane national highway to be allowed to pass through the Kaziranga National Park – a UNESCO World heritage site in Assam. Due to protests it would not be constructed now so as not to disturb the natural habitat of the wildlife.

The oil spills from crude oil-carrying ships from time to time make big news items. Whenever such an accident happens because of any reason, it creates havoc for the living organisms in that portion of the sea or ocean.

Now the question is whether we should bring to a total halt any developmental activity at all.

But this is not a practical solution to the problem of environmental degradation.

There is a solution to this vexed issue. That is, if we have to cause some amount of damage to nature, we must also adequately provide for keeping this damage at the minimum possible level by strategic plans to replenish or refurbish the original situation as far as possible in the long run.

This is why, nowadays whenever a major industry is established or a dam is to be constructed, it is mandatory that an in-depth study called Environmental Impact Assessment (EIA) is carried out for arriving at an estimate based on field-level data and projection. This is done with the view to adopt an effective plan for refurbishing the projected loss of various aspects to be firmly put in place as the industry progresses on its path towards production.

At this point, it is highly important that people from such areas – both to be directly and indirectly affected – need to be informed properly and made aware of the potential problems so as to sensitize them to protest and demand for an alternative. Or at least a concrete plan to be provided for controlling the damage to be caused by the development. Of course, it is not that we can expect a one hundred per cent improvement in the situation. Yet, a bigger percentage would be a big achievement and help for the society.

These are the reasons why an effective environmental communication is of such vital importance for the masses anywhere across the world.

Issues in Environmental Communication :

Issues in this field are myriad as environment is one aspect that has a close relationship with almost each and every walk of our life. The way communication is a highly inter-disciplinary domain, in the same way environmental communication also touches so many aspects and issues in the society that it seems almost each and everything is related to it either in a direct or indirect manner.

As we have discussed about the dilemma of whether to go ahead with development resulting in destruction or disturbance of environment, Environmental Communication is concerned with the cause of development in a sustainable manner.

A few of the major issues in this field include – global warming resulting in climate change causing disturbance to the natural evolution of flora and fauna across the world, depletion of the ozone layer above the earth surface, major destruction of forest covers all over the world including rain forests in Brazil and other countries etc.

The prime challenge before the media is how to sensitize the masses about the urgent need to consume resources in a way which would cause the minimum disturbance to nature and there is a potential to re-develop or replenish that portion of resources as far as possible.

Why do we need a specific strategy for the campaign :

It is said that “The loud saying doesn’t mean everyone will listen to”, “What they hear doesn’t mean they can understand”, “What they understand doesn’t mean they will accept”, “What they accept doesn’t mean they will follow”, and “What they follow doesn’t mean they will repeat doing”. It requires active responses and reminders in order to have community action change becoming a permanent behaviour.

Therefore, it is necessary to have a communication activity or an action plan, which is built on a strategy with sustainable vision to provide better information for stakeholders on poverty and environment relationships, during the implementation phase of any campaign for environmental communication activity. (UNDP, 2007)

Communication here is defined in a broad sense, as the exchange of ideas, opinions and information through a variety of means and media, through which the providers disseminate information and ask for behaviour change, while the receivers give some feedback as a result

of receiving information. The feedback can be collected through many means of activities or dialogue.

In this regard, one-way communication refers to a form of communication where there are no direct contacts between the sender and receiver of a message. Its means are - press files, press releases, public announcements, TV and radio programmes, leaflets, newsletters, information brochures, website, CD-ROMs, billboards, banners, posters and Lessons Learnt Brochure on Completion.

On the other hand, interpersonal communication gives the possibility to have opinions exchanged between sender and receivers of a message, as well as between receivers. This activity is done through information events such as public meetings, journalists' briefings, press conferences, interviews, participation in talk-shows, photo exhibitions, site visits, video performances, Power Point presentations, and participation in seminars and conferences that are Project subject-related, as well as through person-to-person discussions (household visits) and group discussions in specially-identified areas. Information exchanged through networks also belongs to the interpersonal communication form. (UNDP, 2007)

As an activity or phenomenon, environmental communication is all of the diverse forms of interpersonal, group, public, organizational, and mediated communication that make up the social discussion and debate about environmental issues and problems, and our relationship to non-human nature. Loosely speaking, we can refer to that discussion and debate about environmental issues and problems as "environmental discourse." And, we can refer to the even broader social discussion about nature as the discourse of nature. Environmental communication manifests as the discourse of nature and its subset, the environmental discourse. From billboards to Twitter, from Facebook to *Time* magazine, from Current TV to your local public hearing to scientific reports, environmental communication is everywhere.

In the textbook *Environmental Communication and the Public Sphere*, Robert Cox provides a more formal definition that situates the subject as a form of symbolic action. In Cox's words (p.20), environmental communication is "the pragmatic and constitutive vehicle for our understanding of the environment as well as our relationships to the natural world; it is the symbolic medium that we use in constructing environmental problems and negotiating society's different responses to them." For Cox, environmental communication has seven major areas of study:

- Environmental rhetoric and discourse
- Media and environmental journalism
- Public participation in environmental decision making

- Social marketing and advocacy campaigns
- Environmental collaboration and conflict resolution
- Risk communication
- Representations of nature in popular culture and green marketing

Both mass media and interpersonal communication appear to make a positive contribution to understanding, as well as to perpetuating some popular misconceptions. Communication, both mass and interpersonal, holds the key to improvement in public understanding of environmental problems.

Ideas about the role of mass communication in solving environmental problems frequently presume that by increasing coverage, the media can create the desired depth and breadth of individual and public understanding, and once that is achieved people will participate. The model is:

COVERAGE—————UNDERSTANDING—————ACTION

However, this model takes little account of the behavioural processes by which individuals relate to environmental problems. It assumes that coverage is equivalent to exposure and attention to media content, and that this leads directly to understanding. Understanding is then presumed to lead directly to individual action, pressure for action from the appropriate authorities, or consent to actions taken by leadership on behalf of citizens. (Stamm et al, 2009)

1.23.1 Media's Role in Environmental Communication :

As a medium for dissemination of meaningful information to the global population or any segment of the population, there is no parallel like media. This includes all types of the system from conventional mass media to new and social media which is becoming highly popular over the last few years. It can be mentioned here that a few years ago, social media has created unprecedented history by being instrumental in causing the Arab Spring revolution closely followed by Tulip revolution.

This is because media is a convenient and cost-effective means for disseminating information aimed at any specific audiences. So, for environmental communication purposes also, utilizing media is an inevitable conclusion.

As it happens with any other effort for communicating something specific to the masses with a long term effect, a strategic approach is desired for environmental communication so as to achieve the desired results. While different experts have come up with various models for such a strategy, we would like to refer to the one presented by the Organization for Economic Cooperation and Development (OECD) which is more convenient and comprehensive.

The issue of media's role in environmental communication is a critical one as the term media includes a whole lot of media agencies. So the right kind of 'media mix' or 'media planning' or finding out a judicious and practical combination of various media outlets, coordinating them for gaining the maximum effects on the minds of the masses is of crucial importance.

Not only this, it is also important that media maintains a constant omnipresence in the activity right from the initial stage to even after completion of a specific environmental communication campaign so that results or feedback can be monitored and future course correction, whenever needed can be carried out.

With the emergence of newer and newer forms of media in future this challenge would also be growing day by day keeping the communicators occupied always for developing equally-matching strategies and solutions for the upcoming situations.

Environmental Communication transforms the power generated by project managers and the people concerned into action. It provides the missing link between the subject matter of environmental issues and the related socio-political processes of policy making and public participation. It is intricately related to education and training activities, bridging 'hard' technical know-how and 'soft' action-oriented behavioural change. Communication will play a crucial role throughout the policy and programme life cycle of recognizing - gaining control over - solving - and maintaining control over an environmental problem. It is vital that policy-makers or planners realize that different actors are involved at each stage, and that each actor has different perceptions, interests and 'hidden agendas'. Understanding where the project is in its progression from identification, formulation, implementation and management is an essential basis for determining which communication instruments should be used.

The stages of Implementation and Assessment :

Stage 1 - Assessment

- 01 Situation analysis and problem identification
- 02 Actors and Knowledge, Attitude, Practices (KAP) Analyses
- 03 Communication objectives

Stage 2 - Planning

- 04 Communication strategy development
- 05 Participation of strategic groups
- 06 Media selection and mix

Stage 3 Production

07 Message design

08 Media production and pretesting

Stage 4 Action and Reflection:

09 Media performances & field implementation

10 Process documentation and Monitoring and Evaluation (M & E)

The lessons learnt from development communication and agricultural extension teach us that if you ask people to change their practices – e.g. by recycling household waste or saving water – instructive information and raising awareness is not enough.

The diffusion of an innovation requires –

- basic information about the new idea and how others use it,
- the innovation to be applied to personal values and life style,
- preliminary attempts to practise the innovation and evaluate its usefulness and impact,
- acceptance and commitment to the change in practice.

1.5 Summing Up

In this unit we have discussed in details about the following aspects ---

- That Environmental Communication is all about communicating about any and every aspect of preserving, protecting our environment and also sensitize and make the people aware of the urgent need to contribute their portion towards this goal.
- In almost all the major civilizations of the world till date, there have been considerable importance dedicated for appreciating and preserving the environment in its optimum level.
- That, over the years, awareness among the masses is growing in this direction which is a good sign.
- It is important to note that any and every issue in the life of mankind is somehow or the other linked to the overall concept of environmental communication. Thus we need to be highly sensitive in every walk of our life for preserving the environment. It may range from the simple-looking but serious issue of dumping of polythene packets in the paddy fields or water drains to dumping of radio-active waste materials in the deep sea bed endangering human existence for centuries.

- That media – any media from folk, traditional to mass and new media – is of crucial importance for expanding the concepts in this field to the maximum possible number of people on the earth so that awareness level grows further and also to make people educated.
- Without media, the Herculean task of making the masses sensitized would not be possible at all.

1.6 Reference-cum-Recommended Readings

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1.7 Probable Questions :

1. What is your understanding of environmental communication? Why is it important in the present day scenario?
2. Mention about a few important issues in the field of environmental communication. Choose the one you believe is the most crucial one and give a brief background about it. Also discuss about a plan to create awareness about it utilizing the available media at hand.
3. How is the concept of environmental communication so closely related to our individual life? Write how we can make even a small contribution for this cause right from our home or family level.
4. Write how different civilizations across the world had environmental concerns as an important part of their social wisdom.

1.4 Assignments

1. Make a close observation of your neighbourhood and town or village where you live and find out the activities, happenings which are detrimental for a clean and balanced environment. Try to find out how or why these are happening and suggest possible ways of solving them.
2. Make a survey of about fifty persons close to you – your friends, family members, people known to you and find out their level of environmental awareness. Also try to assess if this level of awareness is comparable with the educational background of the person concerned.

Unit 6 : Health Communication

- 1.24 Objectives
- 1.25 Introduction
- 1.26 Concept
- 1.27 Contents
 - 1.27.1 Importance of Health Communication
 - 1.27.2 Various aspects of Health Communication
 - 1.27.3 Global versus Indian efforts in Health Communication
- 1.28 Summing Up
- 1.29 Suggested Readings
- 1.30 Probable Questions
- 1.31 Assignments (Optional)

1.1 Objectives:

This unit of the Science Communication course aims at the following objectives ---

- Acquiring a comprehensive and in-depth knowledge about the domain
- Realizing its significance for society and explore the potential for developing it for human welfare
- Various theoretical and practical aspects of the discipline

1.2 Introduction:

The science of health communication is becoming as central to the field of environmental health as the science of epidemiology. Within the 21st century, such events as Hurricane Katrina, H1N1 influenza, and concerns about chemical exposure in imported drywall have demonstrated the value of communication as a means of protecting public health. When such events occur, health professionals must not only seek disease control interventions but also address audiences' information needs. Health communication science is an essential underpinning for such activities.

Health communication provides a research-based foundation for developing strategies to inform and influence individual and community health decisions. The use of research adds scientific rigor to health communication planning and implementation. Health communication professionals are uniquely

trained and qualified to conduct communication research, develop effective and duplicable health promotion strategies and campaigns, and evaluate communication effectiveness.

The U.S. Department of Health and Human Services (HHS) included health communication science among the Healthy People 2010 objectives. HHS states that during the first decade of the 21st century, health communication has been an essential contributor to improved personal and community health.

It is the study and use of communication strategies to inform and influence individual and community decisions that affect health. It links the fields of communication and health and is increasingly recognized as a necessary element of efforts to improve personal and public health.

For the first time, health communication was allocated a chapter in the United States of America (USA)'s *Healthy People 2010* objectives, illustrating its growing importance, according to Parrott. In these objectives, set by the United States Department of Health and Human Services, health communication is seen to have relevance for virtually every aspect of health and well-being, including disease prevention, health promotion and quality of life. This increase in the prominence of the field, externally, is happening contemporaneously with important developments taking place. Internally, one of which is the focus on the study of environmental, social and psychological influences on behaviour and health. Given the global challenges posed by major threats, health communication scholars and practitioners recognize the importance of prevention and, with it, the need to understand human behaviour through the prism of theory. This has given rise to theorizing about the role of risk perceptions, social norms, emotions and uncertainty in health behaviours.

Healthy People 2010 defines health communication as “the art and technique of informing, influencing, and motivating individual, institutional, and public audiences about important health issues.” The competent authorities defined public health as “what we, as a society, do collectively to assure the conditions in which people can be healthy.” If we integrate these two perspectives, the following new definition emerges: Public health communication is the scientific development, strategic dissemination, and critical evaluation of relevant, accurate, accessible, and understandable health information communicated to and from intended audiences to advance the health of the public.

There are quite a few definitions of health communication. The National Cancer Institute and the Centres for Disease Control and Prevention of the USA use the following, “the study and use of communication strategies to inform and influence individual and community decisions that enhance health.

At its best, communication has an extraordinary power, not simply to inform, but to challenge and to inspire. It can achieve lasting and meaningful change. That is why it is vital for communications to be an integral part of the journey towards sustainable development.

Building Relationship with Media

Media is an effective tool for delivering your message or stories to the people one wants to reach, and can be vital to gaining wide public understanding of one's goals and objectives. Understanding media and building relationship are key components to communicating about local public health. The local data include information about the role of local public health that can be shared in media outreach efforts and provide examples that one can use in your discussions with media.

Understanding the Media

Before one speaks with a journalist, one should find out what the reporter writes about and who their audience is. Many papers publicize their circulation. Try to gauge how steeped a reporter might be on your issue based on their coverage of similar issues. Many reporters are fairly well-versed in many of the issues you care about, and you will be able to have a different type of conversation with them than you might with someone who is usually covering several different beats. Obviously, a local reporter will need more angles related to the community, whereas a national reporter will probably be looking for how these issues affect national policy.

Different types of media will require slightly different messages. For example, on a TV or radio talk show, your responses will need to be much shorter “sound bites” than those you might give to a newspaper or magazine reporter. Each reporter looks for something slightly different. Familiarize yourself with the type of coverage various outlets give issues prior to talking to reporters.

Tools for Communicating

The following are brief details about some effective tools to build relationships with the media:

Desksides or One-on-Ones. Good media relations is all about the relationship you build with journalists who cover your issue. Reporters have busy schedules but they are always receptive to learning something new about their beat. Take the time to arrange a brief meeting in their offices or at a nearby coffee shop to give them a new angle to a story or a heads up about an upcoming event or new programme. The lead expert on the issue should attend the meeting armed with key messages, a fact sheet and other important background materials about the particular health issue or programme. This is also an important way to establish yourself as a local resource over time to reporters. By nurturing your

relationship with your local reporter, you become a reliable source they can turn to even when they are not writing about your issue but need guidance for another story.

Fact Sheets, Issue Briefs. Reporters would rather have an issue brief rather than a journal article; a fact sheet with statistics, examples and messages rather than a book or brochure. One suggestion is to leave a fact sheet from this toolkit behind after a meeting with the media or use the language and examples from them in your conversations. The bottom line is that whether the message is spoken or written, it needs to be concise and kept to one or two pages - much like the provided fact sheets.

News Release. This is probably the most common way to get information out to the news media.

Pitch Letter. Similar to a news release, but shorter and less formal. A pitch letter can be placed in the body of an email and state in a few brief paragraphs your main message and what you hope they might write about.

The Telephone. Call reporters and give them your pitch or story idea directly. Make sure you ask whether they are on deadline. Most journalists prefer to be called before 2 p.m. unless you have breaking news to report.

Op-Eds (Opposite-Editorial page) or Letters to the Editor. Submitting an opinion piece relating to something that appeared in your local newspaper is another way to raise the profile of your campaign and issues. But competition to be placed is fierce. Opinion page editors get hundreds of unsolicited op-eds a week. And, they read them all. Another option: writing a letter to the editor. This is one of the more popular sections of the newspaper and is another way to get your views about something in the public eye. If an article in the newspaper taps into your work or presents an alternative view, send an op-ed or a letter to the editor. Editors are very receptive to pieces from experts and leaders in the community who have something valuable to add to a debate.

Reaction Statements. Releasing a reaction statement in response to something in the news can be an effective mechanism for using another issue in the news to draw attention to your own issue. They can be disseminated to local media, as well as advocacy organizations. If the story appeared in your local newspaper, you also could try writing an op-ed or letter to the editor (see above).

Newsletters. Sending out a quarterly newsletter can be an effective way to get details about your programme or campaign's work out to a wider audience, including reporters. As with all communication, stick to your messages, use stories to illustrate an issue whenever possible, and keep your article brief. These also are vehicles to spur story ideas for reporters.

Scope for Mass Communication campaigns in Health Communication :

Existing evidence indicates that mass media efforts to improve public health can and have accomplished the following tasks – increasing awareness of a health problem, raise the level of

information about health topics, make a health topic or problem more salient, thereby sensitizing the audience to other efforts, such as personal selling, group education or direct-mail brochures, stimulate interpersonal influence via conversations with family, friends, doctors and other experts, generate forms of self-initiated information seeking, and, reinforce existing attitudes and behaviours.

Of course, given enough time and money, mass media campaigns occasionally may operate directly to change some health-related behaviour, the way product advertising can successfully pre-sell certain low-priced consumer grocery and drug items, given advertising budgets that are large enough to achieve adequate levels of exposure. But the point is that there are a number of other possible outcomes of public health advertising and publicity.

Planning, implementing and evaluating public health campaigns :

Recent efforts at utilizing the mass media to promote health implicitly or explicitly point to some strategies for improving the effectiveness of promotional campaigns, and these are reviewed here -

Planning Campaigns

A number of observers have emphasized the importance of setting explicit and specific goals for mass media campaigns (Mendelsohn, 1973; Ray and Ward, 1975). As with any promotional goals, those in the health area must state what target markets are to be reached, what messages are to be delivered, which media are to be used, and what measurable effects are to be achieved over what time period.

The statement of prior goals is important for several reasons.

First, the goals provide guidance for copywriting and media selection. Ward (1975) noted that unless there are explicitly-stated goals advertising copywriters may treat public service campaigns like "creative trips." In that case they are free to let their imaginations run wild without the pressures of accountability that are exerted by commercial clients.

Second, the statement of promotional goals guides evaluation, permits evaluative plans to be specified in advance, and allows for the collection of baseline data where that is desirable.

And third, the process of stating promotional objectives should aid the campaign planner in estimating budgetary needs and in keeping the objectives realistic, given resource constraints.

Another important element in planning successful health campaigns is pre-research on the target market. Extrapolating from Rosenstock's (1966) widely-known health belief model and research by Bauer and Cox (1963), Wortzel (1975) suggest that the health marketer should study target markets in terms of their perceptions with regard to --- their susceptibility to a health disease or problem; (2) the seriousness of the disease or problem if it is encountered, the estimated probability that a given course of action will reduce the threat, and, the estimated cost of the action. Wortzel believes that data on the above factors can be combined with other demographic and psychographic information in order to define market segments and select appeals for each that are most likely to motivate behaviour

The point is that mass media campaigns are more likely to be effective if they are based on an understanding of relevant demographic, psychological, and sociological characteristics and experiences of the target consumers. And since consumer behaviour literature within the public health field is not ordinarily geared to practical marketing planning, it is quite probable that literature reviews will need to be supplemented with primary research.

Implementing Campaigns :

One of the problems faced by any public service marketer is obtaining high-quality, professional creative work. One solution is to ask advertising agencies to donate creative services; many agencies do donate time to worthy causes either through the Advertising Council, local advertising organizations, or independently. The client, of course, must pay the costs of production. However, advertising agencies are not likely to provide the same quantity or quality of time, talent and collateral services to non-paying public service clients that they provide to paying clients, and it is only realistic to recognize that fact. Also, there is the previously-mentioned danger of unsupervised copywriters indulging in "creative trips" on public service projects.

Both Mendelsohn (1973) and Maccoby (1975) argue that the practitioners who create advertising must understand and be guided by empirically-defined principles of communication and persuasion and not allowed to proceed on the basis of subjective insight, guesswork and intuition. In fact, Maccoby believes that an important strength of the famous Stanford campaign to reduce heart risk factors is that the media campaign was designed, created and pretested by the University's Department of Communication media staff which was trained in communications research.

Many observers agree that copytesting is a key to successful public service advertising. Maccoby (1975) has noted that the advertisements and other materials utilized in the Stanford campaign to "unsell" heart disease were extensively pretested. And Swineheart (1975a, 1975b) reported that the Children's

Television Workshop conducted or commissioned some sixty formative research studies in the course of creating the Public Broadcasting System's health programme, "Feeling Good."

The importance of copytesting public service advertising is particularly apparent where that advertising addresses emotional or controversial issues, since there may be a substantial danger of viewer distortion. For example, copytests of a number of storyboards designed to promote ethnic plurality and pride in national and racial origin indicated that one of the storyboards delivered exactly the opposite message. E. g. that everyone should be alike so there would be no prejudice. Yet another storyboard which intended to portray and then refute prejudiced beliefs, failed to achieve an effective refutation (Leo Burnett U.S.A., 1974).

Ray and Ward (1975) provide an overview of the issues involved in copy pretesting, and suggest a multi-faceted set of copytesting procedures.

The actual effects of advertising on deeply-rooted behaviour is apt to be relatively small at best, and to require careful planning and substantial resources. The implications of this are several –

- mass media campaigns in public health may be best suited to the achievement of intermediate goals, such as awareness, increased salience of a topic, etc.,
- where behavioral change is the goal, it may be necessary to combine mass media with interpersonal and group re-education programs,
- there is a need to experiment with nontraditional formats for teaching new behavior via the media, perhaps by simulating interpersonal and group learning sessions in some way; and,
- in many cases, such as seat belt usage, where behavior is particularly intractable, persuasive strategies cannot achieve public health goals and other solutions, such as legal sanctions, money incentives, etc., must be sought. (Bernhardt, 2004)

Communication Renaissance :

Over the last several decades, the application and study of communication and health have rapidly developed and expanded. Originally conceived in departments and schools of communication and medicine, courses in health communication are now found throughout the academy, from the liberal arts to health sciences and at many points in between. The recent proliferation of health communication is evident in the field's significant accomplishments, including the establishment of two peer-reviewed health communication journals, the inclusion of a health communication chapter in *Healthy People 2010-12* the funding of health communication centers of excellence by the National Cancer Institute, and the

publication of three books from the Institute of Medicine (IOM) stressing the importance of health communication in the USA.

Despite these accomplishments, the discipline of communication has until recently operated at the periphery of public health. Perceived as more skill than science, communication was equated only with dissemination of findings by many public health professionals, who assumed that public health information could “speak for itself.” Fortunately, many of today’s public health leaders realize that promoting health and protecting the public require both sound science and effective public health communication. The Centres for Disease Control and Prevention (CDC), for example, has recognized the importance of public health communication, concluding that “public health research, innovations in information technology, and advanced communications offer unprecedented opportunities for CDC to improve health in America and around the world.”

What is a Public Health Campaign :

A key challenge facing health professionals is to mobilize the power of mass communication to empower individuals to adopt healthy behaviours, to direct policy makers’ attention to important health issues, and to frame those issues for public debate and resolution. To address this challenge, the Centre for Health Communication has helped pioneer the field of mass communication and public health by researching and analyzing the contributions of mass communication to behaviour change and policy, by preparing future health leaders to utilize communication strategies, and by strengthening communication between journalists and health professionals.

Public health communication draws from numerous disciplines, including mass and speech communication, health education, marketing, journalism, public relations, psychology, informatics, and epidemiology. Although it is transdisciplinary in nature, the core principles of public health communication are firmly anchored in the central tenets of public health.

Ecological Perspective :

Public health recognizes that health is profoundly affected by social, political, environmental, and behavioral factors with which people live. Public health communication embraces this *ecological perspective* by encouraging multi-level communication strategies and interventions, such as tailored messages at the individual level, targeted messages at the group level, social marketing at the community level, media advocacy at the policy level, and media campaigns at the population level. In addition, public

health communication strategies are often combined with other intervention efforts, such as community organizing or coalition building, to produce multi-level public health interventions.

Change Orientation :

Like most of the applied research and practices in this field public health communication focuses primarily on improving the health of communities and populations. It is inherently interventionist, seeking to promote and protect health through change at all levels of influence. When well-conceived, carefully-implemented and sustained over time, its programmes have the capacity to elicit change among individuals and populations by raising awareness, increasing knowledge, shaping attitudes, and changing behaviours. Although communication initiatives often target those behaviours for change that contribute directly to morbidity and mortality, public health communication also targets social, physical, and environmental changes which can influence health outcomes.

Audience-Centred Philosophy :

Health communication campaigns have sometimes been criticized as paternalistic, and concerns have been raised about the use of one-way communication from “beneficent” experts to passive audiences. Public health communication recognizes that for programmes to be both ethical and effective, information from and about the intended audience should inform all stages of an intervention, including development, planning, and implementation, to ensure that the programme reflects the audience’s ideas, needs, and values. Areas of particular interest include the audience’s health literacy, culture, and diversity. Furthermore, public health communication programmes rely heavily on formative research and two-way communication between sources and receivers to ensure that messages are accessed and understood, communities are involved and invested, and programmes are modified as needed.

Future Directions :

The field of public health communication is poised for a period of rapid expansion, fueled in part by two major developments.

First, a comprehensive report on public health professional preparation identifies communication as a critical content area for future public health education.

Second, through its “Futures Initiative,” the CDC is creating a national centre focused on public health communication and marketing. These developments, along with continued scientific and technological advances, will dramatically affect future training, research, and practice in this field.

The reach and impact of public health communication has never been greater, as numerous campaigns address diverse health issues and audiences throughout the world. Progress towards the Healthy People 2010 in the USA’s objective of increasing research and evaluation in health communication is reflected by recent funding opportunities in public health communication research established by several government agencies. However, for this effort to reach its full potential, significantly more research will be needed, especially in the study of health disparities, communication-access disparities, and the application of electronic health interventions with underserved populations.

Greater support is also needed for research and evaluation in the field that is truly transdisciplinary, simultaneously addressing multiple health issues, intervention levels, and communication channels. Further, although there are many challenges for programme evaluation in public health communication, conducting comprehensive evaluations and disseminating the results is critical for expanding knowledge, improving programmes, and allocating limited resources.

Instructional opportunities in this field have been available for many years and are likely to expand in response to specific recommendations and future changes in workforce needs. Many schools and programs in public health are developing academic programmes in public health communication, including certificate programmes and concentration within traditional and distance-learning postgraduate programmes in public health. To ensure that these programmes adequately prepare students for careers in public health communication, however, it is important that disciplinary competencies be collectively developed and disseminated, ideally with support and direction from a federal agency or national organization.

Finally, professionals from this field have a responsibility to communicate well with each other. To facilitate the exchange of information and the translation of public health communication research to practice, the communicators need to become more visible and vocal in the society’s professional organizations.

With its interdisciplinary nature, ecological perspective, change orientation, and audience-centred philosophy, the area has the potential to make significant contributions to the health of the public. Public health leaders and visionaries who have recognized this potential and the innovative work conducted by public health communication professionals should be encouraged for their efforts. Over the coming years,

this discipline will continue to grow and develop, and when the dust has finally settled, public health will be changed and improved to its very core.

Important factors of success include content, messenger, choice of media and tone. Experts are realizing that traditional messages from governments and green groups urging the public to adopt the environment into their day-to-day decisions need to be overhauled. Many of these messages are simply too patronising, guilt-laden or disapproving. Instead of turning people on to the environment, they risk switching them off. The lesson to be learned is that communication styles have to be positive and tailored to different circumstances and cultural contexts. (Rimal, Lipinsky, 2009)

Communication is at the heart of who we are as human beings. It is our way of exchanging information; it also signifies our symbolic capability. These two functions reflect what James Carey characterized as the *transmission* and *ritual* views of communication, respectively. Carey recognized that communication serves an instrumental role (e.g. it helps one acquire knowledge) but it also fulfils a ritualistic function, one that reflects humans as members of a social community. Thus, communication can be defined as the symbolic exchange of shared meaning, and all communicative acts have both a transmission and a ritualistic component.

Intervention efforts to change behaviours are communicative acts. By focusing mostly on the transmission function of information exchange, such efforts often neglect ritualistic processes that are automatically engaged through communication. In adopting the transmission view of communication, it is reasonable to think carefully about the channels through which intervention messages are disseminated, to whom the message is attributed, how audience members respond and the features of messages that have the greatest impact.

Use of these health communication principles in public health presents challenges.

First, the evaluation of communication interventions, especially those using national mass media, does not usually lend itself to randomized trials. Hence, innovative methodological and statistical techniques are required for attributing observed outcomes to intervention efforts. The responsive and transactional nature of health communication interventions also mean that modification in intervention content may occur, adding an additional challenge to the evaluation process.

Second, the recognition among behavioural scientists – that causes of human behaviour reside at multiple levels that reinforce each other – poses difficulties in designing and testing multilevel interventions. This complexity of health behaviour determinants also requires a multidisciplinary approach

for effectively promoting change. This further means that interventions need to incorporate expertise from a variety of professional backgrounds.

Finally, due to the rapidly changing communication channels, health communication interventions need to make extra efforts to meet their audiences at their level of technology use.

Communication alone can:

- Increase the intended audience's knowledge and awareness of a health issues, problems, or solutions
- Influence perceptions, beliefs, and attitudes that may change social norms
- Cause prompt action
- Demonstrate or illustrate healthy skills
- Reinforce knowledge, attitudes, or behaviour
- Show the benefit of behaviour change
- Advocate a position on a health issue or policy
- Increase demand or support for health services
- Refute myths and misconceptions
- Strengthen organizational relationships

Communication combined with other strategies can:

- Cause sustained change in which an individual adopts and maintains a new health behaviour or an organization adopts and maintains a new policy direction
- Overcome barriers or systemic problems, such as insufficient access to care

Communication programmes can include multiple methods of influence

Health communicators can use a wide range of methods to design programmes to fit specific circumstances. These include the following:

- Media literacy - teaches intended audiences (often youth) to deconstruct media messages so they can identify the sponsor's motives; also teaches communicators how to compose messages attuned to the intended audience's point of view
- Media advocacy - seeks to change the social and political environment in which decisions that affect health and health resources are made by influencing the mass media's selection of topics and by shaping the debate about those topics

- Public relations - promotes the inclusion of messages about a health issue or behavior in the mass media
- Advertising - places paid or public service messages in the media or in public spaces to increase awareness of and support for a product, service, or behaviour
- Education entertainment - seeks to embed health-promoting messages and storylines into entertainment and news programmes or to eliminate messages that counter health messages; can also include seeking entertainment industry support for a health issue
- Individual and group instructions - influences, counsels, and provides skills to support desirable behaviour
- Partnership development - increases support for a programme or issue by harnessing the influence, credibility, and resources of profit, non-profit, or governmental organizations

1.32 Summing Up:

From the discussions above we can summarize the following learning points:

- Health communication has already assumed a major significance because of the effectiveness of preventive measures in controlling health hazards – a considerable portion of its being carried out through the media as we know of the proverb – prevention is better than cure.
- At this point media and communication come to play a decisive role in creating mass awareness among human beings in this regard.
- A lot of research has been going on in this particular field, mainly led by the western developed world. These are primarily aimed at finding out how an effective combination of health issues and communication and media strategies can achieve the goal of transforming the target audience. The goal is to convert laymen into wise persons with the capacity to think rationally while dealing with the day-to-day aspects of health issues.
- A proper campaign with flexibility and scope for improvising depending upon the ground realities is necessary for a successful implementation of the health communication programmes.
- Involving the people at grassroots level through community media is very important in this regard.
- It needs to be kept in mind that all types of media may not bring about the desired results in all circumstances. Thus there is a need for utilizing the services of different types of media to suit the requirements of various situations demanding application of media and communication tools with a specific orientation for a particular community or society.
- Health communication is becoming a major field of study in the academic world over the years.

- The ultimate aims and objectives of health communication can be summarized in just one sentence - pass on the benefits of health and scientific research to the common people in the final analysis so that the number of people dying because of lack of awareness on health issues can be reduced to the minimum possible level.

1.33 Suggested Readings :

A Field Guide to Designing a Health Communication Strategy

Bernhardt, JM. Communication at the Core of Effective Public Health. *American Journal of Public Health*. Vol. 94 (12), Dec., 2004 (2051-2053),

Beato, RR, Telfer, J. Communication as an Essential Component of Environmental Health Science. *Journal of Environmental Health* Volume 73 • Number 1. July/August 2010 .

Making Health Communication Programmes Work. National Cancer Institute at the National Institute of Health, USA.

Public Health Communications Toolkit. National Association of County and City Health Officials (NACCHO), USA.

Rimal, NR, Lapinsky, MK. Why health communication is important in public health. *Bulletin of the World Health Organization* 2009;87:247-247. doi: 10.2471/BLT.08.056713

Shea, L, Townsend, S. Communicating sustainability – How to produce effective public campaigns, United Nations Environment Programme (2005). ISBN: 92-807-2580-7

Schlenger, MJ. The Role of Mass Communications in Promoting Public Health. NA - *Advances in Consumer Research*, Volume 03, eds. Beverlee B. Anderson, Cincinnati (1976). Association for Consumer Research. (302-305).

1.34 Probable Questions:

1. What is your understand of the term Health Communication? Why is it becoming more and more important over the years?

2. How can we make Health Communication programmes effective? What problems do you foresee in implementing these programmes in the real life scenario?
3. How can mass communication and media contribute towards making health communication successful?
4. What is the status of health communication in our country?

1.35 Assignments:

1. Keenly observe two newspapers – maybe both in English or one in English and the other in a regional language. Make a list of all the health and health-related communication – news, advertisements and editorial articles for a period of three months and find out the number in comparison to the total media contents in these two newspapers for that period.
2. Find out if there is any notable difference in the advertisements given by private health care industry and the government ones. And also the possible effectiveness of health awareness and precautionary notices put out by the state / central government health departments at different points of time.