## CHAPTER-5

### DATA PRESENTATION AND ANALYSIS

**TABLE 5.1. PROFILES OF SCIENTISTS**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>NAME OF THE SCIENTIST</th>
<th>D.O.B.</th>
<th>PRIMARY AFFILIATION/MAJOR TYPE OF WORK</th>
<th>SPECIAL INTEREST AREA</th>
<th>Formal media training/course Attended</th>
<th>LANGUAGES USED</th>
<th>MEDIA USED</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Harish Agarwal</td>
<td>20.11.1930</td>
<td>Journalist</td>
<td>Science, Technology, Health, Agriculture</td>
<td>Yes</td>
<td>Hindi, English</td>
<td>Newspapers</td>
</tr>
<tr>
<td>2</td>
<td>Dr. Achyut Datta Prasad Dabholkar</td>
<td>15.5.1938</td>
<td>Director, Shri Ram Institute for Industrial Research scientist</td>
<td>Science, Technology, Health, Agriculture</td>
<td>No</td>
<td>Marathi Articles and Books</td>
<td>Articles and Books</td>
</tr>
<tr>
<td>3</td>
<td>Dr. Sukanya Dutta</td>
<td>19.12.1961</td>
<td>NISCAIR Author, Editor, Science Communicator</td>
<td>Science, Technology, Health, Literature</td>
<td>No</td>
<td>Hindi, English</td>
<td>Articles, books</td>
</tr>
<tr>
<td>4</td>
<td>Arvind Gupta</td>
<td>4.12.1953</td>
<td>Independent Science Communicator</td>
<td>Science Communication Through Toys,</td>
<td>No</td>
<td>Hindi, English</td>
<td>Articles, Books</td>
</tr>
<tr>
<td>5</td>
<td>Dr. N.C. Jain</td>
<td>31.3.1959</td>
<td>ICMR Scientist</td>
<td>Science Technology, Medicine.</td>
<td>Yes</td>
<td>Hindi, English</td>
<td>Speeches, Books</td>
</tr>
<tr>
<td>6</td>
<td>Dr. V.B Kamble</td>
<td>29.11.1949</td>
<td>NCSTC (DST) Scientist, Science</td>
<td>Science Technology, Medicine, Biographies</td>
<td>No</td>
<td>Assamese, Gujarati, Hindi</td>
<td>Speeches, Articles, Science</td>
</tr>
<tr>
<td>Name</td>
<td>Date of Birth</td>
<td>Position</td>
<td>Language</td>
<td>Other Activities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------</td>
<td>---------------------------</td>
<td>-------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.S. Manekar</td>
<td>15.09.1957</td>
<td>Director, NSCM, Mumbai</td>
<td>Hindi, Marathi</td>
<td>Speeches, Articles, Radio- TV, Broadcast, Puppetry, Science Films, Exhibitions,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No History of Science, Current Science, NSCM, Mumbai, 15.09.1957.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T.K. Mandal</td>
<td>11.06.1944</td>
<td>Scientist, NCSTC (DST)</td>
<td>Hindi, English</td>
<td>Speeches, Films, Puppetry, Science Films, Exhibitions, Human Research, 11.06.1944</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khan Badiuddin</td>
<td>04.08.1936</td>
<td>Managing Trustee</td>
<td>Hindi, Urdu, English</td>
<td>Speeches, Articles, Books, Science Behind Miracles, Exhibitions, Films, Radio TV,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Foundation Development Human Research, Science Behind, Human Research, 04.08.1936</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Hindi, Marathi
- English
- Hindi, English
- Hindi, Urdu, English
- Hindi, Urdu, English
- Marathi, English
<table>
<thead>
<tr>
<th></th>
<th>Name</th>
<th>Date</th>
<th>Position</th>
<th>Topic</th>
<th>Language</th>
<th>Duties</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Mrs. Ratnabali Mitra</td>
<td>3.11.1949</td>
<td>Programme Executive Science cell, Broadcasting House, AIR Broadcast Journalist</td>
<td>Science, Environment, All topics coming under science</td>
<td>Hindi, English</td>
<td>Speeches, Articles, Books, radio TV Broadcaster.</td>
</tr>
<tr>
<td>11</td>
<td>Dr. K.N. Pandey</td>
<td>1956</td>
<td>Research officer, Publication and information Division, ICMR.</td>
<td>Zoology, Fishery, Health, Medicine</td>
<td>Hindi</td>
<td>Articles, radio, TV Broadcaster.</td>
</tr>
<tr>
<td>12</td>
<td>V.S Ramamurthy</td>
<td>02.04.1942</td>
<td>Director NIAS, Bangalore</td>
<td>Nuclear Physics, Atomic and Molecular clusters, ion beam applications, science administrator, science and technology policy, R &amp; D and science education, technology infrastructure</td>
<td>English</td>
<td>Speeches, articles, Science films, Radio-TV Broadcaster</td>
</tr>
<tr>
<td>13</td>
<td>Dr. N K Sehgal</td>
<td>7.11.40</td>
<td>Science writer, Science communicator</td>
<td>Topics of everyday interest</td>
<td>Hindi, English</td>
<td>Speeches, Articles, science films, radio-TV Broadcaster</td>
</tr>
<tr>
<td>Name</td>
<td>Date of Birth</td>
<td>Profession/Position</td>
<td>Language(s)</td>
<td>Radio, TV, Articles, Books, Speeches</td>
<td>Year of Birth</td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>--------------</td>
<td>-------------------------------------------------------</td>
<td>-------------</td>
<td>-------------------------------------</td>
<td>---------------</td>
<td></td>
</tr>
<tr>
<td>Dr. R. Sreedher</td>
<td>6.6.1947</td>
<td>Director, Electronic Media Production Centre, IGNOU, CEMA</td>
<td>Hindi, English, Tamil, English</td>
<td>Speeches, Articles, Books</td>
<td>99.7.1946</td>
<td></td>
</tr>
<tr>
<td>Anuj Satguruprasad Sinha</td>
<td>17.11.1949</td>
<td>Scientist, Head, NCSTC, Vigyan Prasar</td>
<td>Hindi, English</td>
<td>Speeches, Articles</td>
<td>71.11.1949</td>
<td></td>
</tr>
<tr>
<td>Bimal Kumar Srivastana</td>
<td>09.07.1946</td>
<td>Dy. Dir., Production Media Centre, Airport Authority (Cartography)</td>
<td>Hindi, English</td>
<td>No</td>
<td>91.7.1946</td>
<td></td>
</tr>
</tbody>
</table>
Table 5.1.1. FORMAL TRAINING OF SCIENTISTS IN MEDIA

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Details of Media Training</th>
<th>No. in Figures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No of scientists who have taken formal media training</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>No of scientists who have not taken any formal media training</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>17</td>
</tr>
</tbody>
</table>

Graph 5.1.1 Formal training in Journalism/media
The data analysis was performed according to the characteristics of the research questions

- Objective type
- Descriptive type
- Relational type

**Demographic Profile**

Descriptive characteristics of the sample of scientists are as follows:

The demographic profile of the scientists is given in Table 5.1 on page 83.

- There was greater number of male scientists in the sample than females. There were only three female respondents in the sample of scientists.
- Age ranged from 45 to 80 years. Majority of the scientists were in the age group of sixty years and above, which points out that they are all experienced people and have contributed in the field of science communication for many years.
- The language and comprehension aspects of the questionnaires were evaluated during and after questionnaires administration of the questionnaire.
- None of the participants had problems answering the items on questionnaires.
- The scientists had been associated with government organizations during major part of their career.
- All scientists have done science communication as a part of their official duty.
- Only a few scientists had undertaken science communication as a voluntary activity.
- Most participants had completed education beyond higher education. 75% of the participants were currently working and 25% were retired.

**Questionnaire consisted of four parts:**

- **Part 1-** Consisted of questions about the age, birth year, gender, educational level, marital status, employment, occupation.
- **Part 2-** Descriptive questions
- **Part 3-** Relational questions
- **Part 4-** Tables on Responses of different media towards science.

Two open-ended questions were included at the end of the questionnaire to identify additional suggestions and problems.
Q 5.2.1. There is enough information about science and technology available in the society?

Table 5.2.1 Showing scientists view on the topic of enough information of science and technology available in the society.

<table>
<thead>
<tr>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>33.33% in Favour</td>
<td>66.6% Against</td>
</tr>
</tbody>
</table>

Graph 5.2.1. Scientists view on the topic of enough information of science and technology available in the society.
Q 5.2.2. Who is responsible for communicating the outcome of cutting edge research to the public?

Table 5.2.2. Depicting the choices of participants with regard to Question 1.2 as to who’s role is it to communicate research outcomes to the public.

<table>
<thead>
<tr>
<th>Scientists</th>
<th>Media</th>
<th>Government</th>
</tr>
</thead>
<tbody>
<tr>
<td>11</td>
<td>5</td>
<td>6</td>
</tr>
</tbody>
</table>

Graph 5.2.2. The role of scientist to communicate to the public
Q 5.2.3. Since what age did you start Science Communication?

Table 5.2.3. Showing the age at which participants started science communication

<table>
<thead>
<tr>
<th>S.No</th>
<th>Age Group</th>
<th>Number of Scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Before 20 years</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>20-30 years</td>
<td>8</td>
</tr>
<tr>
<td>3.</td>
<td>30-40 years</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>40-50 years</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>No Response</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td></td>
<td>17</td>
</tr>
</tbody>
</table>

According to the table most of the scientists started communicating at the age of 20 to 30 years. This means that most of them started early or almost after completing their formal education in science.

Graph 5.2.3. Age at which the scientists started communicating science.
Part- 5.3

This part of the Questionnaire is devoted to (Media Access)

Q 5.3.1. Do you read any science magazines?

<table>
<thead>
<tr>
<th>Total number of scientists</th>
<th>Response(Yes)</th>
<th>Response(No)</th>
<th>No response</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>10</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

15/17 = 87.5% of scientists claim to read some or other science magazines. The majority claimed to read almost all prominent magazines, have subscribed to them and also write or contribute for various science magazines.

**Important finding of the table**

- Only two scientists stated that they do not read any magazine as they do not like the content.
- 87.5% of scientists agreed to reading some or other science magazines.
- Science Reporter and Down to Earth are the most preferred magazines by scientists.
Q. 5.3.2. What are the science magazines read by scientists in the study

Table 5.3.2. Science Magazines read by Scientists

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Titles of magazines read by scientists</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Science Reporter</td>
</tr>
<tr>
<td>2.</td>
<td>New Scientists</td>
</tr>
<tr>
<td>3.</td>
<td>Resonance</td>
</tr>
<tr>
<td>4.</td>
<td>Electronic Aap Ke Liye</td>
</tr>
<tr>
<td>5.</td>
<td>Science</td>
</tr>
<tr>
<td>6.</td>
<td>National Geographic</td>
</tr>
<tr>
<td>7.</td>
<td>Down to Earth</td>
</tr>
<tr>
<td>8.</td>
<td>Everyman’s science</td>
</tr>
<tr>
<td>9.</td>
<td>Intelligence</td>
</tr>
<tr>
<td>10.</td>
<td>Vip-Net News</td>
</tr>
<tr>
<td>11.</td>
<td>Invention</td>
</tr>
<tr>
<td>12.</td>
<td>Discover</td>
</tr>
<tr>
<td>13.</td>
<td>Popular Science</td>
</tr>
<tr>
<td>14.</td>
<td>Vigyan Ki Duniya (Urdu)</td>
</tr>
<tr>
<td>15.</td>
<td>Environment</td>
</tr>
<tr>
<td>16.</td>
<td>Science</td>
</tr>
<tr>
<td>17.</td>
<td>Biotech news</td>
</tr>
<tr>
<td>18.</td>
<td>Dream 2047</td>
</tr>
<tr>
<td>19.</td>
<td>Awishkaar</td>
</tr>
<tr>
<td>20.</td>
<td>Vigyan(Hindi)</td>
</tr>
<tr>
<td>21.</td>
<td>Nature</td>
</tr>
</tbody>
</table>
Q. 5.3.3. Did you take any formal training in Journalism/media

Table 5.3.3. Formal Training in Journalism/media

<table>
<thead>
<tr>
<th>Total number of scientists</th>
<th>Response(Yes)</th>
<th>Response(No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>3</td>
<td>14</td>
</tr>
</tbody>
</table>

According to the study many scientists lack the skills or courage to interact with the media. To be successful the speakers have to act according to the mandate or different demands of the media. Scientists have different assumptions about accuracy, precision and scientific reputation and media workshops are tailored to meet these concerns. There should be special incentives and impediments to scientists communicating through the media.

According to the findings from the study, the scientist’s value media skills training. Nearly one-third of the survey respondents had participated in some form of media training and they were over-whelming positive about its benefits. Those who attended media training reported that it helped them to understand the media and how to get most out of media interactions.

The media tends to pay attention to press releases by the universities and research institutes and they print it online or in newspaper. Sometimes media needs to contact specific Science communication Departments and do further research before printing the news. The gap between science and media can only be filled by the science communicators in various Institutes in science, technology and society.

The researcher tried to find out that why do scientists pursue science communication. Is it due to intrinsic or extrinsic factors of motivation, or is it part of their job, to comply with the organizational norms or pressure to perform. Interesting findings are available through this observation that is depicted in the table below:-
Table 5.3.4. Organizations to which the participants belong

<table>
<thead>
<tr>
<th>S.NO.</th>
<th>Organization to which the participants belong</th>
<th>Number of Scientists</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Journalist / Media Organization</td>
<td>2</td>
<td>11.4%</td>
</tr>
<tr>
<td>2.</td>
<td>Research Organization</td>
<td>1</td>
<td>5.8%</td>
</tr>
<tr>
<td>3.</td>
<td>Academics</td>
<td>1</td>
<td>5.8%</td>
</tr>
<tr>
<td>4.</td>
<td>Organizational Pressure to do Science</td>
<td>9</td>
<td>24%</td>
</tr>
<tr>
<td></td>
<td>Communication (as part of their job)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Self Motivation</td>
<td>4</td>
<td>53%</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>17</td>
<td>100%</td>
</tr>
</tbody>
</table>

Graph 5.3.4. Organizations in which participants work to see their motivation to communicate science
Q 5.3.5.- What is the benefit of formal media course / training?

Table 5.3.5. Response of scientists on various benefits of media course / training

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Benefits of media course/training Options</th>
<th>Responses of participants</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>In improved public awareness</td>
<td>3</td>
<td>17.6%</td>
</tr>
<tr>
<td>2.</td>
<td>Lifted profile of research</td>
<td>1</td>
<td>5.8%</td>
</tr>
<tr>
<td>3.</td>
<td>Technology Transfer</td>
<td>2</td>
<td>11.8%</td>
</tr>
<tr>
<td>4.</td>
<td>Generating Funds</td>
<td>2</td>
<td>11.8%</td>
</tr>
<tr>
<td>5.</td>
<td>All of the above</td>
<td>7</td>
<td>41.2%</td>
</tr>
<tr>
<td>6.</td>
<td>None of the above</td>
<td>2</td>
<td>11.8%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>17</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Graph 5.3.5. The benefits of formal media training for the scientists
Q 5.3.6. What are the different memberships of professional organizations / bodies related to science communication that you have taken?

Table 5.3.6. Depicting the various professional organizations / bodies related to science communication

Following are the responses to the memberships of different organizations/bodies related to science communication taken by the scientists

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name of organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Science Writers Association,</td>
</tr>
<tr>
<td>2.</td>
<td>National Council of Science Museums (NCSM)</td>
</tr>
<tr>
<td>3.</td>
<td>Marathi Vigyan Parishad</td>
</tr>
<tr>
<td>4.</td>
<td>The National Academy of Science India Allahabad (life member)</td>
</tr>
<tr>
<td>5.</td>
<td>Vigyan Parishad</td>
</tr>
<tr>
<td>6.</td>
<td>Indian Science Writers Association (ISWA)New Delhi</td>
</tr>
<tr>
<td>7.</td>
<td>Media Science Association</td>
</tr>
<tr>
<td>8.</td>
<td>Science Literacy Society</td>
</tr>
<tr>
<td>9.</td>
<td>Development Communication Forum and</td>
</tr>
<tr>
<td>10.</td>
<td>NISCOM</td>
</tr>
<tr>
<td>11.</td>
<td>Indian Science Fiction Organization</td>
</tr>
</tbody>
</table>

Out of the 17 scientists, eight scientists claimed that they have not taken membership of any of the organizations working in this field due to personal or professional reasons and one of the scientist asserted that, “I have stayed away from professional associations deliberately since my work often called for judging merits of organization and their grant in aid proposals. Though I did accept the honorary fellowship of Indian Science Writers Association New Delhi and Research Academy Allahabad.”
### TABLE 5.4.1. PRINT MEDIA RESPONSE TOWARDS SCIENCE

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Print Media Response To Wards Science</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
<th>17</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NEED</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>2</td>
<td>AVAILABILITY</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>EASY ACCEPTANCE</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>UNNECESSARY</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>DISINTERESTED</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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Note: 1 to 17 - Scientists who participated in the study
Analysis of Scientists and Print Media Table 5.4.1.

Introduction

It has been widely written about and said that too much of contemporary science writing falls under the a distinct category, called as “infotainment”. The target audience in this category is a non-specialist group or layman. The information is given on any specific topic, its brief historical or background information, and some key findings of the research.

There is an entertainment factor which can make the writing enticing or involving or the choice of the topic itself.

Infotainment as it popularly called, also is a dominant format of science writing for layman or popularising science. The language is less ebullient and presents a sober assessment of the research significance. It gives the reader an idea, as to why that particular research has been taken by scientists. It is a topic of debate that whether scientists should be writing for the scientific community or the layman. One of the scientists in the study acclaimed that writing for layman is not the job of the scientists.

It becomes almost impossible for someone who is not from the same subject to understand if the terminology or scientific jargon is not explained to him. The table reflects that the print media has need (as preference1) while science topics are concerned. The scientists claimed that the print media organisations often asked the scientists to write on science based topics and the majority did not face any problem in case they approached the print media.
### TABLE 5.4.2. ELECTRONIC MEDIA (T.V.) RESPONSE TOWARDS SCIENCE

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Note: 1 to 17-Scientists who participated in the study
Electronic Media (TV) Response towards Science Based on Table 5.4.2.

The scientists were asked about the response of Electronic Media (TV) with special reference to scientific content.

- Among the 17 scientists who became part of the study, five scientists picked up 'Need' as their response.
- They held the view that Electronic Media (TV) in particular 'needs' Scientific content (preference 1).
- Two scientists held the view that TV had 'easy Acceptance' (preference 3) for scientific content.
- Two scientists responded that TV is disinterested in science. Another 3 scientists said that for TV, science-lacks entertainment value (preference 8). A few scientists gave their views supporting the table.

Television as a medium

Television is a primary source of science information, particularly with people having less education and money. For scientists also it provides diversity and funding, because for funding they need public support. If you want to reach people who are not convinced and they are ignorant, television is the best medium to reach them.

Why is TV a good medium for science communication? Referring to the study done under the project For Excellence in Journalism (PEJ) analyzed media coverage in 52 print, online television and radio outlets from Jan 2007 to May 2012, to determine the kind of stories that were telecast or printed. According to NSF report "Special tabulation of PEJ data showed that science and technology coverage made up a small percentage of the total amount of news in the traditional media - less than 2% annually - between 2007 and 2012". That is very less coverage actually.
Also research in this area shows that science till date has a diversity problem. A 2013 report from U.S. Census Bureau made clear that Minority in under-represented in science and technology, engineering and mathematics fields (STEM).

With a drastic change in habits of the society and how they 'consume' information the traditional forms of journalism are changing and giving way to simple content providers. Public can access direct sources of information on topics they are interested in. Relationship of scientist with media was unfriendly and strained, and was the case a few years back. A sea change is underway, a report published in the journal 'Science' (Hans Peter Peter's reflects that the relationships are improving and are now more frequent and smooth. Scientists are reluctant to talk to media due to several reasons which they reported in the study. A few scientists fear that they would be disapproved by their peers if they become more media savvy.

There is another group of scientists who fear that if they appear more on television, it would adversely affect their careers.

Then again there are a few scientists who never got time or opportunity for they were busy with research activities. They said they were open to such media interactions if, such a situation or need arises. They also complained media's lack of interest and the 'push' factor for them not using television for public dissemination of science.

Although the situation is changing but it will take time, more so in a country like India where language and culture also pose a great challenges as most scientist only know English and therefore scientific jargon poses a great problem and all information cannot be translated in regional languages. Science fiction documentaries are media which can be used for science popularization. In the current panaroma effective audio-visual presentation of science stories is one of the most daunting tasks for science communicators, owing to the complex nature of science with logical structures and the medium itself. That could therefore be one of the main reasons why science popularization does not come very often to programming schedules. The current situation therefore demands that effective public communication of science
uses a special kind of discourse, which is not just simplified scientific content but a different one. Television can be used very effectively provided the scientists understand the nature, mechanisms and complexities involved in making a scientific story which must be at the same time interesting for the masses. Gregory and Miller (2000) reflected in the book 'Science in Public: Communication Culture and Credibility' on the importance of recognizing the motives that lead to a scientist to communicate to the public.
TABLE 5.4.3. ELECTRONIC MEDIA (RADIO) RESPONSE TOWARDS SCIENCE

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Note: 1 to 17-Scientists who participated in the study
Electronic Media Radio Response towards Science Based on Table 5.4.3.

The scientists were asked about the response towards scientific content with reference to Radio. As radio is an audio medium, the listeners need to be made interested in the content.

The success and longevity of radio are due to a number of factors, but at its core, people like hearing other people tell stories. That story could be what happened in the world today or it could be how the surface of Mars once held water. Storytelling is at the core of all radio reporting and the linear nature of radio reports, with a beginning, middle, and end, makes radio a perfect medium for science news. Science communications is often characterized as difficult to understand and laden with jargon; to understand science. (Encyclopedia of science and technology communication)

In the study in the table of scientists response towards media it has been found that majority of the scientists claimed to have no idea of the Radio Medium as they have never worked or associated with it.

7 (seven) scientists preferred ‘not to respond’ (preference 10-last in the table) for that matter. There was therefore mixed response among other 10 scientists.

Three scientists held the view that Radio had ‘need’ (preference 1) for science.

One scientist responded that Radio as a medium made time ‘available’ for Science Content.

Two Scientists said that science seems ‘unnecessary’ (Preferred-2) for Radio.

Two scientists took scientific content as ‘Educational’ (Preferred-7) in the Table.

One of the scientists mentioned her experiences during her career with Radio (AIR as Programme Director in Science Cell).

In order for public to participate meaningfully they need to be informed. It is through popular media like radio that the majority of the people gain knowledge about scientific and technological advancements.

It has been observed and commented that the popular media is not routinely in the business to provide free help service to the scientists. They also maintain ratings in order to make profits or justify public investment in the form of taxes. A few
scientists acclaimed that scientists should understand the role of media and how it operates as a system in the society when they are seeking to spread information about their research. This should not deter them from engaging with media. Scientists should know how their subject area is covered in the particular media. What main areas and issues are highlighted? Scientists should also understand that communication cannot be a one way process rather a matter of dialogue and discussion. An awareness of ways in which science issues are formed with reference to region, moral, ethical, environmental and regulatory frameworks is also helpful for scientists. These experiences can be invaluable while preparing scripts for public dissemination. The communication Media are characterized by their accountability to the communities they serve. 'Milestones in Mass Communication Research' carries a landmark study on the Effects of Media done on radio. The book “Science Radio Broadcasting. The Role of the Radio in Science Communication” by Marzia Mazzonetto, Matteo Merzagora, Elisabetta Tola gives a detailed account on how to use Radio for Science Communication but there is dearth of research in this area. The advantages of radio as a medium for science communication are its speed relative to print media, the ‘live’ aspect, its economics and simplicity.

Another facet of radio used for the society and development issues is community radio. Community radio has grown particularly in numbers around the world, for delivering an outreach mechanism for women issues, education, entertainment, self-expression and communication is what distinguishes community radio from other media. Also it has high level of public participation in program production and management. The full potential of community radio is not utilized for science communication.
### TABLE 5.4.4. ONLINE MEDIA RESPONSE TOWARDS SCIENCE

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Note: 1 to 17-Scientists who participated in the study
### TABLE 5.4.4.1. Scientists use of Online Media and its advantages and disadvantages

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<tr>
<th>Platform</th>
<th>Advantages</th>
<th>Disadvantages</th>
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</table>
| Blogs    | • Longevity; posts are accessible via search engines  
         | • Robust platform for building an online reputation | • Time investment for preparing thoughtful posts  
         |                                                        | • Posts should be disseminated and advertised via other platforms |
| Twitter  | • Low time investment, short posts  
         | • Ability to rapidly join in online conversations  
         | • The most current source for breaking news and topical conversation | • Posts are quickly buried under new content  
         |                                                        | • Twitter does not make its archive database accessible to search  
         |                                                        | • Gaining followers can be a slow and difficult process |
| Facebook | • Established judgement in the social media world  
         | • Ability to create “groups” and “pages” for a person or cause | • Privacy concerns  
         |                                                        | • Frequent changes to layout, features and settings |
| Google+  | • Integration with Google tools  
         | • Easily manage privacy/visibility by grouping contacts into “circles”. | • User base not unique compared to other sites  
         |                                                        | • Users still unsure how to use it |

Online Media response towards Science Based on Table 5.4.4.

Scientists were asked about the response of online media towards scientific contents.

As online media is a new phenomenon many scientists in the study reflected their inability to understand or use the media. Therefore, the majority of participants, 6 scientists did not respond to the table.

Whereas another six scientists held the view that there is 'need' for science content (preference 1).

Five scientists held the opinion that there was 'Essay Acceptance' of science content on online media (preference) in the table).

Social Media can be used to help in the advancement of Research.

Some scientists swear they would never use online media as they take it as waste of time. The study done by BIKHM (Goldstein, 2013) provides an elaborate discussion on this issue. The social media helps in building and maintaining an online presence, for this a few scientists have a personal website and portrays their research projects, expert areas which can be searched by peers, media and public. Professional websites can be established through external hosts which offer more flexibility and are easy to maintain. Social media helps the scientists to locate important online conversations and meet people of similar interests and backgrounds. According to many scientists the online media increases their global presence, building reputation and professional visibility. It allows them to upload material for others to read. These days there is a lot of discussion going on Open access and crowd sourcing. It is helpful to researchers to know about funding opportunities available and to keep track of much of the research that is mid-way or ongoing. The researchers in the early career need to know about it.

The citizen science projects helps scientists and researchers deal with large amount of data that confronts them.

According to Wilbanks (2014) in an article on seedmagazine.com "knowledge is a public good and increases in value as the number of people possessing it increases".
Scientist’s Name: Harish Agarwal

Scientist -1

Article 1: Vigyan (August 2011) had taken out a special issue on Harish Agarwal

Title- Shatabti Ka Sabse Bada Prayog Brahmand Aadi Se Ant Tak, Vigyan (August 2011) taken from September 2008 (Vigyan Pragati). This article is based on how this Universe was created. This article was written at the time when preparations were being made for the search of “God Particle” as said in a popular language. This article is informative and entertaining and written in simple language and would make interesting read for people seeking detailed information on quantum physics.

- Length of the article- 3 pages.
- (No picture)
- Article on latest scientific research.

Scientist-1, Article 2: Meri 60 Varsh Ki Vigyan Lekhan Yatra, Vigyan (December)

This article has been written as a mark of gratitude for completing his 60 years in the field of science writing. He gives a detailed account of his family his childhood, education and how he got into Science communication. He also shares about how he got a chance to visit several countries and meet science journalists and eminent scientists. In the end he highlights the need for science writing and science in the Society. He also quotes Dr Kothari’s and Dr. Atmaram’s idea for Indian writers to write in the mother tongue and regional languages. He also enlists names of prominent science communicators.

- No Pictures
- Personal Experience
- Need for Science communication.
- Magazine Article.
Title- Public Understanding of Science.

This article meant for restricted circulation only among the ISWA members.

Thomas H Kean, Governor of New Jersey, said in a speech at the National Academy of Sciences, “An educated public is the secret to our common survival.” Further he states, “in these days of complex problems, and high-technology solutions, it is essential that those who understand the laws of nature be more involved in the making of the laws of man.”

He also writes about his meeting with Nigel Calder, Kalinga prize winner and former editor of ‘New Scientist’ and what he said to him in 1974- “There are Newton’s and Galileo’s amongst ourselves, but we have not cared to meet them (hereby he meant Science writers and journalists).” He also quotes from Calder’s talk on the All India Radio entitled.” Science and Public Understanding”-It is not just a matter of more newspapers, articles or books or radio programs about science. Something much more radical is needed. People who are Scientists and engineers have to stop shutting themselves away from the world and thinking that so long as they do-their jobs and make important discoveries and inventions they are serving mankind. That is only the start: they have to work with their fellow men and women in trying to see the meaning of their experiments and how a better world can be constructed.”

Further he adds that the most urgent need for understanding of science is not with the ignorant public-which is in fact fascinated by Science and often remarkably well informed but among well-educated people in positions of power and cultural leadership.

- No picture
- Need for Public Understanding of Science & Technology
- Based on personal experience and interviews
Scientist-1, Article: 4

Title- Science Ki Zaroorat Hamein Kyon Ho?

Subtitle: Tarakki Ka Engine Technology hai aur uski buniyaad science, agar avval aana hai to raviyaa badalna hoga.

Publication: Nav Bharat Times, 4 July 2008

This article depicts the depleting condition of science education in the society looking back into history when there was Nehru’ sera, when everyone seemed much excited about science technology and engineering.

The article also attempts to look into the reasons of fall down in the science research. There after the author highlights the importance of science in our day to day life. According to the words of the author, “Bharat mein science ki pooch kam kyon ho rahi hai, uska arth-shastra yahaan viksit nahin ho saka. Swayat Sansthaon ko yeh kam saumpana hoga”

In the end the author attempts to make science as a lucrative career options and how our government should take up science more seriously and how it can be linked to economic growth of our country.

- Title-Open ended question-thought provoking.
- Picture of rocket and astronaut from film toy story.
- No Caption in pictures
- Article highlighting the Importance of Science.

Scientist-1, Article: 5

Title- Janta tak kaise pahunchein (Section-Vigyan aur Jeevan)

Subtitle: Vigyan ki manzil dar manzil tey karti is duniya mein aaj bahut bara prashan yeh hai ki janta ko us pragati ke saath parichit kaise rakha jaye?Yeh kam kaise hoga? Vigyanik ko itni fursat kahan hai ke Prayogshala chodkar veh janta ko samjhane baiithe. Toh fir?

In this article the author highlights the importance of science in the society and to solve day to day problems. He also stresses upon the need for people to be aware about science and how media can play an important role.
Science writers and communicators play a role in bridging the gap between scientists and people. He also stresses upon the use of simple language that a layman can understand.

He cites examples from day to day life to prove the importance of science. Further he quotes the strong opinion of Dr. Daulat Singh Kothari that language of Science should be easy and interesting. There should not be misrepresentation of facts. The writer should write keeping in mind societal perspectives and how his writing is going to impact the minds of people.

He further stresses the role, and responsibility of government politicians, policy makers in the progress of science in our country.

- No picture.
- Need for Science Communication
- Importance of Science in Society.

Scientist-2 – Ratnabali Mitra

Scientist-2, Article: 1

Title- Kya Marusthal bhi hare-bhare ho sakte hain?

Publication: Ravivariye Hindustan, June 1974

In the given article, the author talks about how deserts can be used for plantation and what plants can be grown in sandy soil and arid climate. Further the author talks about new technologies those are successful for panting in deserts. The author also discusses the reasons why deserts are growing at an alarming rate and how they are posing a threat to our ecological balance.

- Bottom 7 column story
- 3 column picture (Black & white)
- Pictures showing vegetable plantation in deserts of Sudan.

Scientist-2, Article: 2

Title- Manzilein aur bhi hain, April 1998

The writer talks about the missiles and defense mechanism of our country and credits the hard work done by our former President Dr. A.P.J Abdul Kalam. She also talks about his interests like reading, writing simple and down to earth nature.
In an interesting and inspiring way she motivates the young aspiring minds of our country to dream and turn your dreams into reality.

She gives a detailed biographical sketch of Dr. Abdul Kalam and outlines his achievements. Also she gives a detailed account of the new missions being worked upon under the flagship of Dr. A.P.J. Abdul Kalam in DRDO.

She also highlights his poetic genius by quoting some lines from his collection “My Journey”. She portrays the emotional side of the great scientist in an interesting manner. Pictures of missiles and the positive outlook of the future of defense strategy, makes it an article on science with a different perspective.

- Large picture of Abdul Kalam
- Pictures of missiles
- Length of article-3 page

Scientist-2, Article: 3

Title- APOLLO- SOYUZ MEET Rendezvous in Space

SECULAR DEMOCRACY; July 1975

- Pictures of left to right Soviet cosmonauts Alexei Leonov and Valeri Kubasow

The article is about Apollo-Soyuz Test Project, also called ASTP mission, following the May 1972 agreement between the USA and USSR to perfect a common docking system to enable spacecrafts from different countries to link up with each other.

This was perhaps the initial step of setting of the global communication system. The caption is placed directly below of the picture. The article is written at the time to onset of the new era in the evolution of space technology.

Scientist 2, Article:4

Title- Hakikat se bhi aage ka ehsaas.

Aavishkaar; January 2011.

The author talks about augmented reality. She gives a detailed account what augmented reality is and how has technology progressed in this area. Taking an
example of her own experience of travelling in Mumbai, she says that if she had a
smart phone that could give her details of a restaurant, it would be very beneficial for
a traveller to get information about nearest bus stop, ATM etc.

Then she also describes the use of augmented reality in different fields such as
defense, mechanics, medicine. She also sheds light on the use of hardware for
Augmented Reality.

It is not necessary that augmented reality comes in the form of a smart phone only. It
could also be in the form of binoculars wherein the person could not only be able to
see the things around him but also be able to get information about them.

- Picture of mobile and eye
- No caption.
- Language – Hindi
- Simple/easy for a layman to understand.

Scientist-3: Bimal K Srivastava

Article: 1

Title-Vigyan Lekhan: Samasyain evam Samadhan.

Book, Date-Not documented by the scientist

This article talks about Bimal K. Srivastava’s journey in the field of science writing.
He writes on aero planes and technology.

He emphasizes on writing in simplest form so that a layman can understand. He also
stresses on taking in account Indian perspective as most articles are copied from West
which most Indian cannot relate to.

Writing in Hindi poses difficulty to most writers as science and scientific Jargon is in
English. He has also written on topics related to travel and tourism. He got the
inspiration from Discovery and National Geographic. In 1980’s there was beginning
of computer and Internet Technology and much of the writing work was done
manually. People had to consult various libraries to search for content. Typesetting
and editing was also pain-staking. Advancement of science and technology in this
area has benefited many science writers to a great extent.
• Topic related to science writing – (Barriers in science Communication.
• Use of simple language stresses importance of simple language.
• No pictures.
• Article in a Book by Vigyan Prasar.

Scientist-3, Article: 2

Title- When Blue Ice Falls From the Sky.

The blurb mentions that there are conjectures, often magical explanations but the culprits are often commercial aircrafts.

The author has given various instances and examples where these incidents have been reported in different places in India.

• Article on how things happen explaining a scientific phenomenon.
• Important for a layman and use of simple language English.

Scientist-3, Article: 3

Title- Kitna Nyara Dhruv Tara Vigyan Pragati, August 2008

This article has been written about North/Pole star and how popular it is among travellers, Navy and people travelling in desserts since long. But little is known about it from the geographical point of view. The important feature about this Pole Star is that it seems fixed mostly in the north direction that is why it is named so. According to it is named as ‘Alfa Ursa Minor’ in Hindi it is named as ‘Dhruv Tara’ which means fixed or stable at one place. It stands 48th in terms of brightness in stars. The brightest star is ‘Cerius’. The article is written in the (Rochak Jankari) interesting facts section of the magazine.

The article gives detailed information about the star and it could be useful for people using it for navigation. The article is also an interesting read for children and the like seeking information on stars and planets.

The author has given pictures and illustrations explaining the different aspects like direction, size and phenomenon related to the star and how to locate Pole Star in the sky. The author highlights the importance of Pole Star for the purpose of navigation.
The article is written during a period when a new planet is discovered. The article gives detailed information about the planet 2003 UB 313.

The article also answers the question 'Is Pluto a planet' in the detailed scientific manner. It also accounts that in recent years, scientists have recognized that Pluto and its moon Charon are not actual planets and satellites but Kuiper Belt objects (KBOs) a class of objects composed of material left over after the formation of other planets.

The article also mentions that a large group of astronomers have a sentimental attachment to Pluto being regarded as the ninth planet of the Solar System and are not in favour of it being downgraded to a mere Kuiper Belt Object.

Article holds importance to masses. It is a Controversial issue the result of which are still not known to people at large. Concept has been taught in school.

- Article about a New Discovery/widely accepted scientific phenomenon.
- Photographs are big and colourful

Scientist-3, Article:5

Title: Kaise honge nayi pidi ke yatri viman

Aawishkar, December 2004

This article is in continuation to an article published in December 2003 reflecting upon the developments in past 100 years in the field of aviation.

The article sheds light upon the initial developments starting from Boeing 747 (Jumbo Jet) and how different variations were used for different purposes. Precisely it talks about last 50 years of developments in aviation sector.
Then discussing about the latest advancements the author talks about BWB technology and how it is better as compared to old techniques.

(BWB) Blended Wing Body as it is called, requires a change in the basic shape of an aircraft. With the help of diagrams and pictures the author describes in a detailed manner what this future technology holds in store for the next generation.

The picture shows an aircraft in its initial phases ready to take a plunge showing the log of Stanford University, and the Caption saying the aircraft based on BWB technology in which passengers will sit inside its wings. It would enable upto 800 to1000 passengers to be seated in one plane. The article also talks about ‘Concord Aircraft’ and how NASA made significant improvements to its design. The future aircrafts will depend upon satellite navigation for direction control rather than on radio technology. GPS, GNSN – Global Satellite Navigator System and Galilio are important techniques in this regard.

Further the author also talks about the material used for constructing an airplane. Earlier aluminium and titanium were mainly used but it added to the weight. These days carbon composites are used which are more tougher and light weight. These are called as (CRFP) or Carbon Fibre Reinforced Plastic) which have added to durability factor. The details of fuel are also given. In the end the article also talks about Supersonic and Hypersonic planes.

In November 2004 ex-43A a test flight of Supersonic created a new landmark in the history of aviation. This gives a ray of hope to the scientists for further developments in aviation sector.

- Article about Aviation
- Pictures with captions
- Interesting
- New technological advancements in aviation
- Useful for masses
Scientist-4 Dr. R. Shreedhar
No articles written or given for document analysis.

Scientist-5 Vineeta Singhal

Title: Maanav pratiroop Kuchh anuttariat prashan
Vigyan, Oct-1999

Subheading: in a form of a summary paragraph date raising questions about the issue of cloning.

The article is about the ethical issues involving human cloning. After all what is human cloning?

A few years back it seemed as a distant reality genetically identical cop a human. Human cloning is the creation of genetically identical copy of a human. At the heart of this unending debate is something called as stem cell. Stem cells are the types of cells from which all the different tissues of the body are derived. There is claim of therapeutic benefit for embryonic stem cells which is not borne out by the many years of research. Presently over 70 diseases can be treated with adult stem cell. In our society a few people are so concerned that they pursue this research to help the sick because it is the ‘humanitarian’ thing to do and yet they deny the humanity of those destroyed.

- It poses ethical questions that are difficult to answer.
- Pages – 3,
- No pictures

Scientist-5, Article: 2

Title: AIDS: Kaise Milega Chhutkara
Vaigyanik, Jan-March 1995

Sub-heading: AIDS – Acquired Immuno Deficiency Syndrome is a disease spread through HIV Virus (human immune deficiency virus) As the disease progresses it interferes with the immune system, making people more likely to get infections. Today after 12 years also it is difficult to comment on its cure as success is minimum scientists are still working on it.

The article mentions a Conference in Yokohama, Japan where there were much expectations regarding cure of this deadly disease but gave dissatisfaction. Citing the year of 1983 when scientists had first given details as to how this disease spreads.
Very little was known at the time when this article was written about how this HIV Virus spreads in the body and weakens the immunity of the body. There is a growing need for a vaccine against AIDS. The scientists are optimistic about finding its cure.

The article also mentions 'aspirin' as a miracle cure for AIDS. Then comes ddI, ACT and ddC. d4T and 3TC that work as A2T. All these have not given satisfactory results till date.

- Pages-5
- Pictures-1 (Pictures showing structure of HIV virus)

Scientist-5, Article: 3

Title –Samajik aur Saanskritik Chetna Vigyan aur prodyogiki ka prashan.

Kamputrikrit Kitabein-Padiye bhi, Suniye bhi.

Date-Jan-1999

Article about digital books or e-books. Till now we are familiar with only one kind of books-printed on paper. The article gives a brief history of printing and typography.

Coming to the latest developments and how computers have entered every walk of life. The e-book is a book length publication in digital form, consisting of text, images or both and produced on, published through and readable on computers and other electronic device. They can be available on CD's and could be read as a printable books.

You can read to e-books and also listen to them. These books are available in Japan and Europe in pocket calculator size and their price ranges from some hundred to thousand dollars. The future of e-books is bright. These books will spread fast on internet.

Scientist-5, Article: 4

Kahaan se aaye hum. Gyan Vigyan, 2012Since ages human existence on earth has been an issue of debate. Every country culture has various historical and mythological stories on human evolution.

Few days back Geographic project starts in collaboration of National Geographical and TBI have highlighted similarity in humans. Human Origin Project is the most ambition and comprehensive and researchers have high hopes for its outcomes.
Article gives a detail on genetic make-up of human beings. Scientists are working hard to ensure the vast potential of the Human Origins Project is realized.

- Article on human evolution
- Picture-7
- Length of article –6 pages.

Scientist-5, Article: 5

Title-Swachh Paryavaran Ke Liye Carbon Vyapar,

May 2012

There is no doubt about the effects of global warming on our environment. This article is written ahead of UN Climate Summit in DOHA and new research published had come up that India is one country that has managed to control Carbon emissions in comparison to other economics like China, US and European Union (EU).

Carbon credits are an established market based tool through which you can address your CO\textsubscript{2} emissions from driving, flying and home energy use also.

Article also gives details on sources of emission of Green House Gases. The cause of climate change is manmade and therefore everyone has a responsibility to reduce their individual carbon footprint and there are many ways by which you can do so.

- Pages3
- Pictures 4
- This article is about Carbon Credits

Scientist-6-SukanyaDutta

Article: 1

Title: Ayurveda to OSDD-India’s Unbroken Tradition of Affordable Health Care.

The articles talks about an initiative of The Council of Scientific and Industrial Research (CSIR) that has launched an innovative Internet based ‘Open Source Drug Discovery (OSDD) programme to eliminate injections diseases that afflict the developing world by providing affordable health care especially for the weaker sections of global populations. OSDD relies on knowledge sharing & constructive
collaboration. It’s an open source platform for both computational and experimental technologies.

- Talks about the Indian achievement in the field of Drugs.

**Scientist-6, Article-2**

**Title- Whale of a Story.**

VIPNET NEWS-June 2010/vol No.6

Article about blue whales, Time-International year of Biodiversity 2010.

Poetic beginning- The Rabindra Sangeet-“Tomar holo shara”, (Translated into, Thine is Tomar holo Shuru, amar holo shara, this a beginning, mine also an ending)

Genesis of whale-fall ecosystems. Some lines from the article are mentioned here- “This is just an example of the many mysteries of nature about which we were ignorant till recently”. The last paragraph- “There is no doubt that more light needs to be shed on the unique ecosystems that are no less an important part of the earth’s biodiversity because of their rarity”.

- Pictures showing animals on whale bone
- Whalebone on sea floor.
- Whale bone community
- Congregating hagfish.
- Different stages of whale fall
- Importance for the masses.
- International year of Biodiversity 2010.
- Human Interest factor- Rare and unique.

**Article 4: India’s achievement**

**Title-Unravelling the Human Genome-An Indian Breakthrough**

The article mentions India’s achievement and breakthrough in the field of Genetics. The starting sentence “With the first sequencing of the entire genome of a human being, India has finally made its way into an extremely elite Scientific Club”.
According to the author, “This giant step was made possible by CSIR scientists working it the Indian Institute of Genomics and Integrative Biology (IGIB)”. 

“The first Indian human genome sequencing (determining the exact order of the base pairs marks a national milestone but also sets the stage for India’s entry into personal genomics, opening up new possibilities in disease diagnostics and treatment”. It could also open up new opportunities for affordable health care in India. The project was led by Prof Samir K. Brahmachari, Now Director General CSIR.

The article also mentions how large amount of data was handled using supercomputing facility at IGIB. Picture showing IGIB supercomputing facility and DNA sequencing machine.

- The article further outlines the goals of Human Genome Network

Interview with Dr. Rajesh Gokhale, Director IGIB. Sheds light on the history of human genome sequencing. The project has been apply named “Project Kaurava” after the 100 Kaurava brothers in the Mahabharata

In the last paragraph “The time taken to decode genomes is also being whittled down. While the first human genome sequencing took over a decade, CSIR completed decoding the Indian genome in 45 days and Dr Quake’s machine can sequence a human genome in four weeks with a staff of just three people.”

- In the picture – The team that unravelled the human genome.
- The article about India’s achievement in the field of human genome.
- Interesting read.
- Human Interest factor
- New Innovation/ scientific development

Scientist-6, Article: 5

Title-Healing Wounds the Hi-tech Way

Emerging Science, Vol II, No.2 July 2010

Wound as defined by WHO open injuries have a potential for serious bacterial wound infections including gas gangrene and tetanus.
Then there is a detailed information on dressing related to advances in Biotechnology and Bio-engineering. The future prospects

“In India however the traditional products still hold sway.”

Starting in the article giving Hindi Cinema example to make it interesting.

- History of Healing
- Bioactive-Textile based dressings.
- Hydrocolloid dressings
- Algienes
- Hydrogels
- Chitosan coated textiles.
- Non-woven fabrics
- Human Interest value.
- Useful for the masses.
- About Health care

In a Science Magazine-Advancements in Biotechnology and Bio engineering.

Scientist-7: Dr. T K Mandal

Note- All article published in NCSTC newsletter, not available for document analysis.

7.1 Communicating Science through exhibitions
7.2 Contact programme for talented school students
7.3 Lecture cum demonstration for S&T popularisation
7.4 Visit to establishments where S&T are at work

Scientist-8-Khan Badiuddin, Kept no records of his articles.
Scientist-9, Dr. N.K Sehgal
Scientist-9, Article: 1

Title-Science communication for children
The author that children constitute a very important segment of our population. The author points out some 'ground realities' related children that need attention.

Children are discouraged to ask questions at home as well as in schools and there is lack of effort to relate what one learns in school and what is happening around them.

Thus it is imperative that content and design of science communication for children should be designed in a manner that involves them actively.

**Scientist-9, Article: 2**

**Title-Nutrition communication: The Indian challenge.**

Book- Reflections on popularization of Science and Technology

The article focuses about the poverty stricken population of India. Explaining the discerning conditions of illiteracy and the reach of mass media, the author mentions ground realities that present a formidable challenge to nutrition communication.

The population should be divided into groups more or less similar in need the criteria could be based on demography, sex or age, related to income and educational level of people. The communicator should have thorough knowledge of the scientific basis of nutrition and of local language.

The communication should be to make programs, keeping in mind the needs, concerns, aspirations, purchasing power and other realities of the audience.

**Scientist-9, Article: 3**

**Title-Teaching and Teachers of science**

Book.-Reflections on popularization of Science and Technology

In the article the author talks on how to bring the popularization of science among common people and teaching of science in schools together.

The most important thing is to make sure that “Science” in both cases has to do something with real-life things, situations that are concerned with everyday life.

**Scientist-9, Article: 4**

**Title -Desh Ki Disha Tay NahinToVigyan Ki Raise Ho.**

Jansatta (Editorial page), Date- 27.10.93

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Science curriculum needs a drastic change in the philosophy of its design.

The new curriculum should be redesigned “understanding” of the type that would enable students to learn by practical approach.

(3) Extracts from UNESCO DIRECTORGENERAL’S SPEECH: CITATIONS FOR 1991. KALININGA PRIZE WINNERS

The newspapers and media show interest in science stories and also the people read with interest and adapt in their day to day lives.

Kalinga prize has been given to scientists who have contributed to science popularization. Among Indians Dr. Jagjit Singh has won this award.

Dr. N.K Sehgal belongs to the field of Particle Physics. He obtained his doctorate from his Wisconsin Madison University in 1969. He played an eminent role in disseminating science to the masses Dr. Sehgal has received numerous national awards for his outstanding contribution to scientific communication and popularization.

Scientist 10: Anuj Sinha

Article: 1

Title- Climate change: war at your doorstep.

Dream 2047, June 2011, Vol 13, No. 12

In the editorial the author that climate is likely to be a significant player in the process of development. The investment in energy generation is linked to environment.
He stresses the importance of this new discipline. And also for a concerned citizen to understand its importance. How for this he suggests “Trigger films” and PC based games could help internalize the significant factors and their consequences.

- Science communicators should rise to this challenge and view it as an opportunity.
- Article on Climate change
- Also highlights importance of media and role of science communicators in educating people.

Scientist-10: Article: 2

**Title- Careers and Competition**

Dream 2047, July 2011, Vol 13, No. 10

In the editorial the author throws light on various career opportunities in the field of science communication with their pros and cons.

Also entering one’s preferred career calls for preparation and determination. One needs to consider one’s strengths and weakness.

He suggests a career in science communication. Recently there have been opportunities in private sector. Public health campaigns become more effective when backed by communicators who have a strong base in science. He also suggests different courses available in this field.

Scientist-10: Article: 3

**Title- Science and Technology Communication: Way to GO.**


The article is written at the time when Vigyan Prasar enters its twenty first year of functioning.
In the editorial, the author describes the pace with which Vigyan Prasar is developing and what needs to be done with regard to empowering every citizen by developing his capacity for informed decision making which is the mandate of Vigyan Prasar

Scientist-10: Article:4

Title- Editorial: Unchallenged Abuse of Mass Media.

Name of Publication- Dream 2047.


In the editorial the author gives examples of prevailing myths and superstitions in the society. He also stresses the importance of mass media in encouraging rationality and in developing scientific temper.

He suggests that print and electronic media must demonstrate commitment to rational thought, by knowing the dismal levels of public understanding of science and make positive efforts to encourage reasoning and logical thinking. In an editorial in scientific institution magazine it has wide reach.

Scientist-10: Article: 5

Title-Accelerating Sustainable Development.

Dream 2047, August 2011, Vol 13, No. 11

In the editorial, the author highlights the importance environment protection with regard to economic development. Citing examples of different countries he stresses the importance of growth in sector of technology sector in success of any country. For this scientific literacy has to be improved in both organized and informal sectors to increase productivity.

Scientist-11: Dr. K. N Pandey

Title- Bahut Khatarnak Hai Electronic Kuchra.

Vigyan Jan 2010

This article is about electronic waste disposal. It may be discarded computers, office electronic equipment electronics, mobile phones, television sets and refrigerators.
It includes used electronics which are destined for reuse, resale, salvage recycling or disposal. The article gives detailed information and data on how much e-waste disposal takes place in India annually. Giving the example of Bangalore which has become IT capital, it has given surprising fact that as many as 30000 computers are disposed whereas Delhi itself disposes 15000 computers annually. The challenge lies in identifying the e-waste and categorizing it according to its reusability and residue materials.

- Electronic Kachra- category
- Length of article- 5 pages.
- No of pictures-2
- Coloured pictures
- Indian perspective

Scientist 11: Article: 2

Title-Khadya Padarthon mein Rasaynik Sandushan; Vigyan, Feb 1990

The article starts with a famous adage that “if health is gone-every thing’s lost. This fact reinforces the important role in maintaining health.

Food additives and contaminants resulting from manufacturing and processing can also adversely affect health to a great extent Toxic compounds find their way into food during manufacture, storage or transportation. These include largely the industrial contaminants persistent organic pollutants (POP), pesticides heavy metals and toxins of fungal and bacterial origin. There is an urgent need for formulating maximum permissible standards for each country taking into account food habits, social, cultural and economic status.

- Length of article-2 pages
- Pictures- No.
- Language-Hindi

Scientist 11: Article: 3

Title-Madhumeh Ek Janleva Rog; Chetna, Oct- Dec 2005 (Trimonthly)
The author writes about diabetes which is a growing health concern. Diabetes is a group of metabolic diseases which are affecting millions of people all over the world. The symptoms of diabetes. The classic symptoms of untreated diabetes are loss of weight, polyuria (frequent urination) poly-dipsia (increased thirst) and polyphagia (increased hunger).

All forms of diabetes increase the risk of long-term complications. The article gives details on how to control diabetes by making changes to lifestyle.

The box gives points or tips to control diabetes such as life-style changes—such as exercising and taking a balanced diet:

- Growing health concern
- Weight loss
- Regular exercise
- Smoking cessation
- Language-Hindi
- Pages-2
- No Pictures

Scientist-11: Article 4

Title-Protein Urja Kuposhan: Ek Gambhir Samasya; Vigyan, July - Aug 1997

The article is about protein energy malnutrition which is among the major causes of death among children under five. Other complications are: ARI, Diarrhoea, Gram negative septicemia and poor-feeding and electrolyte abnormalities.

The author also gives recipes that can help combat severe malnutrition.

Treatment includes frequent feeding every two hours night/day.

All severe malnourished children have Vitamin and mineral deficiencies. Malnourished children should be given diet made of milk, sugar and oil.

Also a cheerful environment and mother's involvement can help combat malnutrition.
April 2002- Vegetarianism is the practice of abstaining from consumption of meat.

Earlier records of vegetarianism come from ancient India where it was connected with the idea of nonviolence towards animals (ahimsa). Vegetarianism can be adopted for various reasons such as ethical or religious beliefs. The article contains details various categories of vegetarianism.

Amino acids- it is easy for a vegan diet to meet the recommendations for protein as long as calorie intake is adequate.

Green vegetables are a rich source of minerals including iron, calcium, potassium and magnesium) and vitamins K,C,E and many of B vitamins.

Benefits of being a vegetarian.

Vegetarian diet contains a variety of phytonutrients including beta-carotene lutein and zeaxanthin that protect “from age related problems. Ideal diet.”

A healthy and varied vegan diet includes fruits, vegetables, plenty of leafy greens, whole grain products, nuts, seeds and legumes.

Scientist-12 Article: 1

Title-Popular science stuff is cheap and authentic.

He acclaims that the publications by government agencies it in the field of health and environment have good content but are also affordable.

PID has a long list of cheap titles. In the field of environment education sustainable development the science and environment fort nightly ‘Down to Earth’ tops the tally.

ICAR brings out popular journals on agriculture, also a number of books on agriculture.
‘Science ki Duniya’ started in 1975, a quarterly is the only popular science journal catering to Urdu reading population.

- Important pictures
- Importance for the masses.
- Scientist talking about need for science popularisation.

Scientist-12: Article: 2

Title- Saving the Endangered

Hindustan Times (On Science and Technology page), 1997

This article is on the topic of biodiversity prospecting of animals and medical plants. Proves a continuing threat to the medicinal plants.

National environment awareness campaign of the Union Ministry of Environment and Forests had chosen medicinal plants as the focal theme for the year 1996-97. The article also highlights that India accounts for eight percent of the global biodiversity, existing in only 2.4 percent land area of the world. The article stresses the need to preserve our biodiversity.

Scientist-12: Article: 3

Title- Jellying in many ways, Pioneer (Science Section) 1997

Article is about Biotechnology. The article highlights the benefits of Biotechnology for the society. Also plant tissue culture industry is expanding rapidly and holds lot of potential.

The scientist gives an example of the gelling agent ‘Agar’ and its highest purified form. Article also talks about the efforts of scientist in producing low cost solutions for the masses.

Scientist-12: Article: 4

Title- Media Centre can ensure accuracy in science reporting.

Published in Pioneer (view point section), Date-Not documented by scientist.
The article highlights the need for a national media centre to ensure factual accuracy in science reporting. The article takes excerpts from a medical seminar and stresses on the need of rechecking the facts; before they are sent for print.

The author gives examples of an article published on Jan 14, 1994 in which the history of the acclaimed Kalinga prize is wrongly mentioned as thirty years, whereas it was forty years.

He also highlights that the scientist demand to recheck facts before going to print due to in accuracies and mistake on the part of the journalists.

- No Picture

**Scientist-12: Article: 5**

**Title:** Analysis of Kalinga awardees confers enhanced science and technology support in the developing countries.


The article highlights the situation where in the generation of knowledge is extremely asymmetric in developing countries due to lack of funding or lack of political commitment to science. In this regard rewards and appreciation to scientists are important. The Kalinga Prize for the popularisation of science is a national initiative of global character for international cause started by UNESCO in 1951 following a donation by Bijoyanand Patnaik of Orissa, Founder and President of Kalinga Foundation. The article also provides a list of prize awardees of the last decade

**Scientist-13: Dr. V.B Kamble**

**Article: 1**

**Title:** Making Science More Assessable and Less Frightening.

Published in Dream 2047 (taken from Science Musings); Jan 2001.

The author retrospects the scientific and technological developments in our country in the last fifty years and how they have improved the quality of life. Certain fields like biotechnology have also instilled a sense of fear in our minds.

People are keen to understand new technologies. Citing the examples of great scientists like Stephen Hawkins and Michael Faraday he suggests that it is through
them that science can become more accessible to the public. He further adds that for scientists and science communicators, this is both a challenge and a social responsibility.

Scientist-13: Article-2

Title- Popularizing science Through Matra- Bhasha.

Dream 2047; 2001

The article focuses on how science affects lives of people in issues such as health, technology, income generation, sanitation and hygiene and how it is important to develop scientific temper. Knowledge can help save lives of people. It is also important to organize, analyse and apply information. Reproducing articles from repeated journals will not help. Every region speaking a particular language will have to evolve its own language.

He appreciates the efforts made by scientist like Prof. J.V. Narlikar who have taken upon themselves the task of taking science to the people in regional languages.

Scientist-13: Article: 3

Title-Fake Medicines Sick Business Dream 2047, December 2006

The article throws light on the state of availability of genuine medicines in the market. Further citing the figures portrayed in the media and how much loss of revenue occurs due to fake medicines, depicts an alarming state. Further the article educates by giving the different threats associated by using these fake medicines.

Such business strive due to ignorance of consumers, lack of stiff penalty for committing offence and a lax regulatory system WHO has set up an agency, the International Medical Products Anti-Counterfeiting Task force (IMPACT) in a hope to bring all parties together to tackle this menace. Mashelkar Committee had recommended death penalty for drug racketing and Central Drug Administration.

There is a need to educate public about the ills of spurious drugs through various media and modes and then only we can think of making a healthy world.
Article 1.

Title: Learning Science through Activities and Toys.

Sub-Heading: children learn best through doing.

In this article the author talks about how children learn best through doing. There is the need to understand how a child's brain functions.

Children are naturally equipped to learn by observation. Every experience word impacts their mind and understanding of the world around them. Hands on learning provides them with multiple and varied opportunities to use what they have learned and helps to build effective connections in the brain.

Article 2.

The Toy maker and His Dream.

This article in Hindu By Anita Kannadasan on Arvind Gupta, on how he was toys to teach science in an interesting manner. This article throws light on his work. He has done 155 translations and uploaded them on his website. He has written 236 books, most are available free on his website. He likes curiosity in children. According to the author he has been to over 1500 schools and impacted lives of millions of children across the world through his work.

Article 3

Title: Active learning, Passive Teaching.

This article is written at the national level workshop with school teachers. The author monitors that childhood is the time when children can learn many things.

Children imbibe certain manners without words. He also talks about the 'activity' based classrooms. He emphasises the role of pre-schools years in a child’s life and that the education and the schools don’t give much attention to childhood and their learning abilities.
Scientist-14: Article: 4

**Title: Using stories and storytelling to teach environmental issues.**

The author emphasises the role of storytelling in our Indian culture. These can be used to provide an enriching tool for science teaching.

The article explores the use of stories to teach science in an engaging and interesting way.

Scientist-14: Article: 5

**Title: Toys from Trash-Teaching kids science using everyday objects.**

In the article at the (ndtvgadgets.com) the author writes about Arvind Gupta and how he is adept at making toys using waste materials. He is a visiting scientist at IUCAA and talks about his work of popularising science and how much he enjoys doing it.

Scientist-15

**Dr. Achyut Dattaprasad Dabholkar**

Writes in Gujarati, Marathi and English. Has written 1 book in Gujarati, 2 books in English and 2 books in hindi.


No articles available for document analysis

Scientist-16: A.S. Manekar

No articles available for document analysis

Scientist-17: V.S. Ramamurthy

No articles available for document analysis
Table no. 5.5. Dey's (1993) 5Ws and 1H- Based on Document Analysis

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- Fake Medicines: The practice of selling counterfeit medical products for profit. 
- Sick Business: A term used to describe unethical and harmful business practices, such as selling fake medicines. 
- Dream 2047: A vision or idea for the future, often used in science fiction to imagine what could be possible by 2047. 
- Matra - Bhasha: A terminology or language designed to make science more accessible and less frightening. 
- Kalinga Award: An award given by UNESCO for significant contributions to the promotion of science and technology support in the developing countries. 
- Need for Media Centre: The importance of establishing a media centre to promote and disseminate information about science and technology.
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DOCUMENT ANALYSIS

The following is based on the document analysis of articles written by scientists. Five articles each were collected from scientists. Most articles fall in the category of popular science. The broad definition of popular science is science meant to be consumed in leisure or free time. It is largely for personal leisure falling in the category of 'infotainment'. It is science for fun, to experience the wonders of nature to learn about issues that are close to you or simply because you are interested in it and not meant for professional purpose.

Mostly this term is associated with print media but can exist in any medium. The study focuses on the articles written or published in print media. The study reveals that this form of writing allows scientists to talk across their own area of expertise or on the topics that are otherwise neglected. This form is known as popular science, most commonly used for print media or science stories in print.

The category is so broad that term lacks its coherent meaning. For a case in point, 'Cosmos' of Carl Sagan, a landmark in the history of science, which was a documentary was converted into book form after it gained popularity.

Some scholars argue that popular science is more of a bridge rather than a boundary. 1980's was seen as the golden period for popular science books. Popular science helps shape public definition of science. It provides an open space where scientists and science communicators, coming from vast and diverse fields talk about science in their areas of expertise.

The study has found through document analysis of the articles written by the scientists that majority of the scientists wrote about how science communication should be done or its importance to the society. According to the table based on document analysis there are 21 articles on the topics related to public communication of science, barriers faced by scientists, what should be the style of discourse, how science communication should be, or how it should be done, talking about the problems faced in our country, but the discerning part is that very little work of actual science communication is done. It is just like beating about the bush or preaching, not really doing it.

The study focuses on the public communication of science and technology. It is a distinguished field used to describe communication between scientists and non-
scientists. The term emerged in the 1980’s. The term is not widely used with one specific meaning but it appears in science writings just as one terms used to describe the broad area.

History has seen that almost all popular science communicators were scientists. Lewenstein (1987) writes about popular science in his article “Was there really a popular science “boom?” that how popular science developed over the years.

In the recent years there has been a rise in pseudoscience that blurs the line between science and religion. There has been very little work done in the area of public beliefs in various forms of pseudoscience including UFO-logy, new age religion, astrology, haunting and the occult. Majority of the people believe astrology to be something related to science. In science communication the popularity of pseudoscience creates new challenges.

In India myths, magic and superstition are part of the tradition and pseudoscience has become very popular. Print and electronic media have ample space and time devoted to it, owing to large audience interested in it. There are regular columns devoted to astrology, numerology and vaastu in newspapers. According to many scholars pseudoscience is diametrically opposite to science literacy. There should be more articles to promote scientific temperament and science literacy.

There is an article on the topic of Hi-tech medicines “Healing wounds the hi-tech way (Dutta, 2009). In recent years the trend of using complimentary or alternative medicines (CAM) has grown tremendously. There is a turf between alternative and conventional (allopathic medicine). There are highly polarised viewpoints on this debate, with both ends expressing strong negative attitudes towards each other. People with little or almost no knowledge of medicine, surf the net and find cures to almost any disease. The term used for such people is “Cyberchondriac”. This is proving as a great threat to the health of the masses. It is the role of the scientists to write about such issues and make the people aware of the hazards of self-medication. Many quacks are earning lot of money due to the ignorance of the masses. The treatments are still controversial and there are a lot of ethical issues involved.

Of all the controversies around the debate, none is more apt to incite the wrath of the medical establishment than cure of cancer. It is a belief that cancer patients hardly die
of cancer but it is “science” that kills them. The number of accidental deaths is in 
large part due to the unnecessary treatments that are given to protect the doctors, at 
the expense of the patients.

People are misguided and pushed to go for expensive treatments and tests which are 
not required. For example skull X-rays are done for the sole purpose of protecting the 
doctors, which put a hefty burden on patients and also are dangerous as they can cause 
fatal brain tumours.

It is at these places that we are forced to think whether science is a boon or bane. 
Scientists have the responsibility to guide the masses and help them to prevent them 
from fraudulent therapies and practitioners of science.

Another debate is over the genetically modified food(GM food) versus conventional 
crops. This involves consumers, biotechnology companies, government regulators, 
NGO’s and scientists. Among the various issues surrounding the GM foods is that 
whether they should be labelled, role of government and objectivity of the scientific 
research and publications, but most importantly health issues and the impact on 
environment. An article by one scientist discusses in detail about the potential harms 
of having the GM food.

While the public is concerned that consuming GM food may be harmful, there is a 
broad consensus that food derived from these crops poses no greater threat than 
conventional foods. On the other hand the opponents of the GM foods acclaim that 
the risks have not been identified and managed. Some groups opine that there are 
unanswered questions regarding the potential long term impact on human health, and 
demand mandatory labelling or a moratorium on such products.

Some benefits of genetic engineering in agriculture are increased food quality, 
increase in crop yield, and reduced costs for food or drug production, reduced need 
for pesticides, enhanced nutrient composition. A number of animals are also 
genetically modified to increase yield and decrease susceptibility to diseases.

Such alterations may change the organism’s metabolism, growth rate and response to 
external environmental factors.
It is the duty of the scientists to make the masses aware of the potential health hazards of GM foods such as exposure to new allergens and transfer of antibiotic-resistant genes to gut flora. It could also lead to ecological imbalance.

Some say that the anti-GMO campaigners have distorted the science behind GM foods, for their personal benefits. According to some it has profound effects on the economy as the companies who will create them, would claim their ownership and will not share them with public at reasonable cost. There are religious and ethical concerns also but we are not discussing here. (For further information read United States Department of Energy, Office of the Biological and Environmental Research, Human Genome Program. Human Genome Project information: Genetically modified foods and organisms, (2007).

Science Communication in Relationship to Disaster

It is important for everyone involved in communicate the science of a disaster to examine the different perspectives of communication. In some cases, individual scientists or organizations will need to formulate a communication plan because they have directly contributed to the disaster. This is a very different situation from providing explanations from the perspective of an expert assisting society to understand the disaster.

A significant amount of published literature describes the best practices for scientists and science communication organizations responsible for managing or communicating risk, offering advice to prepare for a disaster, or even those directly causing a disaster (for example in the case of an explosion or tsunami). Science and technology communicators have an important role to explain what leads to disasters and may also be called during an emergency to answer questions about them.

At the time of the disaster, the information technology infrastructure in the local area to connect with the wider world may get dysfunctional. Science Communicators and media reporters who are present at the location have an especially important role to play at the time of crisis. The media becomes a vital link between the disaster-affected region and the rest of the world.

Nearly 1.7 billion people were using the Internet in 2001 at the time of Gujarat Earthquake in India. In their paper about the use of the online environment for media
reporting and the formation of online communities, researchers Kris Kodrich and Melinda Laituri found that the internet raised the awareness of the Gujarat earthquake and helped create a global community transcending national boundaries and enabling multiple lines of communication. Initially, the media profile of scientists with relevant expertise is elevated following a disaster. While it is important to convey accurate information regarding the cause of the disaster and its impacts, it is also important that scientists do not appear opportunistic in such an emotionally charged time.

The public may misinterpret scientific comment as exploitation of the situation for personal or institutional promotion. Experts and communicators should assist the media to understand the issues, without inappropriately promoting their organization. It is wise to put forward only those spokespersons having a strong reputation, and have undergone some form of media training and experience, and are experts in the particular field. (Harris, Torok, Clement 2010)

Framing and Priming in Science Communication

Scientific and technological issues are increasing becoming policy issues, with different stakeholders trying to influence the on-going debate. It is therefore imperative for science communicators to understand the importance of process such as framing and priming. The two theories of media effects have their roots in psychology, communication, and other social science disciplines. Although they are often presented as related, they refer to two different processes.

Science communicator faces challenge of writing about a complex scientific issues, be it for a speech at a conference, a newspaper article, a magazine story, or a blog, he is certain to emphasize a specific dimension of the issue over numerous others to make the story more compelling or more relevant to the audience. To highlight the favoured interpretation of an issue, science communicators use specific metaphors, visuals, symbols, and other culturally relevant devices. They may be doing so intentionally to persuade a specific audience (through speech writing, for instance) or by necessity to efficiently present a complex issue as in the case of journalistic science writing. By doing so, the science communicators are framing the issue, much like artists would do when choosing a specific frame to present a painting in a particular light.

In theory, frames refer to the mode of presentation used by communicators (journalists and others) to characterize an issue in a way that resonates with their
audiences. Different frames for the same issue do not simply diverge in terms of content; rather, frames differ in how they present ambiguous information such as complex scientific issues. For instance, an article by one scientist on an emergent technology such as nanotechnology could present the technology as the next plastic, therefore evoking potential technological breakthroughs. The same article could have depicted nanotechnology as the next asbestos, which would have conveyed a very different interpretation of the issue. These diverging media frames could both be used by audiences to make sense of topics such as nanotechnology, although each might produce different effects on audience’s perceptions.

There are so many topics in science that have recently captured national and international attention such as Stem cell research and cloning, evolution and Science education, bioterrorism, environment and climate change, sustainability, energy policy, space exploration, genetic medicine, nanotechnology, agricultural communication, astronomy, infectious diseases and many more. These are neglected areas and public wants to receive more information. The question arises that why these topics do not capture scientist’s fancy and why is not much written on these issues. There is lot of scope and through this research the message needs to be sent out to all the scientists as a wakeup call to come out of the ‘ivory towers’ and start communicating to the masses.