SCIENCE COMMUNICATOR

INTER-DISCIPLINARY JOURNAL
FOR
SCIENCE COMMUNICATION AND JOURNALISM

Directorate of Public Relations and Publications
Cochin University of Science and Technology
Kochi - 682 022, Kerala, India

SCIENCE COMMUNICATOR

INTER-DISCIPLINARY JOURNAL FOR
SCIENCE COMMUNICATION AND JOURNALISM

DEMOCRATIZE SCIENCE COMMUNICATION

Science & Technology in India has made tremendous growth for the last few decades. However, the fruits of science & technology are yet to reach the people in their daily life. The mainstream print media do publish science and technology news, articles, features and even columns, but how much of these reach the common denominators is a vital question. Mostly such scientific articles are written by experts and often get circulated among the highly literate masses. It is high time that our scientists and science communicators should make serious efforts to cultivate the art of writing science in a simple, palatable and lucid style and language so that the common readers can imbibe it. The scientific information should appropriately be coined with the social reality and living circumstances of the target audiences.

Though all the media from print to digital, including social media, contribute a lot to the propagation of science, accelerated and concerted effort is required for its democratization. The word democratization indicates that scientific knowledge straightaway moves down to common man for its direct application by enabling him to enjoy the result of applying science in day to day life, whether it be cooking, farming, or even digging a hole in the field. Communication should percolate to the grass root level of the society to impart scientific awareness and create scientific temper. If the message fails to reach the ultimate target due to its non-reader friendly format, the whole mission will fail.

It is true that science communication and science journalism is gaining momentum now-a-days. However, there are certain primitive rituals being performed in many parts of the country on account of religion even in this 21st century. Even educated masses follow certain blind beliefs, superstitions etc. and such activities are on the rise than before.

Beliefs can be classified as belief backed by scientific evidences and beliefs without scientific evidence. Certain beliefs are meant either for personal safety and security or for social well being or even environmental protection. These two types of belief systems are entirely incompatible. Probably it may be inferred that such belief systems were created and sandwiched with religion so that people ought to follow them with or without the knowledge of the science behind it. Remember the words of Einstein

"Science without religion is lame, religion without science is blind." By knowing the science behind each rituals and superstitions, people really become enlightened and could perform such things with enhanced enthusiasm. Otherwise people can be at the liberty to either follow them or not as is the case may be. We can take simple logical steps to come to the best and most reasonable conclusion only through scientific knowledge and not through mere education. It can be demonstrated that a scientific belief system is differentiable from a religious one because it minimizes faith, has a greater explanatory power, and is open to belief revision. One of the most important steps in the development of scientific attitude is the relentless fight against superstitious beliefs. There is also an urgent need to educate the society in such a way that each day they witness application of science on whatever they see or hear or smell; and also whether it is cooking, farming, agricultural practices, or even natural phenomena.

In the pre and post-independence era, the science communicators as a whole have shown commitment and enthusiasm for paving the way for popularization of science and inculcation of scientific temper. The success of green revolution and vaccination drives against small pox can be cited as examples. But it is really doubtful whether now-a-days the vibrancy of science writers has dwindled. Many of the science writings in print media are communicating nothing but dreariness. The fundamental objectives of science communication should be that the writing is for readers which involve common man at large. What we need now is a new orientation in science communication based on social system life style and culture of the target audience. The orientation may include selection of proper media for science communication. This includes local folklores, multimedia, short films and documentaries, internet, Whatsapp, Facebook, Twitter and such other social media apart from TV and Radio. Science communicators must develop suitable dynamics for effectively reaching the common man by overcoming the present challenges for science communication. Let us dream for the day where science shapes the society and culture through scientific thinking.

Dr. S. Anil Kumar

CONTENTS

CREDIBILITY PERCEPTION OF MEDIA CONSUMERS

Subash Kuttan

Abstract

The study assessed the nature of relationship between the credibility of the media and the duration of their use. The aim was to know whether a person who spent more number of years in using a medium would give more credibility to that medium when compared to another person who spent less number of years in using the same medium or else, whether the credibility of a medium was related to the number of years of its use. Accordingly, the correlation between the total number of years spent by the respondents in using each medium and its respective credibility rating was calculated . The result showed that there was no significant correlation between the two. So, the study found that media credibility was not related to duration of media use. Another specific objective of the study was to understand the difference if any in the credibility ratings given to the three media based on the media dependence of the respondents. The variable of media dependence was assessed by finding out the medium used most often by each respondent to get news. The analysis showed that media dependence has a bearing on the credibility of the visual media.

Introduction

A source regarded as highly credible is often more influential than a less credible source in communication. Researchers have found the relevance of the credibility variable in several communication contexts. For instance, Haiman (1949), Hovland and Weiss (1951) have observed that more attitudinal changes can be created by highly credible sources. Likewise Bettinghaus (1980) found source credibility as the most striking factor of a communicator's influence in persuasive situations. Also, it was noticed that if a message originated from a low credibility source, it was considered as more biased and unfair than if it emanated from a source regarded as high in credibility.

In mass communication context, the credibility possessed by a medium can promote or impede its potency to disseminate information to the public. Rampal (1996) underscored this assumption by observing, " Credibility is the most precious attribute a medium can have". Lee (1978)

Dr. Subash Kuttan, Professor & Head, Dept. of Mass Communication and Journalism, University of Kerala, Kariavattom, Thiruvananthapuram, Kerala 695581
E-mail: subash.kuttan@rediffmail.com

rightly said, "As more people use the mass media as their main source of information , the media must maintain the credibility of what they present to the public".

Earlier studies which looked at the significance of credibility in communication were carried out more with relation to interpersonal interactions and public speaking situations. However, as the mass media emerged as major sources of information for the public in due course , the focus of studies was shifted more towards credibility assessment in mass communication contexts. The relevance of assessing the credibility of mass media as sources of information acquires added significance in the present age.

The current media scene in India shows that a variety of mass communication channels are competing with each other to catch the public attention . In terms of reach and coverage our media have grown and are poised to grow further. Though our electronic media are on an expansion spree, scathing criticisms are on the increase with regard to their performance as sources of news.

Hence, it is highly relevant to assess the level of credibility possessed by our mass media. So, the present study was carried out to know the credibility of major mass media as sources of news and information. The study was conducted in Kerala, a state having a very high media exposure in India.

Kerala stands unique in many ways. With its highest percentage of literacy, largest network of educational institutions, high political awareness and highest rate of media consumption in the country both in items of the print and the electronic media, Kerala is distinct from other states. Readership surveys have repeatedly reported that Keralites have the highest newspaper reading habit in the country. In terms of the reach of the electronic media, Kerala is in the forefront of other states. Considering all these factors , Kerala seemed ideal for carrying out the study.

Objectives of the study

The study was conducted with the major objective to understand the credibility of mass media - newspapers, television and radio as sources of news for the general public in the state. Specifically , the study tried to determine the nature and extent of relationship between the credibility of the three media and the duration of their use and also to understand the difference if any in the credibility ratings given to each of the three media based on the media dependence of the respondents.

Methodology

In the survey conducted for the study, a multi- stage stratified random sampling method was adopted to select the sample. 600 respondents drawn from three randomly selected districts representing the northern, central and southern regions of the state constituted the

sample for the study. A questionnaire and a summated rating scale formed the tools of data collection for the study. For collecting the data on the socio- demographic variables and the media habits of the respondents, the questionnaire was used and the scale was employed to get data on the credibility ratings given to the media by the respondents. The data were analysed through descriptive and statistical methods.

Findings

As stated, one of the specific objectives of the study was to determine the nature and extent of relationship between the credibility of the media and the duration of their use. The aim was to know whether the duration of use of the three media in terms of number of years had any association with the credibility attributed to each one. In other words, whether the number of years spent by a respondent in using daily newspapers, radio, and television had any correlation with the respective credibility given to each of these media as a source of news . This would help to know whether a respondent who had been using a medium for a longer period or for more number of years attributed a higher credibility to that medium in comparison with a respondent who had been using that medium for a shorter period.

First, the correlation between the total number of years spent by the respondents in using daily newspapers and the credibility rating given to that medium was assessed . The result showed that there was no significant correlation between the two. From this it could be inferred that the duration of use of daily news papers had no association with the credibility attributed to that medium by the respondents. (see Tb.1)

Table 1 : Newspaper credibility and duration of use

(Correlation Matrix)

Correlations	Years of Use	Newspaper Credibility
Years of Use	1.0000	0.0565
Newspaper Credibility	0.0565	1.0000
No. of cases	600	

(Not significant at 0.05 level)

To know the association between radio use and radio credibility , the correlation between the total number of years spent by the respondents in listening to radio and the credibility rating assigned to that medium was assessed. The result indicated that there was no significant correlation between the two. Hence, it could be deduced that the number of years spent by the respondents in listening to radio and the duration of use of it had no association with the credibility possessed by that medium as a source of news (see Tb.2).

Table 2 : Radio credibility and duration of use
(Correlation Matrix)

Correlations	Years of Use	Radio Credibility
Years of Use	1.0000	-0.0119
Radio Credibility	-0.0119	1.0000
No. of cases	600	

(Not significant at 0.05 level)

When the association between the number of years spent by the respondents in watching television and the credibility rating given to that medium as a source of news was assessed, it was found that there was no significant correlation between the two. Therefore, it could be concluded that the duration of use of television had no association with the credibility attributed to that medium (see Tb.3)

Table 3 : Television credibility and duration of use
(Correlation Matrix)

Correlations	Years of Use	Television Credibility
Years of Use	1.0000	0.0025
Television Credibility	0.0025	1.0000
No. of cases	600	

(Not significant at 0.05 level)

Thus, the analysis carried out to know the kind of relationship between media use and media credibility came up with a similar type of finding in respect of all the three media under study. That is, the duration of use of a medium and the credibility given to that medium were found to be not correlated to each other. Hence, based on the study it can be drawn out that whether a person has spent more number of years or less number of years in using a medium is not associated with the credibility attributed to it. In other words, media credibility is not related to media use.

The finding poise that in actual terms the established media cannot take for granted that it might have a high credibility. Even a nascent medium may sometimes acquire more credibility from the users than an established medium. Another possible inference is that familiarity with a medium is not a guarantee for higher credibility . This could mean that media men cannot be complacent due to their organization's long existence.

Another specific objective of the study was to understand the difference if any in the credibility ratings given to the three media based on the media dependence of the respondents. Media dependence, a variable related to media habits was assessed by finding out the medium used most often by each respondent to get news and information. Based on the kind of media dependence of the respondents, they were classified into three groups : those who used daily newspapers most often, those who used television most often and those who used radio most often to get news. Accordingly, it was found that 76.8% of the sample depended mostly on daily newspapers. 14.9% on television and 8.3% on radio for news.

The aim of the study was to ascertain whether the kind of media dependence of the respondents had any bearing on the credibility attributed by them to daily newspapers, television and radio as sources of news. In other words, to know whether a respondent who depended mostly on a particular medium (say, daily newspaper) attributed a higher credibility to that medium as a source of news when compared to the other media (television and radio).

As the first stage of the analysis, the mean of the credibility scores given to daily newspapers, television and radio as sources of news was assessed based on three types of media dependence of the respondents. Then, to ascertain whether the differences in the mean values were statistically significant, the data were subjected to ANOVA.

On examining the mean values of the credibility scores to daily newspapers as a source of news, it was found that the highest credibility rating was accorded by the group that depended mostly on the same medium to get news. The mean value calculated for this group was 58.8133 (std. dev.4.1959). The lowest credibility rating for newspapers was given by the group which depended mostly on radio to get news, indicated by the mean value of 57.4091 (std dev. 4.4057). The mean value of newspaper credibility ratings calculated for the group which depended mostly on television was 58.5190 (std.dev. 4.4516). Thus, the mean values indicated differences in the credibility ratings given to daily newspapers based on three types of media dependence. To know the significance of the differences in the credibility ratings, the data were subjected to one- way analysis of variance. It was observed that the F- ratio was 2.2111 at a probability level of 0.1106. This clearly indicated that the differences in the credibility ratings were not significant. From this it could be inferred that those who had their dependence on daily newspaper for news and information did not give a significantly higher credibility to that medium when compared to the other two groups. So it could be concluded that the variable media dependence had no bearing on the credibility attributed to daily newspapers.

On analysing the mean values of the credibility scores given to radio, it was observed that the highest credibility rating was accorded by the group that depended mostly on the same medium and the lowest rating by the group that depended mostly on news papers. The mean value for the group which depended on radio for news was 53.3409 (std. dev.5.1306). The mean value calculated for the group which depended on daily newspapers was 52.1892(std. dev.4.5741). Those who depended on television for news secured a mean value of 53.2785 (std. dev. 5.2255), based on the credibility scores.

To verify whether the differences in the credibility ratings given by the three groups were statistically significant, the data were subjected to one way analysis of variance. The result showed an F- ratio of 2.6186 at a probability level of 0.0739. This indicated that the differences in the credibility ratings were not significant. So, it could be deduced that those who depended mostly on radio for news did not attribute a significantly higher credibility to that medium when compared to the other two groups. Thus, the variable media dependence was found to have no bearing on the credibility given to radio as a source of news.

On assessing the credibility attributed to television, it was noticed that the highest rating was given by the group that depended mostly on the same medium for news and information. The mean estimated for this group was 54.0253 (std.dev.5.1788). The next higher rating for television was given by the group which depended mostly on radio, indicated by the mean value of 53.2955(std. dev. 6.0907). The lowest credibility rating for television was given by the group which depended mostly on daily newspapers, evident by the mean value of 52.0713 (std.dev.4.6214).

Though the mean values pointed out to the existence of differences in the credibility ratings given to television by the three groups of respondents, one- way analysis of variance was carried out to know the significance of the differences. The result showed an F- ratio of 6.0934 at a probability level of 0.0024. This was indicative of statistically significant differences in the credibility ratings given by the three groups.

To know among which group differences existed, the data were subjected to *Scheffe test.* It was observed that statistically significant differences existed between the group which depended mostly on television and the group which depended mostly on daily newspapers. From the findings, it could be inferred that those who depended mostly on television gave a significantly higher credibility to that medium as a source of news when compared to those who depended mostly on daily newspapers. Hence, the variable media dependence was found to have a bearing on the credibility attributed to television as a source of news.

The study has revealed that people's nature of media dependence or their habit of using a particular medium most often to get news/ information has an influence on the credibility attributed to the visual medium. However, media dependence has no bearing on the credibility of the print medium and radio. Or else, heavy use of the print medium or radio cannot be taken as an index of high credibility of the two media. May be the visual dimension of television has an influence on heavy users to perceive as more credible what they see on the small screen.

This study was carried out within the State of Kerala. Even though there may not be much of a difference in the credibility ratings given to mass media as source of news by media users in other states, it is always better to study the situation elsewhere. This will help to know whether cultural differences prevailing in different states are creating variations in the media credibility perceptions. More number of studies are needed to understand the Indian media credibility in its totality.

References

Bettinghaus, E. (1980), Persuasive Communication, New York: Holt, Reinhart and Winston, Inc.

Devito, J. (1982), Human Communication – the basic course, New York: Harper and Row publishers.

Greenberg, B., and G.Miller(1996), 'The effects of low credible sources on message acceptance', Speech Monographs 33:pp 127-36.

Heiman, F.S.(1949), 'The effects of ethos in public speaking', Speech Monographs 16: p.192.

Hovland, C. and W.Weiss (1951), 'The influence of source credibilityon communication effectiveness', Public Opinion Quarterly 15:pp 635-50.

Hovland , C., I. Janis, H. Kelley (1953) Communication and Persuasion, New Haven: Yale University Press.

Klapper , J. (1960), The Effects of Mass Communication, Ontario; Mac Millan Canada Ltd.

Lee, R. (1978), 'Credibility of newspapers and telism Quarterly55.

Rampal, R. (1995), ' Media Credibility- Case study of RTM2 and TCS5 English language news broadcasts', Media Asia22: pp 155-62.

Taylor, A.T. Rosegrant, A. Mayer and T. Sampler (1977), Communicating, New Jersey: Prentice Hall Inc.

Ward, C. and Mc Ginnies, E.(1974), 'Persuasive effects of early and late mention of credible and non- credible source', Journal of Psychology 86: 17-23.

Westley, B., and Severin, W.(1964), 'Some correlates of media credibility', Journalism Quarterly 41: 325-35.

Wimmer, R.D., and Dominick, J.R.(1994), Mass Media Research–an introduction, Belmont, California: Wadsworth, Inc.

COMMUNICATION OF GREEN POLICIES FOR SUSTAINABLE DEVELOPMENT IN INDIA

Kiran Prasad

Introduction

Unsustainable development activities and climate change have a worldwide impact especially on the rural population largely dependent on agriculture for their livelihood. Ensuring food security has an important bearing on checking hunger and malnutrition mainly among women and children. This is a pre-requisite for checking maternal and child mortality levels in the country. Thus environmental sustainability is regarded as the key to the achievement of all other developmental goals. Social movements have begun to revise the meaning of sustainability and build capacities for balancing growth with environmental conservation. It is interesting that in India check dams, rain water collection tanks, and mini water projects, with the active involvement of the local people in several states, have evinced greater support and participation rather than large dams involving massive funds with heavy costs of submergence, environmental impact, rehabilitation and resettlement of the affected people (Prasad, 2013).

Reports on environmental issues and the results of environmental audit in the media have drawn the attention of policy makers and the wider community to impending environmental hazards. The race for economic development in developing countries like India has led to a shift in cultural values and growing aspiration to match affluent societies. This has led to reversal of the gains of development, unsustainable action and even a collapse of the ecosystem. Climate change debates have thrown up a whole range of terms such as green economy, eco bank, environmental/carbon footprint, carbon credit, food miles and eco-warriors. These complex ideas comprehended by scientists, ecologists, activists and policy makers (see Urry, 2011) have been translated into behaviour change initiatives by individuals such as recycling, kitchen gardens, neighbourhood farms, organic farming, rainwater harvesting, minimizing the use of plastics and the use of a variety of renewable energy sources.

Local communities who were at the fringes of development have begun assuming custodianship of their environment and natural resources which previously was the sole responsibility of the government (Prasad,

Dr. Kiran Prasad, Professor, Department of Communication and Journalism, Sri Padmavati Mahila University, Tirupati-517502, Andhra Pradesh, India. Email: kiranrn.prasad@gmail.com

2007; Prasad, 2009a). The creation of eco-sensitive zones, eco-villages, a whole range of livelihoods and products focused on environmental conservation and renewable energy sources have anchored a sustainable dimension to development at the grassroots. For a developing nation, India's goals for tackling environmental degradation and climate change can be seen as far more ambitious when compared to that of other developed countries. This paper will study communication on environmental protection which is finding increasing acceptance among people in India who support a renewed capacity for action founded on strong but neglected traditions that are combined with modern technology to achieve sustainable development.

Ancient Indians advocated an integrated approach to progress without undue exploitation of natural resources. They laid down traditions, customs and rituals, to ensure that the complex, abstract principles they had developed could be put into practice. These practices, over time, developed the technology of agriculture, methods of environmental protection, knowledge of medicinal properties of trees and even techniques of curing their illness (Banwari, 1992). This vast store of ancient environmental wisdom, as a way of life is worth close study, to make our modern urbanized community aware of the sensitivity to environmental protection inherent in our cultural practices. This could make us realize the benefits of living in harmony with nature as part of our process of development.

Communicating an Ecological Consciousness

The UN had declared 1993 as the *International Year of the Indigenous People*. This drew the attention of the highly developed industrial societies to the worldview of the indigenous people about Mother Earth being an inalienable inheritance of humankind and their practice of environmental conservation for sustainable living. It is now accepted that contemporary legislations, which strictly curtail access of forest dwellers to their habitat and reserve forest lands in the name of modern techniques of scientific conservation, have actually thrown out the original conservators of the forests, thus paving the way for their commercial exploitation. The International Chapter of the Indigenous People has declared that, all policies towards forests must be based on a respect for cultural diversity and for promotion of indigenous models of living. These must also be imbued with an understanding that our peoples have developed ways of life closely attuned to our environment (*Chapter of the Indigenous Tribal People of the Tropical Forests*, 1992). Current policies on environment and forests must take this important direction into account.

Many rural and tribal communities invoke the blessings of Mother Earth through several rituals, during various festivals, change of seasons and before beginning cultivation. No work of importance is undertaken

without paying obeisance to the earth. Before laying the foundation for building a house or any construction *bhoomi puja* (worship of the earth) is performed to invoke the blessings of Mother Earth. This traditional practice continues even in the cities. The concept of green architecture which is popular now was a way of life in ancient India where dwellings were built with natural and local material designed according to the principles of *Vaastu* (ancient art of architecture) to enable the maximum amount of natural light and cross ventilation as possible. The present day urban green buildings use the same principles in addition to promoting water harvesting and recycling of waste.

The concept of *panchavati*, which finds mention in literature throughout the length and breadth of India, refers to five (*pancha*) groves (*vati*). *Panchavati*, therefore, means a grove with five trees. According to the *Samkhya* system of Hindu philosophy, the universe consists of five elements, which are symbolic of the plurality and totality of all living beings on earth. In *panchavati*, the word five also means many; when there are many trees in a grove it is referred to as *panchavati*. The traditional concept of *pancavati* was not exclusive, but included other trees, depending on the environment and climate in specific regions. Thus it encompassed all trees which were considered useful in the ecosystem. The tree to be planted was carefully selected, keeping in mind the soil, water and other conditions essential for its growth and survival. It was believed in ancient India, and even today many communities in the villages believe, that planting a tree in unsuitable environmental conditions puts undue pressure on the soil and fertility of the area. This led to the stunted growth of these trees. Thus some trees are suitable for certain soils. Coconut, jackfruit trees and banana plantations are common in the coastal regions of India. Every component of the coconut tree is useful to the coastal people. Many scientifically planned social forestry schemes have had disastrous effects on the natural environment due to the failure of policy makers to carefully select trees suited to a specific region. The eucalyptus plantations under such schemes have led to a loss of biodiversity and decline in water tables in many regions of India.

Small forests, which house green creepers, trees, shrubs, flowering plants, birds, small animals such as squirrels, rabbits, mice, serpents and insects are found in several parts of India. These are referred to as *kavu* in Kerala and *devarakadu* (God's grove) in Karnataka. Such *devarakadu* reserved for Gods exist in the Malanadu forests, Coorg, Shimoga and South Kanara district of Karnataka. The *Nagabanas* of Dakshina Kannda (Karnataka) and *Nagakavus* of Kerala are similar protected areas in which no trees can be felled. This tradition of attributing holiness to certain trees or forests has ensured the preservation of several rare species of trees and animals which are on the brink of extinction elsewhere. It is significant

that the *devarakadus* or *devanas* had been situated at places where growth of forests was indispensable for maintaining the ecological balance in the region.

From Grey to Green Environmental Policies

The moist tropical forests of Africa, Asia and Latin America viewed in terms of biological diversity, have an importance far beyond the land they occupy. The tropical rain forests suffused with exceptional amounts of light, warmth and moisture, house a remarkable variety of ecosystems and species. Many tropical forests lie in countries that though biologically affluent, are economically poor. This is very much the case in India. The realization that the biological impoverishment of the earth will certainly mean the economic as well as aesthetic impoverishment of humans must have many developing countries reluctant participants in economic globalization. In spite of the existence of deep underlying ecological traditions, governments in the poorer countries were less inclined to value abstract long-term ecological goals above immediate economic gains.

The agricultural crisis in India is a making of flawed development policies which puts unbridled industrialisation above sustainable choices. Once regarded the cradle of the Green Revolution, the prosperity of Punjab was the success story across urban and rural India for decades. Punjab now has 7,000 farmers who have committed suicide with eleven villages put up for sale and a phenomenal debt of farmers estimated to a tune of over 1500 million (Dey, 2014). While it is well documented that over a quarter million farmers have committed suicides from 1995 to 2010 in India more and more farmers across India are being pushed to the brink of debt and suicide. Policy makers continue to focus on economic growth unmindful of its impact on human well-being. Economic growth must be measured not only quantitatively but qualitatively in terms of its integration with social and environmental development for promoting sustained, equitable and inclusive development. The journey from the grey to the green path of sustainable development is being spearheaded by several people's collectives against environmental degradation in pursuit of economic growth. They are advocates for development that does not destroy their natural resources and carefully consider the environmental, social, and cultural costs of economic growth.

While the international development debate continues to grapple with the challenges of climate-smart agriculture for improving water and food security in the developing world, there are some successful initiatives in India that can offer solutions in this area. About ten percent of the tribes in India continue to practice shifting cultivation. A total area of about 50 lakh hectares over 15 states, are covered by shifting cultivation in India. The land is not ploughed in this type of farming and neither is there any

need for domesticating animals. The cultivators have total confidence in the generative power of the earth and see no need to resort to eco-destructive methods. At the end of summer, the hill-sides are prepared for cultivation by trimming the undergrowth of bushes and shrubs. These are then burnt and the ashes provide the manure. Before the monsoon set in, the shrubs and bushes are set on fire again. As soon as the rains come, the seeds are broadcast and the earth is activated to produce a rich harvest. Shifting cultivation is based on the eco-religious faith in Mother Earth's power of creation without artificial inputs. After cultivating the same area for three years, when the fertility of the land declines, it is left fallow to regain its vitality. Cultivation during this period is shifted to another area. This method of farming is known as *Koman* in Orissa, *Podu* in Andhra Pradesh, *Bewar* in Madhya Pradesh, *Kureo* in Bihar, *Jhum* in Assam, *Tekonglu* in Nagaland, *Adiabik* in Arunachal Pradesh and *Hooknismany* in Tripura (Vadakumchery, 1993).

The indigenous and tribal communities believe in strictly adhering to the principle of nature. Consumption, for them, is need-based to meet immediate requirements. All resources not required for the day are left untouched in the forest for other users in need. There is consideration for the needs of others and the produce of Mother Earth is accepted with reverence and respect. The poor fishing communities have long been practicing self-imposed periods of abstaining from fishing during the breeding season. This culture of life is based on the ethics of environmental conservation, in stark contrast to the greedy and large-scale exploitation of natural resources in the name of development.

The strategy is to focus on climate adaptation rather than climate mitigation. All Ministries related to climate change are set to visibly demonstrate – through the media – technologies adopted by them to mitigate the effects of climate change. The projected trend of warming, temperature extremes and variable rainfall will impact food and livelihood security of majority of the rural population dependent on agriculture. India's strategy according to the Indian Council of Agricultural Research would be on based on climate smart practices to make agriculture resilient to climate change (Parsai, 2015: 14). The new credo of agriculture is 'More Crop Per Drop' that looks at reducing water use and efficient water management techniques such as drip irrigation for agriculture. The upcoming approach of rice cultivation called aerobic rice cultivation which reduces water use in rice production and increases water use efficiency is expected to change the conventional method of rice cultivation that utilises 5,000 litres of water for producing one kilogram of rice than its actual requirement of 3,000 litres as about 2,000 litres is lost due to flooding and seepage (Anandan, Pradhan and Singh, 2015: 16). This approach will include irrigated lowlands in the states of Karnataka, Tamil Nadu, Bihar, Chhattisgarh, Odisha, Jharkhand and eastern Uttar Pradesh where rainfall is insufficient to sustain rice production.

In 25 villages across Rayagada district of Odisha of India, tribal village women have reclaimed the denuded commons and achieved a remarkable turnaround in food security and livelihoods through eco-friendly alternatives to shifting cultivation (Mohanty, 2014). The Ama Sangathan (Women's Federation) – a sister organization of Agragamee (the State Resource Centre for Adult and Continuing Education in the district) having a membership of 25 women's organisations known as Mahila Mandals (MM) and 1200 tribal women members proposed a project entitled, "Reclaiming the commons with women's power: Eco-village development in tribal Odisha" to the Indigenous Peoples Assistance Facility (IPAF) which was sanctioned in 2012. This initiative enabled village communities to develop a model for reversal of ecological degradation of their lands and commons by combining traditional knowledge systems with agro ecological models. The initiative was able to establish a women-centred model for the governance of the commons that would provide for the livelihood as well as income needs of a tribal community in a sustainable manner. They were successful in growing seasonal agro crops, millets, pulses and other herb-culture varieties in the villages through mixed cropping. This initiative made it evident that sustainable agriculture, food security and environment conservation could be achieved with women farmers at the forefront and enabled them to be self-reliant in the matter of food security and livelihood generation in a vast barren landscape with hardly any scope for water harvesting. It has offered hope to many rural women grappling with the suicide of male farmers and left to fend for themselves alone and manage the food security of their families.

Agricultural productivity has suffered due to lack of innovative approaches such as sustained access to institutional credit facilities, remunerative support prices for crops, cooperative farming, efficient irrigation and energy sources, value-addition and an integrated marketing system. Farmers groups in Kerala in different villages have formed into marketing groups called the Swasraya Karshaka Samiti (SKS) under the Vegetable and Fruit Promotion Council (VFPCK) of the Kerala Government. The SKS consisting of 20-25 farmers as members are responsible for sourcing and marketing farm produce. They run their own markets and have been successful in eliminating middlemen to get a better price for their produce (Prabhu, 2013). Traders are informed by the Market Information Centre (MIC) on the daily prices and also inspect the produce. Presently 600 farmers are members of the SKS and about 150 non-member farmers also make use of these facilities.

India's MSMEs sector recorded more than 10 per cent growth in recent years and has contributed nearly eight per cent to the national Gross Domestic Product (GDP). MSMEs have employed over eighty million people in nearly forty million manufacturing and service enterprises. It has

also accounted for 45 per cent of the manufactured output and 40 per cent of exports from India. The policy of the government to step up their potential to create employment and provide economic growth should envisage the inclusion of rural artisans who have traditional skills in the textile, arts and crafts manufacture and design. The collaboration in the textile industry between women's rural cooperatives in traditional fabric weaving and designing with urban markets is expected to enable rural participation in innovation and expand sustainable livelihoods.

From slogans "Cut the Crap" that focuses on waste minimization to "From Waste to Wealth" that encourages recycling and innovative use of resources regarded as waste, climate change communication has created individuals and communities who practice green initiatives for sustainable development. An innovative 70 year old farmer, Chinna Krishnamurthy has woven rice straw in saris (traditional attire of women in India) and he has plans to weave other accessories such as shawls and handbags from the his traditional childhood knowledge of converting paddy stalks to yarn for making fabric (Krishnamoorthy, 2015: 5). It is quite common for younger children in Indian families even where they can afford new clothes to use and reuse clothes worn by older children, practices that are born out of value systems that encourage reuse and recycling. Energy has also been generated using biomass and waste generated in the farms by rural communities; the conversion of waste to energy is considered as an important goal of waste management.

The urban population has also practiced behaviour that promotes re-use, repair and recycle that has been lauded by many advanced societies. Japan has lauded the Indian society's capacity to repair and reuse electronic gadgets and appliances that is usually discarded in most other societies. There is a renewed attempt to reduce industrial pollution by using the combined power of local communities, regulatory measures, and the news media to police air and water discharges from the industry. Several big cities in India have adopted innovative strategies to promote a cleaner and sustainable urban environment. The 'No Car Day' is being promoted through all communication channels, the mass media and outdoor media to reach the maximum number of people in the cities. French environmental author Herve Kemp's lines "Consume less, Share more" prods communities to go beyond car-pooling to public transport, cycling and walking focused on how engaged, informed and organized citizens can contribute to a healthy urban environment. In the cities, citizen's collectives and shopkeepers' associations play a key role in waste management.

India is the fifth largest generator of e-waste in the world. The concern for safe disposal of e-waste generated by electronic items in the cities have resulted in start-ups that collect, process and repair discarded

items for use among communities who may be in need of such items. Akshat Ghiya and Aamir Jariwala, friends from college, founded Karma Recycling in 2012 as simple traders - government authorised to collect eWaste from households and corporates and, after segregation, sell that waste to plants that were using clean technology to recycle it (Goklany, 2015).They realized they were focusing on "recycling" than the "reuse" of the gadgets. So instead of sending the devices to the recycling plants, they called an electronic engineer to get the products repaired and refurbished. Then, they put the redone gadgets up for sale online and even sold over 100 phones in two days. Realizing that many of the electronic gadgets lying at people's homes could still be used after minor repairs, they shifted focus to extending the life of gadgets as much as was possible and only break-down and recycle them when they couldn't increase their life any further. They realized that there was a lot of reuse potential as there were a lot of people waiting for upgraded technology to reach them at lower prices. They hired more engineers, created a website offering much higher values than scrap-dealers, bought and refurbished more devices, added people to their customer care and marketed their site. According to them, only about 5% parts are non-recoverable spares that need to be recycled into metals and plastic and not a single per cent goes to waste. In three years since Karma Recycling came into being, the number of gadgets it receives has seen a 6-fold increase from an average of 300 gadgets per month in 2013, it tripled in one year to touch 900 gadgets per month in 2014. Today Karma Recycling is handling an impressive 1800 gadgets per month (Goklany, 2015).

The print media, newspapers and magazines, have features, news stories, photo features, city pages and columns on environmental issues. Radio and television carry public education advertisements on maintaining a clean environment and seeks the cooperation of the citizens in improving life in the cities, towns and villages. Radio and television have become important mass media for public interaction and debate on issues on the environment. These media use a wide variety of programme formats such as talks, commentaries, discussions, slogans, plays, quiz, songs, interviews and question and answer sessions with officials of various services including housing, transport, water supply and sanitation, telecommunication, and energy (Prasad, 2009b).

Conclusion

Developing countries like India have demonstrated an ecological consciousness and continue to strive to find solutions to the complex global problems of climate change. According to the BBC, India is a front runner in green technology and has invested almost ten billion dollars which is largest among any of the other major world economies. A relative newcomer in the wind power industry compared to Denmark or the United

States, India has the fifth largest wind power capacity in the world. There is a growing demand to stop trading in carbon credits which rewards polluters to move to climate justice to ensure greater cooperation between the developing and developed countries in a bid to stem the challenges of climate change in a global context.

India has encouraged value systems that emphasise the importance of "responsible consumption and production" one of the 17 U.N. Sustainable Development Goals (SDGs) adopted by countries on September 25, 2015. The cultural traditions have been very cautious of unsustainable consumption patterns and lifestyles and seek to encourage capacity building among people for sensitivity, individual and collective action on the environmental conservation. India's Intended Nationally Determined Contributions (INDCs) to the UN Framework Convention on Climate Change (UNFCCC) is committed to cut the emissions intensity of GDP by 33-35 per cent by 2030 from 2005 levels. The INDCs, which lay out the blueprint for tackling climate change, emphasised eight key goals - sustainable lifestyles, cleaner economic development, reducing emission intensity of GDP, increasing the share of non-fossil fuel based electricity, enhancing carbon sink, adaptation and mobilising finance, technology transfer and capacity building. India has set out eight goals in this regard:

♦ To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation.

♦ To adopt a climate friendly and a cleaner path than the one followed hitherto by others at corresponding level of economic development.

♦ To reduce the emissions intensity of its GDP by 33 to 35 per cent by 2030 from 2005 level.

♦ To achieve about 40 per cent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030 with the help of transfer of technology and low cost international finance including from Green Climate Fund (GCF).

♦ To create an additional carbon sink of 2.5 to 3 billion tonnes of CO_2 equivalent through additional forest and tree cover by 2030.

♦ To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management.

♦ To mobilise domestic and new and additional funds from developed countries to implement the above mitigation and adaptation actions in view of the resource required and the resource gap.

♦ To build capacities, create domestic framework and international architecture for quick diffusion of cutting edge climate technology in India and for joint collaborative R&D for such future technologies.

The mass media must play an important role in creating awareness, shaping public opinion on development and build capacities to shape people as responsible citizens. The mass media must enlist community support to bring about a fundamental shift in societal mores, individual attitudes, values, and lifestyle to stem the spiralling trends of consumerism and wastage promoted by the global economy. A variety of policies are needed to reverse the environmental damage and improve the ecosystem. India's strategy of mobilizing human capacity for mitigation, adaptation and recovery through a judicious combination of traditional values and modern technologies will contribute in solving the global problem of environment destruction and climate change confronting the planet.

References

Anandan, A., Pradhan, S. K. and O.N. Singh (2015). 'Aerobic' rice cultivation reduces water usage, *The Hindu*, September14, 2015, p.16.

Banwari (1992). *Pancavati: Indian Approach to Environment*. (Tr. Asha Vohra). New Delhi: Sri Vinayaka Publications.

Dey, Soumik (2014). 'Cradle. Now. Grave', *The Week*, August 24, 2014, pp.24-32.

Goklany Tania (2015) 'How Karma Recycling is Giving Life to E-Waste', Retrieved on September 23, 2015 from http://sites.ndtv.com/breathe-clean/how-karma-recycling-is-giving-life-to-e-waste?pfrom=home-campaigns.

Krishnamoorthy,Suresh (2015). 'Farmer weaves saree from rice straw', *The Hindu*, April 13, 2015, p.5.

Mohanty, Abhijit (2014) Food security, courtesy Odisha's tribal women, Retrieved on

04 November 2014 from http://indiatogether.org/eco-village-development-project-commons-food-security-in-tribal-odisha-agriculture.

Parsai, Gargi (2015). 'Demonstrate technology used to mitigate impact of climate change', *The Hindu*, October 1, 2015, p.14.

Prabhu, M. J. (2014). "Farmers groups in Kerala run their own markets, eliminate middlemen", *The Hindu*, February 21, 2014, p.17.

Prasad, Kiran (2001). Indian Tradition of Ecological Protection and Religion, *Man and Development*, Vol. XXIII, No.4, pp.64-75.

Prasad, Kiran (2007). Eco-religion to Political Ecology in India: Feminist Interventions in Development, *Women in Action*. No 2. 2007.

Prasad, Kiran (2009a). *Communication for Development: Reinventing Theory and Action, Vol. 1- Understanding Development Communication*, New Delhi: B.R. Publishing Corporation.

Prasad, Kiran (2009b). *Communication for Development: Reinventing Theory and Action, Vol. 2- Advanced Development Communication*, New Delhi: B.R. Publishing Corporation.

Prasad, Kiran (2013). "Environmental Communication from the Fringes to Mainstream: Creating a Paradigm Shift in Sustainable Development" In Jan Servaes (Ed.). *Sustainabl e Developmen t and Green Communicat ion: Asian and African Perspectives*, USA**:** Palgrave MacMillan.

The Hindu (2015). Environment Minister Prakash Javadekar announces India's INDCs, *The Hindu*, Retrieved on October 2, 2015 from http://www.thehindu.com/news/national/environment-minister-prakash-javadekar-announces-india-indcs/article7715535.ece?ref=relatedNews.

Urry, John (2011). *Climate Change and Society*, Cambridge: Polity Press.

Vadakumchery, Johnson (1993). "The Earth Mother and the Indigenous People of India". *Journal of Dharma*. Vol XVIII, No1.pp 85-97.

INTRUSIVE ADVERTISING IN PUBLIC PLACES DROWNING ESSENTIAL INFORMATION

Yaseen P. V.

Every day, our countless media-newspapers, magazines, books, radio, film, TV, the internet and the like-cough up billions of words, visuals, videos, and sound bites. The sheer quantity of information the information that gushes out of our media is a mind boggling one.

Indeed, we are beginning to feel the phenomenon of "information overload" (Farace: 1977). Every moment, the world is being saturated with oceans of information which is beyond the capacity of humans to process, comprehend or make use of.

More is not always better especially when mountains of messages obscure the vital information that we require for survival in the post modern society.

Our dining table is so filled with countless vessels full of side dishes, snacks, and other spicy items that we desperately search for what we really need to eat. Again, the situation could be compared to that of ant which confusingly scrambles here and there in a sweet shop in an attempt to eat up heaps and heaps of sweets of all kind.

The Need for Vital Information

Vital information is the "active information" that will immediately affect the lives of people in some way. People make use of such essential information for their very survival or for improving their existence.

When we look around our public places, we could realize that the urgent need of the present time is not more information sources that churn out oceans of trivial information. Rather, we are in need of few sources that could efficiently deliver to us the grains of vital information essential for our survival.

The tsunami disaster on December 26, 2004-which created havoc in many countries of South Asia including ours-provides a shocking example of human failure in providing the vital information about the

Yaseen P. V., Associate Professor, Department of Communication and Journalism
University of Kerala, Kariavattom Campus, Thiruvananthapuram, Kerala 695581
Email: yaseenpv@gmail.com

impending danger well in advance. Indeed, none of our media-supported with sophisticated radars, remote sensing satellites, radio and television-could disseminate the few bits of vital information about the advancing tsunami. A sentence or two, if received in time, could have saved thousands of lives.

Indeed, communication is the most fundamental tool of the survival of humanity (Casmir: 1978). What we really need is a system to disseminate essential information free from the distraction of trivia of all sorts including the chaotic advertising spreading all around in our public places.

Intrusive Advertisements in Public Places

It could be said that the dense smoke of advertising is spreading rapidly in our public places and our postmodern society is beginning to suffocate from its pollution. Indeed, our highways, bus stops, airports, railway stations and the like are being contaminated by the waste of aggressive advertising of all kind.

Today, every moment, countless advertising of all sorts a-print, audio, visual, and audio-visual-are ruthlessly poured out into the public places by all types of media. The citizens are often involuntarily getting exposed to the chaotic bursts of advertising including the intolerable, high-pitched blasting from the loud speakers.

Indeed, the citizens are compelled to endure the visual and sound pollution by the mind blogging waves of countless forms of advertisements.

Many often, in our public places like bus stands and railway stations, people are forced either to read or listen to unwanted advertising messages while seeking essential information to meet their immediate needs. For instance, a passenger may be seeking to locate the police outpost on the railway platform but may find it hard to recognize one amidst the confusion imposed by all the innumerable and distracting advertisements all around.

The Drowning of Vital Information

Many of the useful information on the signboards at the railway platform often get drowned in the chaotic, much flashy, advertisings that go along with them. Indeed, information overload has come to grab at the very throat of our postmodern society.

Almost all our public places where people are primarily seeking essential information many often have to encounter the polluting smoke of advertising of all kind.Even at the hospitals, one could find distracting advertisements hampering the smooth access of essential information the patients and their helpers seek.

Distraction from Essential Information

While seeking important information in our public places like the bus stand or the railway station, we often get distracted by the chaotic world of unlimited number of advertising all around. At many places, even the information signs that we seek could be hard to locate. Even when we could locate them we may find that the information presented is hard to comprehend because of the dominance of advertising that goes along with the message. Many often the essential information is pushed into the background by the sheer dominant nature of the advertisements.

Totally Drowning the Vital Messages

In our busy public places, seeking an essential piece of information is almost like locating the legendary needle in the haystack. The big heap of countless advertising often drowns the important information that we desperately seek.

Most often the advertising trash in public places obscures access to information that people really need to meet the various needs in their everyday life.

The Beard Outgrowing the Head

Undoubtedly, in public places, we have to give prominence to information that are immediately useful to the public. Such vital information has to be highlighted for display. However, we often have to encounter just the opposite in almost all our public places. Even in our bus stands and railway stations we could see large chunks of advertising brilliantly displayed along with essential information. The insignificant beard became so overgrown that the head has become hardly visible at all.

It appears that the brand bullies have taken over our public places to boost their trade harming the public interest of the citizens.

Advertising Hazardous to Public Safety

Besides, many such advertisements are even hazardous to public society. It is a matter of great concern that we could encounter distracting advertising in, around, and along our roads and highways. Such visual displays, many often utilizing sex appeals, are likely to distract the concentration of the speeding drivers and even pedestrians making a crossing.

Preventing Involuntary Exposure to Advertising

The time has come to seriously consider the idea that getting exposed to advertising of all kind shall be made a voluntary activity. One may freely express whatever one likes, and the other one shall always

have the freedom to listen or not to listen. No citizen shall be forced to listen or view any kind of commercial messages especially in public places.

Creation of Advertising-free Zones

Let those who are enamored by the ultimate advertising jump themselves into that blissful pool but commercial messages shall never be forcefully thrust into the consciousness of unwilling individuals. To accomplish this, the authorities can think of even creating advertising-free zones in public places.

Banning the Mixing of Essential Information with Commercials

The relentless blasting of commercials in our railway stations and bus stands has already become an unbearable phenomenon for the commuters. At Earlier times, commercials are suspended to make the announcements of public information. Many often, as the postmodern society progressed, the current practice is to broadcast both simultaneously. This needs to be strictly banned by law.

Restricting the Information-Advertising Ratio

To prevent the commercial message dominating the essential information, it was a good old way to keep reasonable advertisement-information ratio. Most often the ratio is 3:1 in favour of the Advertising people: the advertisements are always bigger in size. Therefore, in case information and advertisements are mixed, the dominance of the commercial ads has to be brought down by giving at least 50 per cent of space for the public information section. The authorities have to formulate appropriate laws and regulations to enforce this.

The Need for Social Vigilance

It appears that people in general and communication experts in particular are yet to awaken to the utter gravity of the problem involved. People are often carried away by the charm of "more": they often believe that more is always better.

Undoubtedly, we have to focus our conscious attention to this problem involving the drowning of essential information in the sea of trivia and find effective solutions to minimize its harmful impact on our postmodern society which is more information-oriented than ever.

Ruthless use of intrusive advertisements shall not be allowed to thrive by misusing the privilege' of freedom of expression. The urgent need of the time is to formulate and implement ways to save the socially relevant essential information in public places in the ocean of intrusive advertisements.

References

Budd, Richard W. and Brent D. Ruben. 1979. Beyond Media, New Jersey: Hayden Books.

Bourdieu, P. 1996. The Rules of Art, California: Stanford University Press.

Casmir, Fred L. 1978. Intercultural and International Communication, Washington DC: University Press of America.

Cherry, Colin. 1978. World Communication, Chichester: John Wiley.

Curran, J. and Seaton J. 2003. Power Without Responsibility, London: Routledge.

Dance, Frank E.X. and Carl E. Larson. 1976. The Functions of Human Communication, New York: Holt, Rinehart, and Winston.

Farace, Richard V. 1977. Communication and Organising, Massachussetts: Addison Wesley.

Fidler, R. 1997. Mediamorphosis: Understanding New Media, California: Pine Forge Press.

Hochschild, A.R. 1983. The Managed Heart, Los Angeles: University of California Press.

Jenkins, H. 2006. Convergence Culture, New York: New York University Press.

Klane, John. 2013. Democracy and Media Decadence, Cambridge: Cambridge University Press.

McQuail, Denis. 2010. Mass Communication Theory, London: Sage.

A REVIEW ON SCIENCE CLUBS & PUBLIC UNDERSTANDING OF SCIENCE AND TECHNOLOGY COMMUNICATION (PCST)

Brinder Kumar Tyagi, R. Gopichandran, R. Sreedher

A Review on Science Clubs & Public understanding of Science and Technology Communication (PCST)

Introduction

The dynamics of science clubs as robust platforms for communicating science and technology have aligned with several local level considerations. This is in the context of the fact that people need to understand the pervasive nature of science and technology today more than ever before, as these two aspects influence all aspects of life. In all democratic forms of government an increasing number of people are involved in decision making at the local and the national level. Such scientific and technological issues as nuclear energy, global warming and climate change, preservation and conservation of biodiversity, genetically modified crops, etc., dominate the development mosaic and need to be debated before national policies are formulated. To generate meaningful and effective debate, the public needs to be well informed and updated so that informed decisions can be made. The debate should not remain confined among elite groups but emerge with the direct involvement of people from all walks of life. A robust decentralised approach to enhance public understanding of science and technology is therefore essential.

The need

India's manifold diversity including cultural, social, religious, linguistic and regional is unparalleled in the world. Importantly nearly 65 % of population are rural and a significant part of the population is not literate. The reach of mass media, except radio, is still limited. These ground realities present a formidable challenge to a science communicator. In such a scenario, any centrally planned strategy employing modern means of communications does not stand much chances of success. Any strategy to be effective should be 'participatory and in the local language through the familiar channels of communication'.

Brinder Kumar Tyagi, Scientist F, Vigyan Prasar, Department of Science and Technology, A-50, Institutional Area, Sector-62, NOIDA - 201309, U.P. Email: bktyagi@vigyanprasad.gov.in, tyagibk@gmail.com

R. Gopichandran, Director, Vigyan Prasar, Department of Science and Technology, Government of India, New Delhi

Science clubs and networks

Across the world, a variety of science clubs and networks of science clubs are active. These clubs are supported by national governments and even such international bodies as the UNESCO. Some networks of science clubs have significantly long histories since the beginning of nineteenth century. Some such networks of science clubs worth mentioning are from America, Canada, STEM clubs of UK, Federation of Young Farmers Clubs, VIPNET (expand it), DNA and Eco-clubs in India. These clubs, for example, VIPNET Clubs have been involved in some of the major campaigns built around celestial events like solar eclipses, biodiversity, water, etc., that has proved the role the clubs can play in taking science to the people. These involve debates, surveys and demonstrations, performing experiments and answering the queries of citizens at the local level. Over the years clubs' activities have been transformed essentially into people-oriented activities. They are not confined to formal classroom or laboratory experiments, nor do they provide any bookish or theoretical knowledge; rather they invite and involve people to see, do and learn things by themselves and find out the truth. Science club activities have accordingly established a strong link between science and the community. They have not only supplemented formal science education under various circumstances but also played a key role in promoting scientific literacy among the common people.

Scope of this paper

Interestingly, the 1993 saw several science clubs especially in Indian schools reach-out to communities for two very important purposes. To deliver the benefits of formal science learning to the community so as to enrich the latter's prospective on science.

The second approach was to gather insight from the community to re-enforce application of science in daily life as an example of learning through formal system. This was, particularly for the benefit of the children in schools.

It is pertinent to mention that theoretical and empirical research in science communication or Public Understanding of Science (PUS), has relatively a short history compared to long standing practice of PUS (Massimiano Bucchi 2008). However, since 19th century the science club has always been a robust mechanism to promote science in general and science literacy in particular among students and lately, in the community as well through outreach programmes.

In total, as part of literature survey about 147 research papers, articles, reviews, concept papers, opinions, editorial, reports were reviewed

from a wide variety of sources like archival records of UNESCO, books, research journals (PUS and science education, media studies), manuals of science clubs, proceedings of seminars, symposia's, reports of projects and workshops, dedicated websites, blogs, popular articles and informal science learning websites etc. Through the literature survey, the evolution of science club movement has been traced along with how the priorities, focus and the structure of science clubs   has been influenced time to time with science education priorities and the notion of science popularization, which has shifted from scientific literacy to public understanding of science and finally to people engagement in Science and technology.

Evolution of Science club movement

The review considers a wide spectrum of   literature, tracing the evolution of science club movement since 18 century, when science became the enterprise of enlightenment. Since then, as the optimism grew about science, the efforts to popularize science multiplies. As the idea   of the modern science spread to other parts of the world, association for the advancement of science or similar bodies were formed specially in many industrial European and North American and finally in Latin American and Asian Countries,. In all such countries, especially for the younger generation, the science clubs were used as a vector to popularize science and creating scientific attitude, a term synonymous with scientific temper as used in Indian discourses.

A   comparative study of Science Clubs as portrayed by Current Science Magazines article was made by Ethel L Roberts[8] in 1932 at University of Wisconsin by analysing 35 separate articles written on the subject "Science Clubs" representing science club movement from 1914 to 1931. The heading, science clubs, appeared in 35 articles in four magazines (School Science and Mathematics, Science Education, Current Science and the Chemical Leaflets) reflect the nature and the focus of the activities of the clubs i.e. General Science Clubs, Chemistry Clubs, Biology Clubs, Birds Clubs, Service Clubs, Vocational Clubs, Wireless Clubs etc.

In the journal, *School Science and Mathematics*, search with key word "Science Club", showed 2100 results in less than .5 second (Surfed on May 15, 2014). Similarly International Journal of Science Education (Tylor Francis online) showed 92 results in less than .25 second(Surfed on 16 May 2014) The search on Google Scholar showed about 380,000 results (0.04 sec) with key search word " Science Clubs" (Surfed on 16 May 2014).

It was in 1941, the popular science journal Nature[9], the title, "News" mentioned about the Science clubs of America and the kind of activities being undertaken by them. These clubs exist not only in the United States

but also in Puierto Rico, Hawaii, the Philippines, British Virgin Islands, West Indies, Alaska, Canada, and even Portugal.

Role of UNESCO

The UNESCO document (UNESCO/ED/Conf. 9/4, Paris, dated 2 December 1949)[10] gave an excellent descriptive account of the "Science Club Movement". It is a historical document in the sense as it is the record of a meeting of representatives of youths & students organizations, held at UNESCO, Paris- 8-9 December 1949 and recognized the value of science clubs "in encouraging young people to spend their leisure time in constructive way". A distinction between scientific societies, associations and science clubs is also suggested as in scientific societies, the members are specialists. The clubs are envisaged as a means of arousing interest in, and encouraging the study of various fields of science among amateur, especially young people who find in science pleasure, adventure, and opportunities to serve humanity.

Importance of Science Clubs

The importance of Science Club can be traced in the document (UNESCO/NS/PSI/3), referring to speech of Davis Watson, Director of Science Service, Washington DC (Paris June 25th 1949), acknowledging that "What grass root are to agriculture, science clubs are to science education", "if the future belongs to youth and to science, then there is a more important place for science clubs in the scheme of things that are to be". This report also compiled a list of some important clubs along with their structure, activities and method of communication. Some important networks of club which appeared in the list were specially Science Clubs of America (more than 13000, catered by SCIENCE SERVIVE). According to Science Club of (SCA) America handbook, the clubs affiliated to this network were from Africa, Argentina, Bolivia, Brazil, Britain West Indies, Canada, China, Egypt, England, France, Germany, Holland, India, Iraq, Mexico, Norway, Peru, Portugal, USSR and Venezuela. The details of a few clubs affiliated with SCA from the countries like Egypt (Science Club of Assiut, College, Egypt) and France (Astronomical Youths of France founded in 1945) are also mentioned in the document.

Another important network mentioned in this report is 4-H club movement, a bigger club movement than SCA with large number of members, majority of them were Negro boys and girls. The 4-H clubs have members outside USA as well. A detailed account of the origin, aim and objectives of the movement and how it was different from ASC has been given. "The fundamental principle behind this activity was to extend agriculture education to young people in the rural area", The report also mentioned the details of 4-H clubs that go by the same name or resemble along with the number of members present (1948) in Finland, Jamaica, West Indies, Union of South Africa, Philippines, Korea, Germany, Lativia,

Venezuela, Cuba and Canada. The organisations for rural youth, similar to 4-H clubs, but called by other names in England, Norway, Sweden, Denmark, China, Spain, Siam and Australia are also referred in the document.

UNESCO, during the Second regional conference of National Commissions, held in Bangkok (Nov-Dec 1951), developed a base paper "Methods and techniques for popularizing science-Unesco"[15]) on the current status of the clubs and societies (from 1949 to 1950). It gives a clue about the nature, structure and activities of the clubs "The clubs are societies of young people meeting for scientific studies or research independently of school work. Some operate within the school, other recruit members without education at restriction". Regarding importance of Science clubs, paper further state "The importance of science club is very great, the youth should have the opportunity of acquainting themselves with the questions which should be part and parcel of general education". Regarding activities, "The programmes vary from club to club and ranges from experiments by individual to group excursions and visits to factories; they include competitions as well as lectures and discussions. In addition to their own bulletin, a number of clubs published weekly or monthly reviews. The role of the adult was minimal as stated "the organisation in most cases done by the members themselves, with a teacher or other adult director in the background exercising only general supervision. However, teachers, scientists and scientific organisations do play a very great deal to stimulate and encourage the clubs".

UNESCO clubs

Another important network of clubs is UNESCO Clubs, a group of people of all ages, from all walks of life, who share the UNESCO ideals, seek to disseminate it and associate themselves with the work of the international Organization. Clubs for UNESCO: a practical guide, revised version published in 2009, is a manual for those interested in starting or managing a UNESCO club. There are nearly 4,000 UNESCO clubs worldwide[22], (The first version of the manual was published as "UNESCO Club in 1969 Manual[23]The activities of a UNESCO Club vary in accordance with the age bracket of its members, its focus of interest, and mainly the financial resources available to it. Activities include cultural programmes, organization of exhibitions and planting trees and protection of environment.

Science teaching and science clubs

Davis Layton[24] in paper, "UNESCO and Teaching of Science and Technology"[24] discussed the role of UNESCO in S&T education with special concern to developing countries, which in one way or the other influenced the structure, functions and the programme and activities of the clubs. It provides a very logical and chronological account of the development of

science education which finally shaped the science clubs and informal science learning movement across the world. In the paper he highlighted the efforts of UNESCO including development of a series of resources including much influential resource book. The UNESCO Source Book for Science Teaching (1956), emphasizing the teaching of basic sciences. However, the out-of school science and technology activities for young people involving science fairs, clubs, camps and Olympiads remain an important focus of encouragement. The paper also discussed how in late 60s, with the end of the colonial rule the focus of education was shifted to relate education to real-life situations and how UNESCO responded to these contextual changes and produced a wide variety of literature for the promotion of integrated science teaching and increased support for technology as a component of general education. The result of the same was six volumes on New Trends in Integrated Science Teaching". As further observed by Lyton, in 60s the emphasis remained on the teaching of the basic sciences, because technology was seen largely 'simply applied science'. But it was after the radical report of the International Commission on the Development of Education, chaired by Edgar Faure, established by UNESCO in 1971, the concept of technology was incorporated. Further, following the World Conference on Education for All (Jomtien, 1990) and in recognition of a need for 'a world community of scientifically and technologically literate citizens', a major initiative, Project 2000+, was launched by UNESCO in 1992, which recommended that "by 2001 all countries should have in place appropriate structures and activities to foster scientific literacy and technological literacy for all". The focus of the activities was again changed to promoting science and technology literacy.*"

Popularization of Science

Popularization of Science and Technology: What informal and formal Education Can Do?"[25] an online compendium was published which contains a bunch of papers which were presented at a conference in September 4-9, 1989 on the above mentioned theme. The conference was a premise on the need to address the issue of scientific and technological literacy and examine "how non-formal and informal education can contribute to helping people in achieving the same to function effectively in a society in which dramatic scientific and technological changes are occurring at a very fast rate". In the report, it was observed that "though the formal education is playing its role in S&T popularization, but it is not in a position to develop an outreach to people who have already joined the economy, but facing new needs of S&T". For this "it is essential to explore the role of other modes of education, viz non-formal & informal education(PP 28). It was only after 1989, the pace of informal science activities was enhanced and the literature on the same makes a beginning as an empirical field of inquiry. A number of national agencies also come into existence. The compendium contains about 13

individual papers and 10 country papers. Cheng Donghong of China was of the view that "it has been proved that out-of-school activities in S&T is indeed an effective means to popularize S&T among people and complement formal education.

Tyagi B. K[26]. 2014(Science Education, Vipnet News(12)4 April 2014, pp1-3, in article "Science Education in India" also highlighted the importance of science club as "the formal education system does not provide much scope for activities as the syllabi is loaded with content. In this context, the non-formal mode of education would also assume significance, wherein children could undertake investigation projects through a suitable platform like science clubs at schools with some minimal facilities" In the article the evolution of science education in general and in India to be specific and how the same has been influenced from the development around the word. According to him "It is surprising that science in school curriculum did not find any important place in the beginning of twentieth century. Education of science was imparted only at the university level. It was in 1953 that it was made compulsory to include science as an independent subject in school curriculum". It is further observed that "till mid-seventies, a discipline-wise approach for teaching science was recommended (Indian Education Commission set up in 1964). There were separate text book for physics, chemistry and biology. Later, science was considered as part of environment studies at primary level and as composite subject at upper primary and secondary stage. In 1986, the National Policy on Education considered for the first time, the teaching of science at secondary stage as a single subject, rather than three separate disciplines. All the developments in education planning and research like shifting of focus in objectives, content, have a clear bearing on structure and working of clubs in re-discovering their new roles and functions with change scenario.

The genesis and the growth of science clubs in India

The genesis and the growth of science clubs in India was examined by Dr. Sabyasachi Chatterjee[27](2013) which had its roots in National Movement to fight the colonial exploitation and inculcate scientific temper , the term coined by Nehru (Discovery of India). The society, at that time was seen by elites educated in modern western science, as steeped in obscurantism, superstitions and native culture lacking rational thoughts. (TV Venkateswaran)[28]. The process of forming science clubs was started before the independence. But after independence the numbers of these clubs increased. However from 1930s-1940s to the present days the character of these science clubs did not remain the same. Evolution has been made in the activities, participations and expansions of science clubs." The aim of a science club is to make people scientific in their attitude to life. To reach this goal the science clubs organized activities

like model-making, sky-watching, science exhibition, science quiz, discussion etc. To spread their ideas, these clubs publish periodicals and pamphlets on science. These clubs try to expose the so-called supernatural event through scientific clarification. The process of establishment of science clubs was started in 1931. The name of the first science club was Bangiya Bijnan Parisat. The paper *new methods of Science communication being used by clubs (Net Magazine)* has covered some important aspect of Science club movement in India which can be grouped as the chronological history of science clubs in India in general, and Bengal in particular, the changing role of science clubs since pre-independence time and the role of science education in community. The paper also highlighted the point as now the science clubs has become more organized and getting support, both from government and non-government sector and playing the role to bridge the gap between information and action. To some extent, as stated, the clubs are also playing a role of pressure group for reforming science education and other science and society related issues. Some gap areas have also been pointed out as the lack of democratic structure and decreasing interest of children in science clubs' activities. However, Chatterjee concluded with an optimistic note on the future of science clubs as "The present history of the changing role of science clubs shows that though limited in extent the sojourn for communicating science is going on. Hope this effort will be developed both quantitatively and qualitatively in future".

Network of Science clubs in India

In India there are two major networks of Science clubs VIPNET Clubs of Vigyan Prasar, Department of S&T *(WWW.vigyanprasar.gov.in)*[29], and Eco Clubs of Ministry of Environment and Forest *(MoEF, Annual Report 2012-13)*[30]. Initially VIPNET network members were motivated to take up scientific activities and contribute towards its cherished goals of achieving a scientific society of the country. The present strength of the clubs is about twelve thousand present in all the States of the country. The network member has been involved in some of the major campaigns built around the celestial events like solar eclipses, Biodiversity, Water etc. (Tyagi B K,Vipnet News 2010) Over the years VIPNET clubs activities has been transformed essentially into people-oriented activities, not confined to formal classroom or laboratory experiments, nor do they provide any bookish or theoretical knowledge; but they invite and involve people to see, do and learn things by themselves and find out the truth. Today the science club activities have become a strong link between the science and community. (VIPNET Brochure 2009) A self study undertaken by Vigyan Prasar suggested "that science clubs have played a significant role in inculcating an interest and build understanding about world of science among students". "Majority of students perceive major benefit of Science Clubs in providing knowledge which is not available in their routine

syllabus". Around 80 % students opined that Science Clubs are giving information beyond syllabus" (Kinkini et al 2013)[31]

Eco-Clubs of National Green Corps is a programme of the Ministry of Environment and Forests, Government of India covering around 1,20,000 schools in India. "The aim of Eco Clubs is to introduce environmental concerns and good practices to school children to make them actively involved and to be aware of the need to protect".[32] In a paper Nina S.Robert (2009)[33], documented and evaluated the effectiveness of eco clubs and assess the organizational framework of 97000 clubs after an extensive review of secondary data and two focus group interviews at two locations. The findings show that the "partnership programme developed with schools and NGOs to propel eco-clubs concept forward contributed greatly to their ability to provide ongoing quality programmes for the students". However suggested" "different agencies should work cohesively". A similar study was conducted in Ibadan(Nigeria) to assess the contribution of Youth Environmental Scout (YES) clubs towards sustainable environmental programme in selected schools. (G. R. E. E. Anaa 2009)[34]

DNA clubs (DBT's Natural Resource Awareness clubs is one more important network of clubs. It is the flagship school outreach programme of the Department of Biotechnology, Govt. of India, comprised of 190 clubs in 20 States, involved in exploring the world of Bioresources and understanding how human welfare drive strength from sustainable utilization of bioresources[35].

STEM clubs allow children to explore, investigate and discover STEM subjects(i.e. Science, Technology, Engineering and Mathematics), in a stimulating learning environment, away from the constraints of the school timetable or a prescribed curriculum. They allow pupils and their club leaders to work together and explore many different ideas and activities. Although they complement the curriculum, STEM clubs are not designed to be about writing tests date or exams. Activities may involve practical experiments, investigation, discussion and reflection. These clubs are quite popular in Europe and USA. Three studies provide an insight about the impact of STEM clubs on student attitude toward science and its relationship with student opted the STEM subject for higher studies. The first study, though limited in scope conducted by Alpaslan Sahin[36], in which students were encouraged to take part in STEM related clubs and found a relationship between the number of students of STEM clubs participated and their choice of STEM in higher studies and found a positive co-relationship. Results suggest that there is a STEM achievement gap in the success and persistence of students who do and do not participate in STEM-related extracurricular clubs"(Michael A Gottfried)[37]

The report of STEMNET" An evaluation of the impact of STEMNET's on Pupils and teachers, highlight the importance of science clubs, though narrow in perspective as to increase number of enrolment of students in STEM major. The study concludes that the programme has increased interest of engagement in STEM concepts, topics and understanding, also increased awareness about the scope of future studies in STEM and employment opportunities. A number of studies have proved empirically the role of clubs in promoting the interest and engagement in science.

Allan Feldman, Kelly Pirog (2011)[38] reported on the success of a programme on teachers' and students' participation in authentic science research in out of school time science. It was reported that the "teachers who had very little formal science education can gain the expertise needed to mentor the children and the teachers were able to gain the knowledge and skills to facilitate the children's legitimate participation in authentic scientific research. On the other hand, children gained the methodological and intellectual proficiency needed to contribute useful data and findings to the scientist's research program".

Informal Science

In 1999, the Board of the National Association of Research in Science Teaching (NARST) established an Informal Science Education Ad Hoc committee, co-chaired by Lynn Dierking[39] and John Falk to focus on the organization's positioning in regard to out-of-school science education. After 2 years of work, the committee composed a policy statement which defines this arena of research and describes a variety of out-of-school environments in which science learning occurs, identifies issues related to conducting research in this area, and makes recommendations for building a community of researchers in this field and for facilitating opportunities for collaborative initiatives with other research areas in NARST. The statement defines learning in out-of-school contexts means "learning that is self-motivated, voluntary, guided by the learner's needs and interests, learning that is engaged in throughout his or her life" In practice, Informal science education is the science teaching and learning that occurs outside of the formal school curriculum in places such as museums, the media, and community-based programs. By this definition the science club is also a place of informal science learning. In America, "TheCentre for Advancement of Informal Science Education" (CAISE) provides resources for the informal science education community.

Anita Krishnamurthi[40] of Afterschool Alliance, in the article "Informal Science Learning and Education: Definition and Goals" compared the informal science learning and after school science learning, as how one is more structured as compared to other.

Science museum and clubs

Though science clubs has been playing a important role in informal science education, most of the studies undertaken are mainly relating to the role of science museum and science centre except a few on STEM clubs. Laura M. W. (Martin 2004)[41] mentioned in his paper "An emerging research framework for studying informal learning and schools Science Education" recognized the fact that science centres and other informal educational institutions can play a role in the reform of science, technology, engineering, and mathematics (STEM) education, along with several major research and professional programs. The paper discussed one such effort by the "Center for Informal Learning and Schools" (CILS), a collaboration of the Exploratorium, the University of California, Santa Cruz, and King's College, London and stressed the need for a theoretical framework based on socio-cultural theory to link discussion of varied efforts characterizing science learning in informal settings. The paper specially highlights the role of museum in informal science education and reviewed the work that has been conducted in non school settings using examples from research conducted by the Center for Informal Learning and Schools.(Inc. Sci Ed88(Suppl. 1):S71–S82, 2004)

K Falkenberg et al (2006)[42] in their report "Science in Afterschool Literature Review", developed by SERVE Center for the National Partnership for Quality Afterschool Learning, attempted to consolidate the effort supported by the government in USA in terms of grant, policies, studies conducted and the evaluation of the projects supported. The report recognized the ever-increasing pressures for academic accountability and school improvements as afterschool programs are seen as an important strategy for improving student outcomes. According to the report only recently, since the afterschool movement has evolved as a field (Friedman, 2005), there has been an increased awareness of the need for greater accountability and measure of afterschool impact on students. A number of studies have been cited as evidence to prove the point that students who participate in afterschool programs achieve higher grades and higher standardized test scores than the students who did not participate in afterschool programs *(Hamilton & Klein, 1998; Huang, Gribbons, Kyung, Lee & Baker2000); (Schinke, Cole, & Poulin, 2000; Tierney, Grossman & Resch, 1995; White, Reisner, Welsh, & Russel, 2001).* Other outcomes such as improved attitudes toward school, higher expectations for school achievement, better work habits, and higher attendance rates, especially for low-income students, have also been documented (Brooks, Mojica, &Land, 1995; Posner & Vandell, 1994; Schinke, Cole, & Poulin, 1998; Tierney et al.,1995).

Justin Dillon et al (2006)[43] in review of literature on "The value of outdoor learning: evidence from research in the UK and elsewhere"

summarizes the key findings of a review that critically examined 150 pieces of research on outdoor learning published between 1993 and 2003 (Rickinson et al., 2004). The review was commissioned by Field Studies Council and partner organizations in response to the growing concern that opportunities for outdoor learning by school students in England have decreased substantially in recent years (Harris, 1999; Barker, Slings by and Tilling, 2002). Research indicates that fieldwork, properly conceived, adequately planned, well taught and effectively followed up, offers learners opportunities to develop their knowledge and skills in ways that add value to their everyday experiences in the classroom. They observed that the evidence from research carried out around the world suggests a wide range of beneficial impacts on participants.

David A. Ucko (2010)[44] conducted a study "*The Learning Science in Informal Environments (LSIE)"* commissioned by The National Science Foundation (NSF) to synthesize the growing body of diverse research underlying informal science learning with a purpose to establish a base for future research, to provide evidence-based guidance for those developing and delivering informal learning experiences, to broaden the definition of "learning" beyond that typically used in formal education, to encourage knowledge sharing across the heterogeneous informal science education field, and to provide a measure of external validation for the value of learning in informal settings. In the report, the institutional framework and support system with achievements has also been discussed. The report conclude that LSIE represents an important step for the informal learning community and expressed the view that the Museums will be benefited from the report which offers an evidence base for guiding informal science learning.

In June 2011 the WellcomeTrust[45], UK commissioned a study to characterise the value of informal science learning to science education focusing on children and young people (age up to 19) with an intention to provide a better understanding of the scope of informal science learning, its theoretical base and the types of change it can bring about in the understanding of and attitudes towards science. It was expected that the study will come out with recommendations for robust methods for evaluating the impact of informal science learning, based on an analysis of practice in the field, and how to reach deprived learners, schools and families. The report attempted to define the attributes of informal learning. Regarding the importance of informal science, it was suggested that "learning should be seen as a cumulative set of experiences that are part of the system"[46], citing (Falk and Needham's research) that "whereas schooling and childhood experience contribute 17% of the variance in adults' science knowledge, adult informal learning experience contribute 39%". The report also gave a current landscape of the subject in UK along with the problems and outcomes.

Karen Hussar et al (2008)[47], prepared a report for Noyce Foundation. Entitled "Toward a Systematic Evidence-Base for Science in Out-of-School Time: (Report), as a result of growing recognition of After-school programs that holds great potential for increasing child and youth literacy and engagement in science. The basic purpose of this report was to review and report on the current state and needs of the after-school science assessment. Although the use of these instruments has contributed to the assessment of after-school science programs, the field now needs to examine critically the most efficacious and efficient means of assessment, whether these assessments should differ across programs, and how they relate to constructs of science learning and program quality.

Jonathan et al (2007)[48] in an editorial, citing a number of references, put up a very strong case for informal science learning as children between the ages of 5 and 16 spend only 18% of their working hours in school (Bransford, 2006). The school presents science to students in a de-contextualized manner and lack apparent relevancy (Aikenhead, 2005; Osborne, Simon & Collins, 2003). In contrast, the knowledge gained in context is remembered and its value is understood. The editorial discussed the state of art of informal learning, the institutions established like Centre for Informal Learning and Schools funded by US National Science Foundation, which is building bridges between out-of-school and school science institution and trying to build on to strengthen this domain. The editorial also referred to a number of research papers dealing in the domain with different prospectives. "Jane Lehr, Ellen Mc Callie, Sarah Davies, Brandiff Caron, Benjamin Gammon, and Sally Duensing approach the mountain from a very different direction - that of the public engagement with science. Their focus is on the role and value of dialogue event as recent research in informal contexts has been dominated by a socio-cultural perspective (Leinhardt, Crowley, & Knutson, 2002), which has tended to focus on the discourse of participants (e.g., Crowley et al., 2001). Lastly, the contributions of Doris Ash, Rhiannon Crain, Carol Brandt, Molly Loomis, Mele Wheaton, and Christine Bennett have been discussed; these raise important methodological issues as far as the assessment of outcome of those projects are concerned. The article ends with a positive note as "Rather what field has done, and to which this volume is a contribution, slowly develop both our knowledge and the tools with which we may use to answer such questions. Gradually, we begin to map out the landscape and, in so doing, taking us nearer to the foothills of a better and more informed understanding of the learning of science in informal contexts."

For improving the science education, there is always a tacit assumption that learning happens only in classrooms and as a result the arguments tend to focus on issues such as curricula. However researchers

who study learning increasingly question these assumptions. The evidence strongly suggests that general public knowledge about science is picked up outside school through various means such as TV, websites, visits to zoo and museum-and even hobbies such as gardening and bird watching. With knowledge of these arguments, the international science journal "Nature[49]" published an editorial on the value of informal science learning in 2010. In the editorial a passionate call has been made for paying more attention, and spending more money on informal science education. The title and heading: "Learning in the Wild, Much of what people know about science is learned informally". Education policy-makers should take note."

Avi Hofstein and Sherman Rosenfeld (1996)[50] in the article "Bridging the Gap between Formal and Informal Science Learning (RP)" used the premise that there is a strong relationship between a student's motivational characteristic and his/her preference for various instructional techniques. The study presented evidence from the research literature that informal science experiences-in school-based field trips, casual visits to informal settings, and the press and the electronic media can be effectively used to advance science learning. It has also been suggested that the learning contexts and learning methods should be mixed, as is being maintained for formal and informal education. In fact compulsory school context should include informal learning experiences. Such blending can help meet the challenges of "Science for All". For researchers, it has been recommended that future research in science education should focus on how to effectively blend informal and formal learning experiences in order to enhance the learning of science.

Molly Phipps (2010)[51] is of the view that the decade from 1997–2007 was transformative for research into science learning in out-of-school contexts. The field transitioned from being driven by individual programmatic needs into a field with a coherent conceptual framework to guide research. He took three peer reviewed journals for his study (International Journal of Science Education - Science Education, and Journal of Research in Science Teaching, all social-science-indexed journals) and reviewed 85 articles and explored links among each study's research paradigms, methods of data collection, analysis, and study settings as a way to examine the field over the last decade. In addition to examining the body of research as a whole, the research published in these journals in 1997 and 2007 is also compared and contrasted to illuminate how the field has changed over the decade. This overview shows a field that is becoming more strongly rooted in a mix of the socio-cultural and constructivist paradigms with a growing acceptance of qualitative research methods and analyses.

"Technologies and Tools to Support Informal Science Learning[52]" in supporting informal science learning is an outcome of a symposium on the same theme. All the authors (about 16 in number coming with different perspectives) asked a common question from eight different perspectives, and answers a set of common questions, i.e. How can learning technologies-tools, spaces, and places-be designed to support learners within and across environments? How do these studies of learning technologies provide insight into how to support learners, not only within settings but also across environments? How can these learning technologies support field-level collaboration across institutional lines of practitioner, researcher, and evaluator? The authors answer some of these questions by presenting analyses of technology used, and research in non-school environments. In their analyses, the authors examine the role of tools that support various learning processes in informal spaces,

Practices and studies on Learning Science

A voluminous document on the practices and the studies concerning learning science outside schools and universities, i.e. what is referred to as informal education, was promoted by the National Science Council of scientific academies of USA (National Academy of Science, National Academy of Engineering and Institute of Medicine). The document is the work of a committee of 14 specialists (like P. Bell, B. Lewenstein et al)[53] who collected, discussed and then organized hundreds of documents on pedagogical premises, places, practices and pursuits concerning scientific informal education. A number of studies have been cited to support the positive impact on the people's knowledge, attitudes and behaviours' through the casual visit to museums, reading magazines, after-school activities, science festivals and any other science communication outreach programme

Science Popularizing In India (2002 -2013)

A chronological account of development of science communication movement in India was documented by Manoj Pattrariya (2002)[54] along with institutional mechanism evolved over the years. Some important nationwide programmes of science communication like Jathas, National Children Science Congress has also been mentioned in the paper. A brief account of dedicated institutions like NISCOM (now NISCAIR), National Council for Science and Technology Communication (NCSTC), Vigyan Prasar and National Council of Science Museums has been mentioned along with their role in science communication. The role of voluntary agencies and the network thereof has also been discussed. The details of media used for various science communication outreach programmes like print, audio visual, folk media, digital media and interactive media have been highlighted. The challenges of communicating science to a highly diverse population like India were also been addressed

by the author. The article is more of a description of the contemporary scenario rather than an analytical overview.

The India Science Report 2005 (ISR[55]), again presented quantitatively the state of science and technology in India. It was for the first time a large scale survey was conducted. The report also gives an insight into the public understanding of science or science communication. In particular, it states that "there is no decline in interest in the proportion of students who wish to study science". On the other hand, "half the teachers interviewed believed that more computers/equipments were required for teaching science subjects, since inadequate science training was a serious issue. The report draws very interesting inferences as regards public attitude towards S&T. "Over three fourths of the public feel that S&T is important for education; and believe that S&T makes lives healthier and more comfortable". "On an average, the level of knowledge the population has about the scientific concepts is very high" The report also finds that television is the most popular source of information for most people. This finding makes a strong case to utilize television and the Edusat infrastructure for S & T communication in a more meaningful way. Regarding Internet as a source of information, it does not appear to be the popular source of information in India. "Over 44% of S&T information in the US is got from the Internet as compared to 0.2 % in India at present!" An important concern is "the findings of the report that extremely low percentage of people are visiting science museums, planetaria, aquaria etc."

In India, National Curriculum Framework 2005[56], a 124-page document, prepared by the National Council for Educational Research and Training (NCERT), an autonomous body, which advises the Union and State Governments in school education policies, for the first time, emphasized on learning without burden and child-centred education system by providing scope for non-formal activities for science learning. The document also addresses the issue and acknowledges the product obsession in school science education. For the first time, the Hoshangabad Science Teaching Programme and other similar efforts of non-formal approach to science education have also found place in a major policy document. It can be said, that it is a beginning towards a curriculum that is less laden with facts, weak in disciplinary boundaries and links school knowledge with outside knowledge. In addition, the re-structuring of the education base also provided significant scope for joy of learning, inventiveness, and creativity. In this context, the non-formal mode of education would also assume significance, wherein children could undertake investigative projects through a suitable platform. In fact, the document recommends the blending of informal education with formal education as "School should give greater emphasis on co-curricular and extracurricular elements aimed at stimulating investigative ability, inventiveness and creativity, even if these are not part of the external examination system".

Nautiyal (2006)[57] raised some very pertinent points relating to science popularization and science communication activities , about the actors involved (like scientists, communicators, media) and the outcome by raising questions like "Why a common man should know about science, about scientists and the out come of science. The author, himself a science writer and communicator who is associated with many programmes and activities of S & T communication in the past, observed "the road of science communication is full of promises but potholes, and we have to treat with sensitivity, sensibility and scientifically".

Nautiyal (2008)[58] illustrated by way of analyzing the current science communication or popularization scenario in India. He brings out the fact that rural people also crave for S&T information and need it as much as the rest of the people. Citing cases of some natural, 'unnatural' and organized events, it recounts how S&T popularization efforts have fared during the past decade and a half. The cases cited may be from India, but, with a little variation, are true for most of the developing and under- developed societies. Through his article, he discusses the need for science and technology communication, sustaining curiosity and creating role models.

Jeevan (2008)[59]identified the role of public libraries for sustaining the initiatives of science communication. The author listed some of the problems that arise while disseminating science awareness in the country. The importance of the role of NGO's, science clubs, public libraries and initiatives by the government in spreading and enhancing the science communication activities are discussed.

Nikhilan and Panigrapy (2008)[60], highlighted the problems of scientists towards science communication, i.e. lack of enthusiasm to interact with the general masses and the public, differing views on scientific facts and findings, academic background of journalists, ineligibility for writing science, ignorance of communicating the scientific knowledge by the scientists. The author argues that scientists owe a duty to the public to explain their research directly or indirectly, since they get their research funds from the tax payer. He was of the view that some of the hurdles in India are due to mass illiteracy and declining interest in science in the upper strata of society. As a result, there is no significant increase in science coverage in the Indian national dailies. The author terms this as a transitory phase and feels that the presence of internet as a media will help in strengthening science.

Abhay Rajput[61], a young communicator and science writer in his blog addressed the importance of science communication and science communicators. According to him, public is the ultimate consumer of scientific research, which is funded by the public money. In this hi-tech

world of S&T, a science illiterate and technologically unaware person as mentioned in his article, cannot survive or at least enjoy life to the fullest.

The new information sought from the modern scientific research led to the development of a "knowledge society." Bhaskar Mukherjee[62] emphasizes that for a knowledge driven country, it is not enough to focus on the generation of knowledge, but it is equally essential to spread and share it.

Gauhar Raza along with Surjit Singh and Rajesh Shukla (2009)[63] presented Public Understanding of Science (PUS) as an area academic discipline evolved in India by scholars who have acquired expertise in various academic disciplines and shifted focus on a specific issue related to science-society interface. PUS in its initial stages has conducted surveys in various countries to measure the extent of scientific knowledge, probe public attitude towards science or scientists, and at times have explored the level and lack of confidence faced by common citizens in science. Surveys such as these, gradually turned into an important and regular activity in several countries that eventually led to the formation of PUS. Since 1989, NISTADS, India, has worked on methodology suitable for carrying out surveys.

Abdul Gafoor et al (2010)[64]conducted an empirical study to analyze and explore out-of-school science experiences and interest in science of upper primary school pupils of Kerala. In that study Lickert-type scales was used on topics chosen from the Science curriculum and Science-related experiences that pupils indulge in their daily life. Percentage analysis revealed moderate extent of out-of-school science experiences and relatively high interest in science correlation. Mean difference analysis showed that significant difference existed among pupils in the extent of out-of-school science experiences and interest in science based on gender, locality and type of management of school. The results indicate that in order to reduce disparity among pupils in their opportunity to learn, teachers need to know about what experiences pupils bring to the classroom. It also suggested that monitoring interest should begin from primary classes itself to reduce transitional problems at later stages of study and policy makers and curriculum planners should cater to the special needs of girls as well as rural and aided school pupils. In accordance with earlier studies (Joyce & Farenga, 1999; Uitto et al, 2006, Zoldozoa, 2006) this study also revealed that Out-of-school science experiences have positive correlation with interest in science. The influence of experiences on interest is more in Biology than in Physics and Chemistry.

Dr. A.P.J. Abdual Kalam (2011)[65] (former President of India) in his inaugural speech during 11 PCST 2010 conference, organized in India

(Delhi, 6-10 December 2010)) said "powerful science communication is an asset to the transformation of society" and laid an agenda before science communicators to take up three tasks i.e. i) To make all citizens to feel the excitement about science, ii). to make all citizens to know about the advancement in science and their role in society in economic and health development and to bring more fruits of science within the reach of their daily life, while being sensitive to the sustainability of our planet and our responsibility towards it and iii). To motivate students and entice them to embrace science as a profession. Dr. Kalam also remarked by illustrating the induction of information of science in young minds that working in science itself is the greatest award a scientist can dream of. Through his article, he discussed the mission of science communication and need for mobile science labs in rural schools.

References

1. Morris Meister, Managing a Science Club, School Science and Mathematics, Volume 23, Issue 3, pages 205–217, March 1923

2. Hanor A Webb 1929, Some firsthand information concerning science club, School Science and Mathematics, 29(3).pp273-276, March1929

3. Louis A. Astell, "Fostering Science Clubs in the High School," Journal of Chemical Education 6 (March 1929): 496—501

4. Karl F Qertein Science clubs for service, School Science and Mathematics 31(3) March 1929 pp314-320,

5. Carral C hall, A science Club that has a future Science and Mathematics 20, Volume 40, Issue 9, 1940 (pages 840–841)

6. Harold Walker, High School Chemistry Club, School Science and Mathematics, Volume 26, Issue 8, pages 833–840, November 1926 Science

7. Physics Clubs of New York, School Science and Mathematics, 6: 710 711(1906)

8. Ethel L. Roberts, A study of Science Clubs as portrayed by current science Magazines article (Ethel L Roberts) School Science and Mathematics, Volume 32, Issue 9, pages 948–953, December 193

9. Science Clubs of America, Editorial, Nature, 148, 590-590 (15 November 1941)

10. (www.unesco/education/images/ 0014/001443/144367 eb.pdf)

11. Popularization of Science through Science clubs (UNESCO/NS/PS1/3),

12. How to conduct a Science Fair (UNESCO/NS/PS1/4.),

13. Science service, the American non-profit organization for science popularization UNESCO/NS/PS15)

14. Report of UNESCO (UNESCO/NS/P51/3 Paris June 1949:- By BrgeMichelsen (Division of Science and its Popularization Department of Natural Science UNESCO, 19 Avenue Kle'ber Paris, 16, France.

15. Methods and techniques for popularizing science- Unesco (unesdoc.unesco.org/images/0015/001554/155410eb.pdf)

16. http//unescodoc.unesco.org/Images/ 0015/001592

17. NUESCO/NS/PSI/27 0r (Ws/071.73), Paris UNESCO, 1951 14p

18. UNESCO/NS/PSI/28) or (WS/071.74) Paris, Unesco, 8p by Bendt-Nielsone,

19. UNESCO/NS/PSI/29) or (WS/081.4),

20. UNESCO/NS/PSI/30), or (WS/071.117),

21. UNESCO/NPS/PSI/32 by Jacques Penot)

22. http://unescoscience.blogspot.in/2009/04/clubs-for-unesco-practical guide.html).

23. UNESCO Club in 1969 Manual nesdoc.unesco.org/images/0012/001282 128250eo.pdf)

24. David Layton, UNESCO and Teaching of Science and Technology (http:/www.unesco.org/education/nfsunesco/pdf/LAYTON.PDF)

25. Popularization of Science and Technology: What informal and Informal Education Can Do?" UN Sponsored conference in September 4-9, 1989, at Hong Kong (unesdoc.unesco.org/images/0012/001263/126341e.pdf) (surfed on 22 -5-2014)

26. Tyagi B.K. 2014 (Science Education, Vipnet News (12)4 April 2014, pp1-3

27. Sabyasachi Chatterjee, Changing Role of Science Clubs in Communicating Science, Global Media Journal – Indian Edition, Summer Issue / June 2013/ Vol.4/No.1

28. TV Venkateswaran., Narrative of Superstition and Scientific temper in India-A historical perspective (www.jhc2012.eu/images/partenaires/tvv.pdf surfed on 18 -4 2014)

29. Annual Report (2010-2011) pp 27-28, Vigyan Prasar, Department of Science & Technology. Govt. of India, New Delhi

30. Annual Report, 2010-2011, Minister of Environment and Forest, Govt. of India, New Delhi

31. KinkiniDasguptaMisra, K. B. Bhushan, R. K. Upadhya, Science Club: An effective tool for promoting awareness temper for Science and Technology among school going students, International Journal of Social Science & Interdisciplinary Research, IJSSIR, Vol. 2 (3), March (2013) Online available at indianresearchjournals.com

32. http://www.globalcontact.dk

33. Nina S Robert , Impacts of the National Green Corps Program (Eco Clubs) on students in India and their participation in environmental education activities, Environmental Education Research, Volume 15, Issue 4, 2009, p443-464

34. G. R. E. E. Anaa, E. O. Oloruntobaa& M. K. C. Sridhara, Contributions of Environmental Clubs Toward Improved Environmental Programs in Selected Secondary Schools in Ibadan, Nigeria, volume 8(2) 2009, pp 94-104 Ana

35. http://dnaclubs.nic, in/dnanetwork.html (DNA Clubd of DBT)

36. Alpaslan Sahin, STEM Clubs and Science Fair Competitions: Effects on Post Secondary Matriculation, Journal of STEM Education, vol14 (1) 2013 pp9.

37. Michael A Gottfried, Darryl Williams, STEM club participation and stem schooling outcomes, Education policy analysis archives, vol 21 (2013)

38. Allan Feldman, Kelly Pirog Authentic Science Research in Elementary School After-School Science Clubs, Journal of Science Education and Technology. 01/2011; 20(5):494-507.

Informal Science Learning

39. Lynn Dierking, J Falk, L Rennie, and D Anderson. LynnD, Policy Statement of the "Informal Science Education" Ad Hoc Committee (Policy Statement), Journal of Research in Science Teaching, Vol. 40, No. 2, PP. 108-111 (2003).

40. Anita Krishnamurthi, (http://www.afterschoolalliance.org/documents/stem rennie_krishnamurthi.pdf

41. Laura M. W. Martin, An emerging research framework for studying informal learning and schools Science Education Volume 88, Issue Supplement 1, pages S71–S82, July 2004, (Supplement: In Principle, In Practice: Perspectives on a Decade of Museum Learning Research (1994–2004)

42. Karen Falkenberg, Patricia McClure, Errin M. Mc Comb, Science in Afterschool literature Review, Developed by the SERVE Center (http://www.sedl.org afterschool/toolkits/science/pdf/SERVE%20Science%20in%20 Afterschool%20Review.pdf

43. Justin Dillon et al , Mark Rickinson, Kelly Teamey, Marian Morris, Mee Young Choi, Dawn Sanders and Pauline Benefield, The value of outdoor learning: evidence from research in the UK and elsewhere"School Science Review, March 2006, 87 (320)

44. David A. Ucko, The Learning Science in Informal Environments study in Context (Report), Published in Curator, 53(2):129 (2010).

45. Clare Matterson and John Holman, Reflections from the Welcome Trust (Report), Reference (http://www.wellcome.ac.uk/stellent/groups/corporatesite @msh_peda/documents/web_document/wtp040859.pdf).

46. Richard Lloyd, Ross Neilson, Dr Suzanne King, Mark Dyball, (20012), Review of Informal Science Learning, http://www.wellcome.ac.uk/stellent/groups corporatesite/@msh_peda/documents/web_document/wtp040862.pdf

47. Karen Hussar, Sarah Schwartz, Ellen Boiselle, Gil G. Noam, Toward a Systematic Evidence-Base for Science in Out-of-School Time: The Role of Assessment(2008) (http://www.pearweb.org/pdfs/Noyce-Foundation-Report ATIS.pdf))

48. Jonathan Osborne and Justin Dillon, Editorial, Research on Learning in Informal Contexts: Advancing the field? International Journal of Science Education, Vol. 29, No. 12, 8 October 2007, pp. 1441–1445

49. Learning in the wild: Much of what people know about science is learned informally. Education policy-makers should take note, editorial, Nature 464, 813-814 (8 April 2010)

50. Avi Hofstein and Sherman Rosenfeld, Bridging the Gap Between Formal and Informal Science Learning (RP), Studies in Science Education, 28 (1996) 87 112.(http://www.bobpearlman.org/BestPractices/Israel Bridging%20the%20Gap.pdf)

51. Molly Phipps, Research Trends and Findings From a Decade (1997–2007) of Research on Informal Science Education and Free-Choice Science Learning Visitor Studies Volume 13, Issue 1, 2010)

52. Heather Toomey Zimmerman et al, Technologies and Tools to Support Informal Science Learning, http://www.cs.uic.edu/~llyons/papers/icls_10_ISE.pdf)

53. P. Bell, B. Lewenstein, A.W. Shouse and M.A. Feder (eds.), (2009), Learning science in informal environments: people, places and pursuits. by the US National Science Council by Learning Science in Informal (P. Bell, B. Lewenstein, A.W. Shouse and M.A. Feder (eds.),

54. Manoj Pattairiya, Science communication in India: perspectives and challenges (http://www.scidev.net/global/communication/opinion/science-communication in-india-perspectives-and-c.html

55. Shukla Rajesh, Science Education, Human Resources and Public Attitude towards Science and Technology-, India Science Report 20005 Council of Applied Economic Research (http://www.insaindia.org/pdf India_Science_report-Main.pdf)

56. Position Paper, National Focus Group on "Teaching of Science "NCERT, 2005 (www.ncert.nic.in/rightside/links/pdf/framework/english/nf2005.pdf

57. Chandra Mohan Nautiyal, Science Communication :QUO Vadis?, Indian Media Studies, Journal • Vol.1 • No.1. July-Dec. 2006

58. Chandra Mohan Nautiyal, A look at S&T Awareness - Enhancements in India' jcom, volume 07,(2) June 2008 pp

59. Jeevan V K J, (2008), 'Science Awareness through public libraries in India', Annals of Library and Information Studies. Vol. 55, September 2008, pp. 224 233.

60. Nikhilanand Panigrapy, 2008, 'Reflections on Science Communication', Indian Journal of Science Communication, Vol. 7, no. 2, pp 20-24.

61. Abhay S. D. Rajput,(2009) , 'Presenting Science to the Public: Role of Scientists. (http://abhaysdr.blogspot.in/2011/08/presenting-science-to-public-role-of.html)

62. Dr. Bhaskar Mukherjee "Scholarly Communication: A Journey from Print to Web,". Library Philosophy and Practice 2009 (July) (http:/ digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1298&context=libphilprac

63. Gauhar Raza, Surjit Singh and Rajesh Shukla, (2009), 'Relative Cultural Distance and Public Understanding of Science'. Science Technology Society, July/December 2009 vol. 14 no. 2269-287

64. K. Abdul Gafoor, Smitha Narayan, Out-of-school Science Experiences and Interest in Science of Upper Primary School Pupils of Kerala, Journal of Indian Education 2010, pp29-36

65. Abdul kalam A.P.J, (2011), Sharing Science 2011,, Chapter1, pp 1-5 (ed. Patairiya M.K.., Noguera M. I)

SCIENCE BROADCAST IN KERALA; TREADING FIRMLY

D. Pradeep Kumar

Jawaharlal Nehru, the architect of modern India was a visionary. He envisaged that Akashvani,the official medium,and the only grass root-level mass communicator should instill scientific temper among it's citizens. As an effective tool to fight superstition, by inculcating scientific and rational thinking, All India Radio stations in India started a volley of programmes in local languages and dialects, catering to the communication requirements of various societies concerned. Apart from entertainment, of which film, indigenous and classical music formed a major chunk; educational programmes too enriched the broadcast content.

Though radio broadcasting in Kerala had it's origin on 12th March 1943 as Travancore Radio, it was integrated into the All India Radio network on 1st April, 1950. The royal radio ,which used to begin and conclude the daily broadcast praising the king by playing 'Vancheesamangalam", had already started carrying the message of national reconstruction by rehauling it's content,which was heavily packed with classical music and memoirs of those from the upper echelons. As the waves of democracy swept in, talks, interviews, short-skits, plays, songs etc on freedom movement, social reforms, democratic values, five-year plans, building of dams and huge factories,family planning schemes, literacy campaigns, health awareness programmes etc were broadcast, carrying the messages to the nook and corner of the State in their language.

The society had then just started it's tryst with democracy, plagued by superstition and blind beliefs, as the literacy rate was abysmally poor. Exposure to media was meagre. Radio sets too were very limited and costly, not affordable to common people, public funds were allotted to start radio kiosks in public places by the Central and State Governments. People begun to assemble around the radio sets in parks, bus stops, junctions, libraries, Panchayath offices etc to listen to news, talks, informative programmes, plays, skits etc., in a majority of places in Kerala with the launch of Akashvani stations in Kozhikode and Thrissur during 1955 and 1956 respectively.

Fragmented geographically, politically and culturally into different sects and social groups since time immemorial, it was a Herculean task to

D. Pradeep Kumar, Programme Executive and noted Science Boradcaster, All India Radio, Kochi - 682 021, Email: dpradeepkumar2@gmail.com

unite them through radio broadcasts. They had to evolve first, a standardised language for broadcast, which is appealing to all sections of society,while retaining the cultural identities. Thus, news, informative programmes, announcements and talks were broadcast in a standardised language, while majority of rest of other programmes like plays, skits,interviews with farmers, social activists ,indigenous music etc were aired in local dialects or spoken language, keeping a balance.

News bulletins extensively carried science news, by covering inventions, discoveries,explorations and developmental activities in the fields of agriculture, health and hygiene, electrification etc. Translating the scientific or technical terms was an uphill task. They had to make science understandable to listeners for which a number of new words had to be coined.

Plague and other fatal contagious diseases used to cost thousands of precious lives every year. Public health facilities were very rare .In some places where people had access to modern medicine, there were strong opposition from different quarters due to religious beliefs and superstitions, Black magicians, astrologists and occult practitioners were ruling the roost. (The message of science was yet to reach the masses). Medical practitioners and paramedical staff were deputed for immunisation and medication against contagious diseases were manhandled in several places by violent mobs. It was taboo to speak in public about reproductive health, lest alone family planning. The message of small family was resisted violently by some religious groups.Those who violated the religious dictates and adopted family planning methods by visiting the camps organized by the State Health Department were often ostracised and excommunicated. Thus, it had socio-political ramifications; to be addressed with caution.

The Government needed the strong backing of Akashvani, the popular mass communication medium, to intstill scientific temper in the society, which was dogged by irrational thinking and blind beliefs. Short features,talks etc on scientific subjects had already became part of the programme content in Thiruvananthapuram and Kozhikode stations .But the turning point was the launch of Thrissur station in 1956.It was one among the 10 stations started in India exclusively for agriculture broadcast. It was intended to give media support to the *'Grow More Campaign'* of Central Government, started in 1952, aimed at self-sufficiency in agriculture production. Lakhs of lives in India had perished due to famine after World War 2. Food scarcity was acute.

Situated in the middle of Kuttanad and Palakkad, the rice bowls of Kerala, a daily agriculture programme entitled "*Vayalum Veedum*" (Farm and Home) was launched from this station on August 11,1966,   with some officials deputed from State Agriculture Department as Farm Radio Officers

and Reporters. They had visited villages and remote places; talked to farmers about their indigenous knowledge, anguish about adapting to new methods, pest-control, high-yielding variety crops, new cattle varieties, health, hygiene, family planning, schemes of Government etc and played them back to experts and officials. Thus exclusive programmes were produced and broadcast on a daily basis. It was a composite programme, covering all the fields of life, in different formats. Weather bulletins, cyclone and wind warning too were given daily, benefitting farmers and fishermen.

Later agriculture lessons and farm news too were launched with the active support of Kerala Agriculture University and Government agencies. For agriculture scientists and medical experts, it was a *'lab to field'* programme, extending the results of scientific inventions to the day to day life of common people. Instead of the jargon-laden formats, they were forced to speak and write in native language and dialects, intelligible to lay listeners; thus reaching out to masses.This has revolutionized radio broadcast in Kerala in several repects. Boring discourses on scientific subjects, accompanied with a host of technical details had been replaced with listener-friendly programme formats, accessible even to illiterate laymen. Thus evolved radio skits.

Now known as radio cartoons these programmes are quite popular in Kerala since 1970s.The weekly skits, *"Kandathum Kettathum"* in All India Radio,Thiruvananthapuram, *"Kinchana Varthamanam"* in Kozhikode and *"Palarum Palathum"* in Thrissur attracted a huge audience,as they clandestinely crticised the vices of the society, giving a fillip to scientific temper and rational thinking. Sandwiched in humour, radio cartoons not only spread the messages of Green Revolution, immunisation campaign, literacy, women's emancipation, Grow More Campaign, family planning, Operation Flood, bio-diversity, green house effect, preservation of environment, green energy etc. but also surpassed the inherent restrictions as being the Government-controlled media by highlighting the negative aspects too.

Written by noted playwright Thikkodiyan in early 1970s," *Kinchana Varthamanam"*, which has it's predecessors in the agricultural programmes,was an instant hit. ''Nattinpuram",a live humorous programme started as part of *"Vayalum Veedum",* dealt with subjects ranging from science,agriculture and social awareness to welfare measures of the Government, was an instant hit. Based basically on current events *"Kinchana Varthamanam"* had one stock character, Sankunni Ammavan. N.N.Kakkad,veteran poet and staff member,lent voice to this character.Other participants were P.M.Mohammed Koya,Rajam K Nair, Vinayan, Balakrishnan. Nair, K.V.Ramachandran, M.Pushpa Kumari, U. A. Khader,Manjula Mathews, Kappil V Sukumaran, all staff members. Prominent actors Balan K Nair, Kuthiravattom Pappu, Nellikode Bhaskaran and Kunjava too lent their voices occasionally. Thikkodiyan

extensively used the local dialects of the Muslim and Hindu communities of Malabar.

"Palarum Palathum" in Thrissur too has it's origin in 1970's. Written and presented by M.D. Rajendran, lyricist and staff announcer, in early years. Its prominent voices were of R.Manikantan Nair,Thrissur P Radhakrishnan ,C.P.Rajasekharan and M.Thankamani, apart from the author.There was no stock character.

It is believed that Nagavally R. S .Kurup and Jagathy N. K. Achari had written the earlier scripts for *"Kandathum Kettathum"*. Thirunayanarkurissi, Madavoor Bhasi, K. G. Sethunath, Veeraraghavan Nair too wrote scripts and lent voice to the skits,which are stock-character based. S. Ramankutty Nair, who wrote the script and presented the central character as an octogenarian, who speaks in typical local dialect, made it one of the most popular radio programmes in Kerala.T.P. Radhamani, K.G.Devakiamma and C.S Radhadevi too carved a niche for themselves playing opposite S. Ramankutty Nair. This popular radio cartoon had an unceremonious exit in October 2015. *Kalikalam,* a daily popular radio cartoon started by Biju Mathew along with Sreekumar Mukhathala in 2007 in the morning chunk too has two stock characters, now being played by K.A. Muralidharan and Rajeshwari Mohan, with occasional presence of another stock character, by G.Sreeram. Sarcastic comments on current events made it a popular programme thanks to the scripts written by S.Narayanan Nampoothiri for a few months and K A Muralidharan, thereafter . The term radio cartoon has been familiarised to the listeners in Kerala with the advent of *"Kalikalam"*.

The author have been associated with radio skits since October, 2013 and took up the skit programme *"Palarum Palathum"* in Thrissur station too, after joining there in April,2006. That was an unexpected success.Thus begun a journey through this road, untravelled. The programme drew characters mainly from the current socio-political events and tried to introduce a pattern with only one theme or incident, usually with two characters, ending in a dramatic twist. Most skits are event- centric, not comment-centric.They are light satires, by nature.The duration is maximum 5 minutes. Local dialects and slangs of all parts of Kerala had extensively been used, apart from the new-generation yuppie style.These satires vehemently attacked social evils, superstitions and manthra-thanthras. *"Deepasthambham Mahascharyam"*, a daily radio cartoon with two stock characters,being broadcast daily in the popular morning programme of Kochi F M station since last two years is a classic example of effective science communication through skits.

All these programms, from *Vayalum Veedum* to skits, played a major role in creating scientific temper in society, apart from the routine science broadcasts from all stations,known in different names like *'Harithavani",'Sasthrajalakam","Sasthralokam"* etc. A major portion of the education broadcat of Akashvani stations in Kerala too are science-related subjects. A number of serials were produced by Kerala stations at the behest of Vignan Prasar, an organisation under the Ministry of Science and Technology for promoting scientific and rational thinking. During 1980's, experts in Science broadcast like G .Jayalal and K.S. Ranaprathapan were appointed as Science Officers and production assistants, to script and produce such programmes in Akashvani. That practice has since been stopped, though Transmission Executives with science background are being selected for the same. Programmes on science and technology are still being aired in Yuvavani, the youth programme.To meet the communication requirement of the common people, a daily informative programme on computer and mobile phones, entitled *"Cyber Jalakam"* was launched in Thrissur station in 2011. This is now being broadcast daily from Thiruvananthapuram, Kochi and Kannur stations also.

In the context of the phenomenal advance of technology and it's application in common people's life, an array of new programmes like live phone-ins,phone- out quizzes etc are the need of the hour. Since the process of distributing social welfare pensions too has been made online,even the marginalised sections want to know about the new developments in this field. Therefore, most of the routine programmes have now become science broadcast too. Whether in a utility programme on village office or UPSC, Grama Panchayath or Parliament, on-line services imparted by them through internet have to be highlighted in spoken words,devoid of excessive technical details and academic jargons. Interactive programmes involving scientists and technologists too have to be simple and easily communicable.

Science journalism is yet to come of age in Kerala and elsewhere. Science broadcast, a late entity compared with it's print media counterpart, is miles to go. But with very few practitioners and dwindling intake of brodcasters with science background, genuine journalitic aptitude, communication skills and flare for writing, the future seems to be not so bright.

Yet the public service broadcaster is treading firmly in it's mission of instilling scientific temper. Though a sea-change has occurred in media since the vision as envisaged by Nehru in 1950s, Akahvani has not yielded to the temptations of the alluring market. It's doors are still shut against astrologers, palmists, futurologists, thantriks, self-styled Gods, occult practitioners, preachers of magical remedies and their kind.

Akashvani stands alone at a high pedestal, unpolluted, spreading the message of science.

IMPACT OF TV COMMERCIALS ON URBAN AND RURAL CHILDREN OF SILCHAR

Shatabdi Som and K. V. Nagaraj

Abstract

Every day children are exposed to numerous advertisements the moment they switch on the idiot box. TV advertising shows various aspects of life in a few seconds. For children it is like a window which enables them to escape from their present socio- economic state as well as psychological state to a zone of unending happiness and pleasure. For the present study, a sample of 500 children of age group 2-11 years, residing in urban and rural areas of Silchar is selected. The excessive exposure to TV advertisements may contribute significantly to rise in the level of materialistic attitude in children, unhealthy food habits. The study explores the understanding of capability of the ads according to their age.

Key words: advertisements, children, consumption, education, media, rural, urban, television.

Introduction

Advertisements have become the common ingredient in everyone's life in such a way that everyone in their life at least once has tasted the flavour of ads. An advertisement comes and goes like a flash, although it is short lived, it marks a huge impact on the viewers. The immediate and intended impact by advertiser is that the advertised product is valued in a positive way and the viewer is convinced enough to buy the product (Unnikrishnan and Bajpai, 1995). A child is a careful observer who views the television as a bridge between their ordinary life of child and a magical world of boundless happiness and dreams. Human beings are emotional and aesthetic creatures, who have always invested the things they make, acquire or use with meaning beyond the merely utilitarian (Hood, 2005). Unlike adults they are unable to comprehend the intention of selling behind the ads. Children do not understand the notion of intent to sell and frequently accepts advertisement claims at face value (Macklin, 1999). In late 1970s, the Federal Trade Commission concluded that it was unfair and deceptive to advertise to children younger than 6 years (Federal Trade Commission in the Matter of Children's Advertising: FTC Final Staff Report and Recommendation. Washington, DC, 1981). In order to minimise the harmful effects of ads some countries banned the featuring the ads for a specific time period in a day. Sweden and Norway ban all advertising

Dr. K. V. Nagaraj, Professor, Department of Mass Communication and Journalism, Misoram Central Univeristy, Izwall, Misoram, Email: nagarajkv2000@gmail.com

directed at children younger than 12 years, Greece curtails toy advertising until after 10 PM, and Denmark and Belgium strictly control advertising aimed at children (Valkenburg, 2000). India has witnessed a rapid growth in the advertising sector. There has been a rapid spread in TV programming, along with a concomitant growth in TV advertising (Unnikrishnan and Bajpai, 1995).

Objectives of the study

The main objectives of the study are:

(i) To find out whether the buying behavior of children is influenced by television advertisements.

(ii) To know what kind of gratification children achieve when they see an advertisement as well as when they buy the product.

(iii) To understand the perception of children towards ads according to their age.

Hypotheses

H1: Rural children are more impacted by advertisements than urban children.

H2: Television advertisements encourage a sense of materialism among children.

H3: Children of higher age group are able to understand the underlying meaning of the ads.

Theoretical Framework

The Uses and Gratification theory attempts to explain the uses and functions of the media for individuals, groups and society as a whole. It also explains how people use media in order to satisfy their needs. It also identifies the positive as well as negative consequences of individual media use. The core concept of the theory lays the assumption that audience members actively seek out the mass media to satisfy individual needs. But the interpretation of the message varies from one individual to another. The audience may decode the message not in the same way it has been encoded. For instance, children watching a particular advertisement of play station games can be interpreted in many ways. As these games are expensive in nature, some children may feel that buying the product will be a complete waste of money, for another group of children it becomes a desire and they want to have it at any cost and for some it remains a dream as they cannot even think of having it.

According to Blumler and Katz Uses and Gratification theory suggests that media users play an active role in choosing and using the

media. The theorist says that a media user searches for a media source that best fulfills the needs of the user. Uses and gratifications assume that the user has alternate choices to satisfy their need. Wimmer and Dominick (1994) say that U and G began in the 1940s when researchers became interested in why audiences engaged in various forms of media behaviour, such as listening to the radio or reading the newspaper.

Review of literature

Namita Unnikrishnan and Shailaja Bajpai's research study on *Impact of Television Advertisement on Children* was conducted in the year 1995. The research was done on the impact of advertising on the values, attitudes and aspirations of children residing in urban as well as rural areas of Delhi. The study was conducted among 700 children between 5- 15 years. And according to its findings, 75% children between age group 8- 15 want to purchase products that were advertised on TV during that time. Research study titled *The Influence of TV Advertisements on Adolescents of Baroda City was* conducted by Uma Joshi and Ritu Bhatia in 1997. The study revealed that the impact of advertisements on lifestyles, habits, behaviour, emotions and thinking patterns of the adolescents was enormous. The study provides a guideline for parents and schools on how to control the impact of advertisements have pushed their children to words a consumer culture, exposed them to violence and influence that are the harmful to the interest of the society, it also portrays the positive role that advertisements play in the education of children.

A case study titled *The Impact of Television Advertising on child Health and Family Spending* carried out by Kadambini Katke. For the purpose of study random sampling method is used. The sample size was limited to 200 parents of child aged between 3-12 years. The statistical technique of correlation is used to analyse the relationship of television advertising and its impact on child health and family spending. This paper discusses the television advertising and its impact on child health and family spending. The study has revealed that a positive co-relationship exists between time spend with television and its impact on the buying behavior of a child and its influence on family spending. Barrie Gunter, Caroline Oates and Mark Blades (2005), in their book on *Advertising to Children on TV: Content, Impact and Regulation* reviewed the research examines the content of advertising on television aimed at children, children's understanding of advertising, and the influence of advertising on young viewers.

A study conducted on *Freedom to be a Child:Commercial Pressures on Children (2007)* by David Piachaud, London School of Economics. According to researcher, children's lives have been transformed over the past century. Family incomes have increased,

children lead more solitary lives, attitudes to childhood have changed, new products have been developed and commercial pressures on children have increased. Deborah L. Roedder, studied on *Age Differences in Children's Responses to Television Advertising: An Information Processing Approach (1981).* According to the study, age differences in children's response to television advertising are scrutinised from an information point of view. Jaspal Singh and Namrata Sandhu, studied on the *Impact of Television Commercials on the Social and Moral Behavior of Indian Viewers – Empirical Evidence (2011)* However, there exists no consensus concerning the impact of television commercials on the social and moral behaviour of viewers.

Methodology

(i) Design

The design of the study is survey research based. A sample survey is conducted in the urban and rural areas of Silchar, in order find out the overall impact of television advertisements on school going children of Silchar.

(ii) Population and sample of the study

The population of the study includes children between age group 2-11 years, residing in both urban and rural areas of Silchar respectively. The total sample constitutes 500 children, 245 and 255 from the urban and rural areas of Silchar. The parents of the children of age group 2-7 years are also included in the study as children of this age group cannot provide the exact details.

(iii) Sampling technique-

The study employs a stratified random sampling technique. The universe of the study comprises of all the school going children of both urban and rural areas of Silchar. The town is divided into 28 Wards that governs urban areas of Sichar and 11 Gaon Panchayats governing the rural areas of Silchar. Through stratified random sampling the urban and rural areas are divided into several sub- population called 'strata', the wards and village panchayats. From every ward and village panchayat one school is selected both from urban and rural areas. A total number of 39 schools from urban and rural area are selected through lottery method. The class registers bearing the roll number is used to select the samples at a sampling rate of 1/5 having a sampling interval of 5. Randomly a starting point is chosen, for example, the student bearing roll number 1 and the subjects numbered 6, 11, 16, 26, and 31 and so on.

(iv) Variables

Sl. No.	Variables	Categories	Description
1	Age group	2- 11 years	2-4years
			5-7 years
			8-11years
2	Residential Background	Urban and Rural	

(v) Method of data collection-

For collection the data, a schedule was framed for the children for collecting the required data. It was served to the age group 8-11.

A schedule bearing the similar structure as the previous is also employed in order to collect data from the parents of the children of age group 2-7 years.

(vi) Pre testing of the tool

The tool is pre-tested on 30 accidentally selected students from all age groups from both urban and rural areas. The purpose for pre-testing the tool is to check the clarity of language, ease in responding and average time taken to respond.

Findings and discussion

Out of 245 respondents from urban areas 60 belong to the age group 2-4 years, 70 belong to 5-7 years and their parents answered the questions. And 115 children belong to 8-11 years. 23.33% of children between 2-4 years watch TV less than 30 minutes a day, 26.67% watch for an hour every day and 30% of them watch 2-3 hours a day. Majority of the urban children of age group 5-7 watch 2-3 hours a day .The parents of children belonging to rural area of age group 2-4 years answer that majority of the children watch TV 2-3 hours a day. The children of 8-11 watch similarly as the urban children for 2-3 hours a day. 51.67% of kids of urban areas watch TV with their parents and majority of the children of age group 5-7 and 8-11 watch TV alone which offers a free allowance for them to watch any kind of media content. Around 7.75% of urban children watch TV with their neighbours as they do not have an access to television. Greater part of the rural children 0f 2-3 years (51.68%) watches TV with

their parents and many children (41.42%) watch alone. Similarly 33.91% of children of 8-11 age groups also prefer to watch TV   and around 16.87% of the total rural respondents watch TV with their neighbours as they do not have an access to TV which is higher than the urban population.

Among the urban children cartoons are extremely popular among all age groups this is evident from their responses. Entertainment as well as music channels are also popular but lesser than cartoons. Around 78% of the children watch cartoon channels, so they are more exposed to the characters shown there and the products endorsed by these cartoon characters which may imbibe bad food habits in children (Anand Nawathe, Rohan Gawande, Sudhir Dethe, 2007). Other channels that cater information only occupy a minimal space in the preference of children. Similarly in the rural areas children of all age group are attracted towards entertainment channels. But a negligible percentage watches news and informative channels which is lower than the urban areas. Watching the ads and buying a product is related to one another. They want to buy the product whenever they see an ad or whenever they go out for shopping. Some children are less demanding in nature as they wish to have the product of their choice during occasions only. Very few children consume non- branded products. When the ads are featured a good number of respondents from all age groups pay attention to the ads which is evident when they say that they watch ads without winking their eyes. But majority of the children of the age group 5-7 and 8-11 tend to shuffle the channels when ads are featured. And some of the children are escapist in nature as they compare themselves with the characters featured in the advertisement. Rural children are more influenced by the ads as the frequency of children demanding for advertised products is higher in rural areas. Buying a product when they go out for shopping is lesser in the rural part and number of children buy the non-advertised products as compared to the respondents of the urban areas.

Table 1: Perception of children regarding advertisements

Category	Age	Exaggerate facts	Ads are always true	Ads are TV programmes	Ads are not reliable	Not meant for children	Total
Urban	2-4 years	0 (0)	41.66(25)	50 (30)	3.33 (02)	5 (3)	100(60)
	5-7 years	1.42(1)	38.59(27)	31.42(22)	21.43(15)	7.14 (5)	100(70)
	8-11 years	20.86(24)	20 (23)	12.18(14)	44.35	2.60 (3)	100(115)
Rural	2-4 years	0(0)	50(20)	50 (20)	0(0)	0(0)	100(40)
	5-7 years	0(0)	57.58(19)	24.2 4 (08)	12.12(04)	6.06(02)	100(33)
	8-11 years	13.18(24)	37.91(69)	4.39 (08)	39.56(72)	4.94(09)	100(182)
Total							500

The majority of urban children of 2-4 years are unable to understand the underlying functions of advertisement, they watch and believe them and 50% of them are unable to distinguish between the ads and TV programmes. The children of 5-7 age groups also rely on the information disseminated through the ads and a minimum number of respondents feel that ads exaggerate the facts for promotion of the product. And a large number of respondents of age group 8-11 feel that ads are not reliable. Kara Chan (2001) opines that older children had more consumer experience. Every advertisement is an exaggerated and emotionally highly charged brief burst of information, which is directed to a specific target group (Bergler, 1999).

The rural respondents of age group 2-4 cannot differentiate between ads and TV programmes and believe in whatever is shown. Even 57.58% rural children of 5-7 age groups believe in whatever is shown in the ads which is quite higher than the urban children of the same age group. Oates, Blades and Gunter suggest that young children may not understand the link between advertising and commercial profit. For 37.91% of children between 8-11 years the ads are reliable and for 39.56% ads are not reliable and only 13.18 % believe that ads exaggerate the facts. The understanding capability of children increases with the progression of age. More children in a study (52%) showed explicit understanding of what an advertisement is than the younger children in the Pine and Nash study (32%), suggesting age-related increases in knowledge (Pine, Nash, 2002). Between four and seven, they begin to be able to distinguish advertising from programmes (K. Katke, 2007).

Table 2: Buying behavior of children

Category	Age	Every time ads are featured	During occasions	While shopping	Rarely demand for advertised products	Buy non-advertised products	Total
Urban	2-4 years	23.33 (14)	15(09)	35(21)	25(15)	1.67(01)	100(60)
	5-7 years	30(21)	10(07)	30(21)	20(14)	10 (07)	100(70)
	8-11 years	24.34(28)	24.34 (28)	23.49(27)	24.34(28)	3.49 (04)	100(115)
Rural	2-4 years	42.5(17)	10(04)	10 (04)	05(02)	32.5(13)	100(40)
	5-7 years	42.43(14)	3.03(01)	30.30 (10)	12.12(04)	12.12(04)	100(33)
	8-11 years	25.28(46)	14.83(27)	15.93 (29)	31.87(58)	12.09(22)	100(182)
Total							500

The present study shows positive relationship between watching the ads and buying behaviour of the children. In the urban areas children do not buy a product if it is not advertised on TV or the advertisement is not attractive. Some of the children do not buy a product if celebrity featured in

the ad in not impressive. Children in the UK who watched more commercial television requested significantly more items (K. J. Pine, Penny Wilson, Avril S. Nash, 2007).The present study shows positive relationship between watching the ads and buying behaviour of the children. In the rural areas majority of the children do not want to buy a product if it is not advertised on TV or the advertisement is not attractive. Maximum numbers of children do not buy a product due to its unavailability in their place which is higher than the urban areas and some of the children do not buy a product due to financial problems. Some of the children do not buy a product if celebrity featured in the ad in not impressive.

When asked the parents of children if their child helps them while making any shopping decision, in 55% of the cases it was found that the child used to influence the buying decision of their parents particularly buying clothes, food items, toys, FMCG items including cosmetics and fashion accessories (Anand Nawathe, Rohan Gawande, Sudhir Dethe, 2007).

Table 3: Food habit of children

Category	Age	Homemade food	Packaged fast food	Anything given by parents	Advertised Health drinks	Advertised beverages	Total
Urban	2-4 years	36.67 (22)	45(27)	11.67(07)	0(0)	6.66(04)	100(60)
	5-7 years	38.57(27)	38.57(27)	10(07)	8.58(06)	4.28(03)	100(70)
	8-11 years	26.08(30)	48.69 (56)	15.65(18)	6.09(07)	3.49 (04)	100(115)
Rural	2-4 years	40(16)	57.5(23)	2.5 (01)	0(0)	0(0)	100(40)
	5-7 years	57.58(19)	30.30(10)	12.12 (04)	0(0)	0(0)	100(33)
	8-11 years	53.85(98)	28.02(51)	11.54 (21)	2.74(5)	3.85(07)	100(182)
Total							500

Majority of the urban children consume fast food as well as soft drinks. But it must be mentioned that home-made food is the second preference given by the children. Only a few of them want to consume the health drinks. In the rural area the home-made food is the first preference given by the children. But fast is also very popular among the rural children. And only a few of them want to consume the health drinks. Television pumps in lot of junk food and snack advertisements. Indian child on an average get exposed to not less than 20 attractive messages of these product. More time spent with television viewing more exposure to these messages repeat advertisements message result into placing the brand on top of the mind will result into buying the brand illustrated in the advertisements (K. Katke, 2007).

64

Table 4: Gratification achieved after buying the advertised product

Category	Age	Possessiveness	Mental satisfaction	Status consciousness	Competitiveness	Utility satisfaction	Total
Urban	2-4 years	10 (06)	61.67(37)	05(03)	11.67(07)	11.67(07)	100(60)
	5-7 years	25.78(18)	31.43(22)	10(07)	17.15(12)	15.71(11)	100(70)
	8-11 years	17.40(20)	39.13 (45)	13.04(15)	10.43(12)	20 (23)	100(115)
Rural	2-4 years	17.5(07)	70(28)	0 (0)	12.5(05)	0(0)	100(40)
	5-7 years	42.43(14)	30.30(10)	0 (0)	15.15(05)	12.12(04)	100(33)
	8-11 years	26.39(48)	44.50(81)	3.85 (07)	11.53(21)	13.73(25)	100(182)
Total							500

A good number of respondents feel a sense of possessiveness when they buy an advertised product, majority of them become mentally satisfied after buying the product, some of them try to maintain their status and buy the product to maintain the competition and some of the children become happy with the usage of the product. A good number of respondents feel a sense of possessiveness when they buy an advertised product which is higher in the rural areas, majority of them become mentally satisfied after buying the product, only a few of them try to maintain their status and is lower in the rural areas and some of them buy the product to maintain the competition which is similar as the urban area.

Table 5: Perception of children regarding function of advertisements

Category	Age	Create pressure for consumption	Create awareness	Ads implement healthy habits	Have adverse impact on health	Generate a sense of responsibility	Total
Urban	2-4 years	40 (24)	21.67(13)	18.33(11)	13.33(08)	6.67(04)	100(60)
	5-7 years	41.42(29)	14.29(10)	14.29(10)	22.86(16)	7.14(05)	100(70)
	8-11 years	16.52(19)	54.79(63)	16.52(19)	4.34(05)	7.83 (09)	100(115)
Rural	2-4 years	60 (24)	05(02)	10 (04)	20(08)	5(02)	100(40)
	5-7 years	63.64(21)	12.12(04)	9.09 (03)	12.12(04)	3.03(01)	100(33)
	8-11 years	29.12(53)	39.57(72)	23.08 (42)	5.49(10)	2.74(05)	100(182)
Total							500

The parents of the children of age group 2-4 and 5-7 feel that ads creates a unseen pressure on the child to buy a product. But the children of age group 8-11 consider that ads make them much more aware. From all the age groups the respondents believe that ads are also able to implement healthy habits. And some of the parents as well as children feel that ads have an adverse effect on health and psyche. And many children feel that they have generated a sense responsibility after watching the ads.

The parents of the children of age group 2-4 and 5-7 feel that ads create a unseen pressure on the child to buy a product. The children of age group 8-11 also consider that ads pressurize them to buy a product. Only some of the parents of the children of age group 2-4 and 5-7 feel that ads are also able to implement healthy habits which are lower than the urban areas and some of the parents as well as children feel that ads have an adverse effect on health and psyche. Only a few respondents feel that they have become more responsible after watching the ads.

Table 6: Parental involvement in the decision making process of children

Category	Age	Being very strict	Apply logic to implement their decision	giving excuse of financial problems	Help children in understanding function of ads	Cannot motivate the child	Total
Urban	2-4 years	20 (12)	56.67(34)	6.66(04)	15(09)	1.66(01)	100(60)
	5-7 years	21.42(15)	37.14(26)	12.85(09)	15.71(11)	12.87(09)	100(70)
	8-11 years	20.87(24)	34.79(40)	13.05(15)	20(23)	11.30(13)	100(115)
Rural	2-4 years	17.5(07)	25(10)	40 (16)	7.5(03)	10(04)	100(40)
	5-7 years	15.16(05)	24.24(08)	21.21 (07)	9.09(03)	30.30(10)	100(33)
	8-11 years	14.29(26)	29.12(53)	42.30 (77)	4.39(08)	9.90(18)	100(182)

The parents residing in the urban areas involve themselves in the decision making process of the child. Parents play an important role in influencing children's purchase decision (R.A.Gbadeyan, 2010). Often they employ their own reasoning skills in order to motivate the child to accept their decision. Some of the parents give an excuse of having financial problem when they do not want to give that product to the child. Several parents help the children in understanding the function of ads and minimum numbers of parents are unable to motivate the child. Research has revealed that in families where the television content is discussed and

66

advertisements are questioned and criticized for their stereotypes; children are less likely to be negatively influenced (Uma Joshi, Ritu Bhatia, 1997). Children's lives have been transformed over the past century. Family incomes have increased, children lead more solitary lives, attitudes to childhood have changed, new products have been developed and commercial pressures on children have increased (David Piachaud, 2007).

The parents residing in the rural areas also involve themselves in the decision making process of the child. Often they employ their own reasoning skills in order to motivate the child to accept their decision. Some of the parents give an excuse of having financial problem when they do not want to give that product to the child which is higher in the rural scenario. Many parents help the children in understanding the function of ads which is also lesser in the rural area and maximum numbers of parents are unable to motivate the child. A study suggests that parents should raise their voice against the exaggeration of ads, and the exposure to vulgarity, aggression and limitless cravings, but they should also take the initiative to shape the child's attitude to words the television and its content (Uma Joshi, Ritu Bhatia, 1997).

Table 7: Reasons for buying a particular product

Category	Age	Saw the ad	Brand conscious	Friends have the product	Luxurious in nature	For being happy	Total
Urban	2-4 years	28.33 (17)	0(0)	26.67(16)	10(06)	35(21)	100(60)
	5-7 years	37.15(27)	0(0)	30(21)	7.14(05)	25.71(18)	100(70)
	8-11 years	13.91(16)	14.79 (17)	31.30(36)	10.43(12)	29.57 (34)	100(115)
Rural	2-4 years	20(08)	2.5(01)	30 (12)	2.5(01)	45(18)	100(40)
	5-7 years	39.39(13)	0(0)	24.25 (08)	3.03(01)	33.33(11)	100(33)
	8-11 years	34.06(62)	6.59(12)	17.59 (32)	6.59(12)	35.17(64)	100(182)
Total							500

A good number of the urban children buy a product after watching the advertisement. Children 0f 2-7 years are not brand conscious. A good number of respondents buy a product as their friends have the same product. Many of them buy a product only for an immediate gratification of happiness. The rural children also buy a product after watching it on TV. A few children are conscious regarding the brand as compared to the children of the urban area. Children prefer to buy branded and standardised products which are more advertised on television (Nidhi Kotwal, Neelima Gupta and Arjee Devi, 2008)

The competitive attitude is evident among them but lesser than urban children. It can be asserted that in both urban and rural areas children buy a product influenced by ads. Peer pressure plays a significant role many of them buy a product only for an immediate gratification of happiness.

Children in the age groups 8-14 years are subject to a fair amount of peer pressure. When children watch advertisements, they discuss amongst themselves. This discussion does lead to purchasing those brands favored by their brands. Children do fall victim to peer pressure prefer the products used by their friends. But a study suggests that peer pressure from reference groups have less significance on the brand preference of children (Sujata Khandai, Bhawna Agrawal, 2012). TV advertising has enhanced their involvement in product selection and purchase, they prefer to buy TV advertised products and it is helpful in buying the new products (Vinod Kumar Bishnoi and Ruchi Sharma, 2009*).*

Conclusion

The present study concludes that in both the urban and rural areas of Silchar advertisement plays a significant role in influencing the buying decision of the child. A greater part of the children want to acquire the product after watching the advertisement. But urban children buy advertised products more than the rural children. The majority of the children of 2-4 years are unable to understand the underlying meaning if advertisement and majority of the respondents of 8-11years reveal their doubt on the reliability of ads. Majority of the children (8-16) understood the purpose behind the advertisement (Ahluwalia and Singh, 2013). There is not a broad gap between the understanding capability of ads among the urban and rural masses. Parents play an important role in the decision making process of the children and their involvement may help them to decode the message of the advertisement in a positive way. Parents should be encouraged to discuss with their children, contents of TV ads (Gbadeyan, 2010). The food habit also seems to be changing as many respondents of the study consume junk food and soft drinks. The study shows that the ads try to instill a consumer attitude among children. At the same time it cannot be denied that ads generate awareness, inculcate healthy habits concerning hygiene among both the children of urban and rural areas of Silchar.

Advertising may be regarded as a part of the economic system which frames the way of thinking of an individual towards an advertised product. Children are considered to be the most delicate target group for the advertisers. Children tend to believe the messages delivered by the advertisers as the small children are unable to understand the underlying meaning of ads. Adolescents are manipulated by advertisement promise that the product will do something special for them which will transform their life (Nidhi Kotwal, Neelima Gupta and Arjee Devi, 2008). The present study reveals that children watch ads and accordingly consume the products of their choice. Children from all age groups are heavily exposed to the ads. In the rural landscape majority of the children from all age groups watch ads every moment they sit in front of the TV which is higher than the urban children. And a few children watch ads to gather information about the product. Children of all age groups are attracted towards the fast moving image and jingle of the ads. The presence of the child also

draws their attention. And 36.52% of the respondents of the age group 8-11 years love watching ads as they are rich in information. Celebrities are endorsed for promotion of a particular brand or product; it has successfully gathered the attention from a large number of children. Similarly as the urban area the respondents of the rural area are drawn toward the ads due to the fast visuals and the attractive music. But small numbers of children watch ads as they provide information as compared to the respondents of the urban area. Ads are pleasurable for a good number of respondents which is higher than the respondents residing in the urban areas. In the rural areas also the children watch ads very attentively. But majority of the children of the age group 5-7 and 8-11 tend to shuffle the channels when ads are featured. And some of the children are escapist in nature when they compare themselves with the characters featured in the advertisement. Rural children are more influenced by the ads as the frequency of children demanding for advertised products is higher in rural areas. Buying a product when they go out for shopping is lesser in the rural part. And more number of urban children buy the non-advertised products as compared to the respondents of the rural areas.

Children tend to show revolting attitude towards parents when they deny to fulfill the demand of the child. It is evident from the present study that many of the respondents show revolting attitude towards parents. 51.51% of the rural children of age group 5-7 years show revolting attitude towards their parents. But some of them do not show arrogance and listen to whatever their parents say the tendency which is higher among the urban children. But some of them are so obsessed with the product that they ask any other member of the family to fulfill their demand which is lower in rural part than the urban children.

Majority of the children of urban areas do not react when they see the product of their choice in the hands of their friend. 30% of age group 2-4, 27.27% of age group 5-7 and 18.68% of 7-11 years become jealous which is higher than the urban areas. Children from all the age groups want to have the product at any cost which is also higher than the urban scenario. Only a few children buy the product with their pocket money. For many, it becomes a dream to have the product as they cannot afford to buy it.

The ads often act as the problem solving agents that come with a magical healing capability for all sorts of problems faced by common people in their day to day life. The there are certain category of advertisements that follow the problem solution-structure. Whatever the problem may be, it can be solved within a short time period after the usage or consumption of the desired advertised product. The problem must seem important and evoke a negative response from the central actor or actors – worry, fear, discomfort and dissatisfaction. When the product is introduced, whether it

is merely shown or briefly demonstrated, it should solve the problem and result in relief, pleasure, or satisfaction" (Advertising Basics, J.V. Vilanilam and A.K. Varghese, 2012).

There are many advertisements that feature children and often at times these products are not meant for them. They are featured in the ads in order to grab the attention of the target consumers and perhaps the audience gets immediately attached to the child featured in the advertisement. For instance, the advertisements of 'firstcry.com', 'flipkart.com', and many ads related to banking and insurance feature children. But these products do not target children and even they are beyond the understanding capability of the small children. But at times they are attracted towards the colourful flash of images, the background score or the music of the advertisement.

The product meant for children often features the child along with the adults and normally these ads target the adult section of audience along with children. And often children influence the buying decision of the parents as they are an important part of a family. They themselves may become the future customers for the advertisers. Today's children can recognise hundreds of brand names and logos. Several companies have exclusive deals with leading fast food and soft drink companies to offer their products in a school or college. Amusement parks offer colorful pictures and brochures to school children in order to attract them to avail special discounts and offers. Kids are greatly influencing parents to spend on products of their choice (Sultan Singh and Jaiman Preet Kaur, 2011). The advertisements of Nerolac paints, Santoor soap, Whirlpool refrigerator, Surf excel, Ujala, Pears, Life Insurance Corporation of India portrays the children in their ads in order to generate an emotional attachment with the product. Research shows that human nature is very soft and especially when it comes to kids. In order to leverage upon this emotional feeling media and marketers are trying to succeed through generating emotional attachment with children's whatever the product category is so that they can insist on purchasing the specific product for their use (Sandeep Aggarwal; Sanjay Hooda, 2012).

Many edible products feature the child in the advertisement. For instance Oreo biscuits, Real fruit juice, Boost, Horlicks, Complan, Bournvita, Rasna, Kellogg's breakfast cereal, Mc Donalds, Knoor's soupy noodles, Maggi, Yippe noodles. There are advertisements that offer free gifts as tattoos, stickers, fun toys to drag the attention of the child. The Kinderjoy Chocolate offers free exciting toys along with tongue twisting flavours of cream and chocolate inside it; if the child buys a Candyman chocolate he/ she will get two free stickers; with Yummiez fried snacks Spiderman caricatures are absolutely free. The children's favourite animated charecters are also used to enhance the consumption. For instance,

Yummiez features the Spiderman, Chota Bheem characters on band-aid ad; Alpenlible to Choco Eclairs also feature Chota Bheem and his companions. A girl child is always attracted towards dolls and often act as mothers and the advertisers have taken the advantage to attract the target group with such advertisements as Little Mommy walk and giggle doll, where a small girl child is seen taking care and treating the doll as her own child. Similar is the ad of Barbie doll where the girl child colours and washes the hair of the Barbie doll. The girls take place of the mother in these commercials; the mother herself is usually off screen (Seiter, 1957).

The health of the child is one of the major concerns of the parent. Therefore in many ads as Pepsodent's- Pappu or Papa, Colgate, Dabur Lal toothpaste features the child along with their parent. As tooth decay is one of the major problems faced by children and the parents are also given the solution of the problem and ads also try to implement a healthy habit of brushing twice a day in the children. The health drinks normally features children and it is shown that the parents who give their children the particular advertised health drink are comparatively stronger, sharper, taller and healthy than the children who do not consume the product. A recent ad featuring Mahendra Singh Dhoni along with a child in the advertisement of new and improved Dabur Chavanprash with frooti flavours claims that for stronger immune system, Chavanprash is a must have product for the child. Children are often featured in the ads of various hand wash liquids as Dettol, Savlon, Lifebuoy hand wash in which children wash their hands with that advertised hand wash product. These ads try to implement a healthy habit among the children, the hand should be washed special before eating as bare hand contain germs and these can be cleaned up only by washing hand by the hand wash.

The advertisers use various appeals in order to capture the attention of the young ones. The emotional appeal, fear as well as humorous appeals is used widely. The children tend to live in a world of fantasy and bear a light hearted outlook towards the life. The advertisers touch this nerve of the child and show them a life in the backdrop of a fantasy world. Fantasy works because audiences have been conditioned to accept it since early childhood, a fact well noted by advertisers of children's products, such as pre sweetened cereals, toys, fast food and video games. (J.V. Vilanilam and A.K. Varghese, 2012).

Often it has been seen that children in various ads are engaged in activities as fighting, riding bicycles at a very fast speed, their engagement in the kitchen and at times minor cut and wounds are not at all any problem. The advertisement of band-aid featuring a child playing football match with the 'Chota Bheem' cartoon characters is wounded in the match, but in the presence of Johnsons's Band- aid the child has to 'carry on'. According to Advertising Standard Council of India (ASCI) guidelines, advertisement

directed to children shall not contain anything, whether in illustration or otherwise which might result in their physical, mental or moral harm or which exploits their vulnerability (ASCI guidelines, Chapter III, Rule 2). Advertisements for liquor and cigarettes have been banned since 1995. "The code of ethics drawn by Advertising Standard Council of India has not had much impact. Liquor manufacturers and advertising agencies have drawn up a code of self regulation for advertising of hard drinks on cable and satellite television channels. But 'surrogate advertisement' of well-known liquor brands continues with the impression being given that soda, playing cards, glass crockery and other items are being advertised" (K. J. Kumar, 2007). Even though these ads give statutory warning but at times these are ignored by the children. In a study, about 45% of the parent survey noticed the presence of disclaimer in the selected television commercials while 55% of the parent could not indentify presence of any disclaimer in the television commercial (Gbadeyan, 2010). Public policies can be formulated in order to reduce the harmful effects of ads and to promote the positive viewpoint of the ads.

References

Namita Unnikrishnan, and Shailaja Bajpai, Impact of Television Advertisements on Children, Sage Publication, 1995.p- 2,3

John Hood, Selling the Dream: Why Advertising Is Good Business, *Praeger, 2005.p-7*

Macklin MC, Carlson L, eds. Advertising to Children: Concepts and Controversies. Thousand Oaks, CA: Sage; 1999

In the Matter of Children's Advertising: FTC Final Staff Report and Recommendation, Federal Trade Commission. Washington, DC: US Government Printing Office; 1981.

P.M. Valkenburg, Media and Youth Consumerism. Journal of Adolescent Health. 2000;27(2 suppl),p- 52– 56.

Anand Nawathe, Rohan Gawande and Sudhir Dethe, Impact of Advertising on Children's Health, International Marketing Conference on Marketing & Society, 8-10 April, 2007, IIMK.

Kara Chan, Children Perceived Truthfulness Of Television Advertising and Parental INnfluence: A Hong Kong Study, Advances in Consumer Research, Volume- 28, 2001, p- 207-212.

Reinhold Bergler, The Effects of Commercial Advertising on Children, Commercial Communicator, January 1999, p-41

Avril Nash, and Karen J. Pine, Dear Santa: The Effects of T.V. Advertisement on Young Children; International Journal of Behavioral Development, Vol. 26, Issue 6, 2002, p- 529; Psychology Press

Kadambini Katke, The Impact of television advertising on child health and family spending -A Case Study, International Marketing Conference on Marketing & Society, 8-10 April, 2007, IIMK, p- 83-86

Pine, Nash, Wilson; The Relationship Between Television Advertising, Journal of Developmental and Behavioural Pediatrics, 28:1–1, 2007, p-4.

Uma Joshi, ***Media Research – Cross Sectional Analysis***, Authors Press, 2002, p- 147- 162

R.A. Gbedeyan , Content Analysis of Selected TV Commercials to Children in Lagos State Nigeria, Journal of Educational Research and Technology, Volume1(1), June, p- 4, 2010

David Piachaud, Freedom to be a Child: Commercial Pressures on Children, David Piachaud, Centre for Analysis of Social Exclusion (CASE), July 2007, London School of Economics.

Nidhi Kotwal, Neelima Gupta, and Arjee Devi, Impact of T.V. Advertisements on Buying Pattern ofAdolescent Girls, Journal of Social Science, 16(1): P-51- 55 ,2008

Sujata Khandai and Agrawal, Bhawna ; Impact of TV Commercials upon the Purchase Behaviour of Urban Indian Children, International Journal of Marketing and Technology, Volume 2 Issue 4, p- 72- 87 , 2012.

Vinod Kumar Bishnoi and Ruchi Sharma, The Impact of TV Advertising on Buying Behaviour: A Comparative Study of Urban and Rural Teenagers, JK Journal of Management & Technology ,ISSN 0975–0924 Volume 1, Number 1, 2009, Research India Publications.

ROLE OF NGOS IN EFFECTIVE SCIENCE COMMUNICATION

Ajit Prabhu V.

Introduction

Science communication activities are gaining momentum in India and the role of science in public policy is becoming ever more pervasive.Dedicated efforts have been made from both governmental and non-governmental platforms to enhance the public understanding of science. A non-governmental organization (NGO) is any non-profit organisation with a group of committed persons and which is organized on a local or national level. NGOs are task orientated and driven by people with a common interest. NGOs in India have deep roots in the society and access to common man in the locality of the organisation and hence can be the effective media to propagate science and related facts to reach the common man. NGOs help to promote science and to penetrate a scientific culture into India's socio-culturally diverse society, and to transform it into a nation of scientifically thinking and scientifically aware people. The dedicated and committed members of such organisations are found to provide selfless service in this direction. A group of self-motivated professionals engage as Science writers and Scientists often possess passions to popularise science and scientific temper among the Indian masses.This paper reviews the activities of NGOs in India in effectively communicating to public on science as well as environment related subjects.

Background – science & science communication in ancient India

It is a well-known fact that India had an impressive scientific heritage to claim. Scientific research-in fields such as mathematics, astronomy, medicine and material science-has been carried out in the Indian sub-continent since ancient times. Some of the reminiscence found even now exemplifies it. Some of the ancient views of the physical world, including those on space and time, continued to wear metaphysical, sometimes even religio-philosophical garb on different intellectual lines. It can be found that even the rules and regulations for communication were laid down, using special metaphors and idioms and sometimes even with non-verbal communication.For example,consider the '*Natyashastra*'of Bharata Muni (written in about 2nd century B.C.)which can be treated as a perfect and scientific methodology of ideas on better communication.

Dr. Ajit Prabhu V., Joint Director & Scientist 'F', Kerala State Council for Science, Technology and Environment, Sasthra Bhavan, Pattom, Thiruvananthapuram - 695 004, Email: drajitprabhu@gmail.com

Communication has been referred there as '*Sadharanikaran*'- simplification, involving '*Sahridayas*'- people having common sympathetic heart. It results in '*Ras Utpathi*' and '*Ras Aswadan*' feeling of aesthetic pleasure. This confirms that the 'message' has been conveyed properly from the 'source' to the 'receiver'. '*Charak Samhita*' also lays the rules for debates and discussions dividing it into 'friendly' and 'hostile' discussion. The assemblies were also classified into two different groups of wise and ignorant people. Rules were laid to communicate with both groups. The oral tradition gave way to written texts on copper plates, on barks and on leaves and ultimately using paper by 12th and 13th century AD. From verses and hymns they turned to beautiful prose explaining Astronomy, Mathematics, Medical Science, Technology and Agriculture. They were passed on from one generation to the next, in a well-knit tradition.

The Vedic texts can be highlighted as communication media which are available in the form of four '*Samhitas*', the '*Rigveda*' with 1,028 hymns and 10,552 verses classified in ten '*Mandals*' or eight '*Astakas*' and '*Adhyayas*'. '*Yajurveda*' or '*Vajasaney Samhita*' has forty chapters and 1,975 verses. The '*Samveda*' is divided into two books. '*Purvacika*' has 585 verses and '*Uttaracika*' has 1,290 verses. Total number of verses being 1,875. In the '*Atharvaveda*' there are 20 chapters with 5,987 verses. There were 17 '*Brahmanas*' out of which 3 are not available. Out of 10 '*Kandas*' of '*Satpath Brahmana*' the first five are associated with construction of the fire-altar.The Sanskrit equivalent for brick is '*Istaka*' or '*Istika*', which was primarily constructed for the use in an altar. Later in '*Sulba Sutras*', these bricks have been described in relation to the geometrical figures of square, round, oblong and diagonal.The mechanical devices connected with the grinding, pounding, macerating with water, allowing to ferment, squeezing out its juice or extract, filtering through various types of strainers, collecting it in receptacles, preserving it in suitable containers under favourable conditions and similar other processes laid the foundation of the pharmaceutical practices in connection with medicinal herbs. The '*Yajnasala*' can thus be treated as a primitive laboratory and the utensil described in this connection became the basis of a chemical laboratory in the alchemic period.

First scientific symposium

The '*Charak Samhita*' - the well-known treatise on Ayurveda, appears to be a proceedings of first ever symposium on different subjects related to medical sciences (Ayurveda). The world's first symposium held on the medicinal plants in relation to diseases was presided over by sage Bharadwaja, somewhere in Himalyas, during 700 BC. The *Charak Samhita* contains the whole account of this symposium including the names of different participants. A number of fundamental questions regarding life and death were also raised in this symposium.

Charak Samhita also laid the rules for debates and discussions. All these rules regarding debates and discussions may be applied to communication of science and technology even in modern times. However, due to various reasons known or unknown, a remarkable gap has persisted between this scientific knowledge and the 'common' man, until recently, almost no effort has been made to bridge this gap. This gives rise to a situation by which we need to cross the traditional wisdom with the modern knowledge of communication technologies.

Pt. JawaharLal Nehru, first Prime Minister of India and an initiator of the idea of inculcating scientific temper in the society in modern times, had said, "Unfortunately this subject (of ancient science) is approached in two ways, neither of which seems to be as very desirable. One is to consider everything written in ancient times on scientific subjects as the last word. The other is to ignore all such matters and consider them as belonging to the age of ignorance, without any scientific value. I think that it would be of great benefit to the history of science, if we examine these manuscripts and books thoroughly and find out what had made by them. But it is essential this should be done objectively and with the spirit of science."

Subsequently, there have been attempts to take science to the common people. For example, *Vigyan* (Science)-a monthly popular science magazine in Hindi-has been published by VigyanParishad (a learned society of scientists and academics) since 1915.

However it is pertinant to note that the first popular science magazine on health in malayalam was published way back in 1903 from the Malabar district of Kerala. The first magazine concentrates on economics, agriculture science & technology was also initiated from Malabar during 1906 with the title "Lakshmi Vilasam" Krishikkaran an agricultural magazine initiated from the same area during 1909 in malayalam is considered as the first farm magazine in the language.

Following Independence in 1947, Pandit Jawaharlal Nehru, introduced the concept of modern 'scientific temper'-a phrase taken to mean an enquiring attitude and analytical approach that leads to rational thinking and the pursuit of truth without prejudice. Accordingly, the constitution of India has a special provision "to develop the scientific temper, humanism and spirit of enquiry" which paved the strong foundation for science communication initiatives in India.

The science communication movement in modern India

After Independence, a number of government agencies and non-governmental organisations (NGOs) took their cue from the constitution and became involved in science popularisation. In this way, science communication was taken up at various levels, institutional as well as

individual. The National Institute of Science Communication (NISCOM)-previously the Publications and Information Directorate-began publishing of the Hindi popular science journal *Vigyan Pragati* (Progress in Science) in 1952. The Science Reporter (an English monthly) and *Science Ki Dunia* (an Urdu quarterly) followed soon after. Today, NISCOM which was set up in1951 to publish scientific journals, periodicals and to compile information on the country's raw materials in the form of the Wealth of India series,an encyclopaedic publication of great national importance. NISCOM also brings out 11 professional scientific journals and publishes various popular science books (often in Indian languages).

The Indian National Scientific Documentation Centre (INSDOC) was established in 1952 to provide information support to the scientists and researchers of the country at a time when research infrastructure in India was at a nascent stage. INSDOC then had the objective of providing documentation, information and translation services at the national level.Over five decades of its existence, INSDOC has been fulfilling its basic objective and also expanding its role to modern areas such as library automation, design and development of databases, access to international information resources, human resource development and others.

INSDOC and NISCOM merged into a single entity with effect from 30[th]September, 2002 thus leading to the formation of a new merged entity to be known as the National Institute of Science Communication and Information Resources (NISCAIR) under CSIR. The major functions of NISCAIR are: to provide formal linkages of communication among the scientific community in the form of research journals in different areas of S & T and to disseminate S&T information to general public, particularly school students, and to inculcate interest in science among them.

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

Other Indian government initiatives include *Vigyan Prasar*-an autonomous organisation of the Department of Science and Technology set up in 1989-which plays an important role in coordinating efforts among various scientific institutions, educational and academic bodies, laboratories, museums, industry and other organisations for the effective exchange and dissemination of scientific information. Vigyan Prasar also develops and disseminates software materials and organises popular science events including workshops, debates and lectures.

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

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

A diversity of science communication media

India's science communicators have used various modes of communication to reach out to the masses. As a result, a lot of infrastructure, software and human resources are available in the country. Under *Print media,* in addition to the scientific journals (both popular and technical) published by the government, several national and regional daily newspapers have now started producing weekly science pages. In a unique initiative, Vigyan Prasar provides a weekly ready-to-print science page, in both Hindi and English, which some 21 newspapers use at a nominal cost.

Audio-visual media: A variety of science-based programmes are now available on All India Radio (AIR), such as *Radioscope*, *Science Today*, *Science Magazine* and *Science News*. In the early 1990s a landmark 144-part radio serial *ManavKaVikas* (Human Evolution) was jointly produced by NCSTC and AIR. The programme was broadcast simultaneously from more than 80 radio stations in 18 Indian languages with 100,000 children and 10,000 schools registered as dedicated listeners. A number of television channels have also been broadcasting science programmes for many years. For example, a 13-part film serial on the history of science and technology in the Indian sub-continent and its impact on the world, entitled *Bharat Ki Chhaap*, was produced by NCSTC and broadcast on the state-run Doordarshan channel in 1989. Several channels on science communication such as Victers channel, started telecasting exclusive science related programmes.

Folk media: It is a common observation that folk media-such as puppet shows, street plays, stage performances, and folk songs and dances-successfully reach segments of society where other forms of media have limitations. These traditional means of communication have all been exploited as alternative media for science communication. They are not

only entertaining, but also offer two-way communication and are cost effective.

'Interactive' media: Science exhibitions, science fairs, demonstrations, seminars, workshops, lectures, scientific tours, conferences and, more recently, digital software, have the advantage of being interactive forms of science communication.Perhaps the most impressive example is the Vigyan Jatha. During this massive event, science communicators march in groups from village to village, interacting with local people and spreading information about science relevant to their day-to-day lives. Catalysed by NCSTC, Vigyan Jatha could be considered the biggest science communication experiment anywhere in the world. Held in 1987 and 1992, themes have included health, water, environment, appropriate technology, superstitions, scientific thinking and literacy. Some 2,500 government agencies and NGOs have been actively involved, and the Jatha have covered nearly 40,000 locations in about 400 districts, touching almost a third of the country's population.

Based on the overwhelming response from Indian Science Congress, Science Congresses on various themes, subjects, and at State levels started functioning which accelerated science communication in a big way and also could create platforms for getting together scientists and researchers. The annual Children's Science Congress-started in 1993 by the NCSTC Network-has become a highlight in the science communication calendar. The congress aims to extend classroom science teaching by providing 10- to 17-year-olds with an open 'laboratory' for enjoyable hands-on learning.

Recently, information technology has given birth to a comparatively new form of interactive science communication-digital media-which includes the Internet and CD-ROMs. This is proving to be an effective way to illustrate difficult scientific concepts. It has also made science communication more accessible both to handicapped and less educated people. Though the reach of the technology is still a limiting factor, the government is working to extend this and reduce the costs of connectivity. In Kerala State IT@School started separate programmes on science & education targeted to school students.

Limitations of Government initiatives

Although much has been achieved in India, there is still an urgent need to make science communication activities more effective, both in terms of quality and quantity. Much is to be done to make a dent in wiping out superstitions that have prevailed throughout the ages, particularly in tribal areas where literacy levels are low and superstition is a way of life. Also, the general public is still largely ignorant about common scientific principles especially natural disasters and environmental issues.

Science is not succeeding in attracting mass media interest. It rarely appears as a lead story, as editors and reporters do not consider science to be 'news' in the normal sense. On average, science only accounts for less than three per cent of coverage by India's mass media. Additionally, readership of popular science magazines has declined-people no longer rely on print material as their only source of information.

It is encouraging that radio, which is extremely popular in rural areas, has an increasing amount of scientific content. Television is following a similar pattern, with a few special channels on science and technology, and other channels featuring scientific discussions and interviews of scientists about their research. But it has not yet reached a satisfactory level as far as science communication is concerned.

There is no doubt that scientific information is becoming an essential and integral part of people's daily lives. However, illiteracy and ignorance are major challenges. While literacy levels are increasing (currently estimated at 52 per cent of the population), scientific literacy is still drastically low. Given India's large population, limited resources and multitude of languages, mass science education faces particularly great challenges. There have been efforts to popularise science through our 18 regional languages, for example by producing some scientific publications in vernaculars and translating certain television and radio programmes. But without more attention on local languages, much of the population will miss out on science communication efforts.

Science writing still tends to be dry and boring, making it unsurprising that few science articles interest newspapers and magazines. The number of capable science communicators and voluntary scientific organisations is alarmingly low and hardly sufficient to cater to the country's large and diverse population. A large number of science communicators are being trained through postgraduate degree and diploma courses in science communication, and short-term science writing and journalism workshops. However, such numbers are still very low and are not forming a critical mass to fulfil the objective of communicating science with the increasing population in the country.

Most importantly, science communication activities must be conducted and governed in a systematically planned manner, under one umbrella organisation, and according to a properly defined national policy. But the formation of networks of organisations alone is not sufficient. A suitable mechanism must be evolved to ensure team work in a more cohesive manner. This poses a major challenge in the Government sector.

Access to nearly 6.5 lakh villages in India with different cultural background, religious customs, languages, educational levels, etc. still remain as a big question and a hard nut to propagate science

communication throughout the country. Budget constraints, lack of man power, lack of proper experts in science communication, only a few training institutes in science communication etc. are major challenges in government sector to effectively handle science communication in the whole country.

Advantages of NGOs

Non Government Organisations (NGOs) can offer aviable alternative to bring about change that ensures local ownership of the science without the risk of political influence. NGOs can effectively tackle the above limitations with a better local involvement and access. Major advantages of NGOs are that they are composed of a group of committed and knowledgeable persons and have roots in the local society and hence could earn respect and recognition form the local people; thus making an effective means to communicate to the local people in their dialect and languages.

NGOs throughout the world have many different characteristics and can take the form of large inter governmental agencies (IGOs) that are intergovernmental in nature and act on a regional level onbehalf of their State Government. NGOs can also be based on a cultural or spiritual foundation or represent traditional villagecommunities effectively.

Prominent NGOs in India in effectively communicating science

India has a number of NGOs that work in the field of science & technology, environmental conservation and ecology. Some of the prominent NGOs which effectively function in India are given below. The NGOs are also communicating science and related matters to the locality using folklores, local art forms, dramas, cinemas, radio, publications etc.

Assam Science Society has 75 branches and was set up in 1953 to disseminate science knowledge.They impart environmental education and training through camps for teachers and students and conduct surveys on environment and have Science books and journals as publications.

BAIF Development Research Foundation, Kamdahnu was set up in 1967 at UrliKanchan, Pune District to improve the quality of life of the poor through regeneration of degraded resources such as land, livestock, water and vegetation. They carry out tree plantation, agro forestry and wasteland development and conduct research on tree species capable of surviving in adverse conditions. They do consultancy for afforestation, wasteland and watershed management. They encourage the use of non-conventional sources of energy. They have a quarterly publication titled the BAIF journal.

Bombay Natural History Society started its work in September 1883 at Mumbai. It aims to collect data on the specimens on natural history throughout the Indian sub-continent. To disseminate knowledge of flora and fauna by means of lectures, field trips, literature and expeditions and, to study wildlife related problems and recommend management plans to conserve wildlife and its habitat. It conducts field research projects on bird migration and studies on the movement and population structure of Indian avifauna. It also conducts studies of certain endangered species of wildlife and their habitat and through environmental education impart the knowledge and awareness of the need to conserve wildlife. Hornbill (4 issues in a year), other journals are in their credit as publications.

Centre for Environmental Education (CEE) was set up in 1984 to spread awareness of environmental issues and try to find solutions for them. It is based at Ahmedabad and they have offices all over the country. CEE mainly aim to create environmental awareness in the communities.They conduct widespread environmental education and training programmes through a very vast network. They have also taken up projects related to conservation of biodiversity and eco-development. CEE possesses a large computerised database-the Environment Education bank, which has a collection of more than 800 environment concepts, about 2500 environment related activities and 100s of case studies.CEE have a vast range of publications-books, posters, educational packages, bibliographies and directories.

Centre for Science and Environment (CSE) does research, investigative and educational work in the field of pollution, forest, wildlife, land and water use.The activities are carried out through lectures, field trips, publications, exhibitions on the various issues they take up, meetings and workshops. Down to Earth - a fortnightly environment magazine; Children's magazine. The Gobar Times; books; reports; computer database; audio visuals, etc. are prominent publications of CSE.

Centre for Environment and Development (CED), established in 1993, is an autonomous research and development, training and consultancy organisation focussing in fields related to environment and development. CED has its Head Quarters at Thiruvananthapuram and Eastern Regional Campus at Bhubaneswar, Regional Centre at Hyderabad and projects in Andhra Pradesh, Jharkhand, Bihar, West Bengal, Pondicherry and Gujarat apart from Odisha and Kerala. One of the functions of CED is to provide scientific and technological support to implement developmental projects of Local Self Government Institutions and other agencies and also to promote energy and water conservation among public and also to create awareness on various environmental issues.

Clean Ahmedabad Abhiyan is a local NGO that has been working with the Ahmedabad municipal corporation in the area of solid waste and is instrumental for organizing door to door meetings, awareness campaigns to educate people about the importance of segregating waste into biode gradable and recyclable waste.

Vignana Bharathi previously known as Swadeshi Science Movement (SSM) is a science movement with Swadeshi Spirit and is working for science popularisation and implementation of modern technology and ancient scenes in India. SSM was founded in 1982 at IISC, Bangalore and developed into a national level organisation as Viguan Bharati in 1991. The Major activities include Swadeshi scene congress, Swasraya Bharath exhibition, science fairs, publication of books, science popularisation activities, special programmes to inculcate scientific temper among students, talent contests etc.

CPR Environmental Education Centre (C. P. Ramaswami Aiyar Foundation) is based at Chennai and was set up in 1989 to promote environmental awareness, to produce and disseminate basic educational and reference material on environment and to take up environmental projects.It has done a study of the sacred groves of Tamilnadu and soil and water analysis. The Centre gives guidance on environmental laws, environmental impacts and management studies. It works in the field of environmental education. CPREEC promotes smokeless chulhas and other renewable sources of energy and publishes Books on environment, posters, audio cassettes, web site on environment education as their publications.

Dasholi Gram Swarajya Mandal was set up at Gopeshwar, Chamoli District, U.P. in 1964. Its aims are to encourage forest conservation and the use of forest products for self employment; to cut down soil erosion by encouraging volunteers to build embankments in the catchment areas and to plant trees.The world famous **Chipko Movement** was spearheaded by this organization. It gives a great deal of importance to forest conservation in the Himalayas. It has promoted environmental awareness in these areas and carried out major eco-regeneration programmes.

Development Alternatives based at Delhi, work in all parts of the country. It was established in 1983 to design options and promote sustainable development through programmes of economic efficiency, equity and social justice, resource conservation and self-reliance. Its activities cover the entire nation. They are working in the field of pollution monitoring and control; waste recycling management; wasteland development; appropriate technology. It brings out a Monthly newsletter.

Gandhi Peace Foundation-Environment Cell began functioning at Delhi from June 1979. It was set up mainly to promote the environmental

activities of rural development agencies; to disseminate environmental information through the publication of up to date reports on environmental issues; to organize workshops and seminars for environmental experts, policy makers, individuals and organisations working for environmental issues. Their activities include researching the role of women in community forestry and rural development; conducting studies in soil erosion, water logging, drainage and seepage around select dams; planting fast growing trees. They bring out publications and educational aids on the Chipko Movement, environmental education, dams etc; audio visuals on Mitti Bachao, the Chipko Movement, deforestation, the Yamuna and the Narmada rivers and traditional rain harvesting techniques.

Green Future Foundation was set up in 1987 at Pune in Maharashtra to promote and work towards environmental protection, energy and ecological conservation and pollution control. They impart environmental education and training by organising forest based camps for adults and youths. They also do afforestation and have raised a nursery of medicinal and indigenous plants.

Indian Association for Environmental Management (IAEM) was set up at Nagpur in 1963 to educate people on the environment, to encourage the conservation of the environment and to spread environmental knowledge. They conduct seminars, essay competitions and exhibitions related to water and its pollution, they have carried out water pollution control activities and worked in the field of environmental management.

Kerala Sastra Sahitiya Parishad (KSSP) was set up in 1962 in Thrissur, Kerala to preserve the environment, to provide alternative models for development and to popularize science among the people.They have worked in the field of eco-development, creating awareness about water and energy conservation and encouraging the use of non-conventional energy sources such as smokeless chulhas, etc. KSSP were actively involved in taking science to the people, especially through folk forms. KSSP has a premium role in the Kerala State to popularise science and effectively work against superstitions by sensitising large section of people including rural mass. Quarterly publications and several science books are published and popularised by KSSP.

Kalpavriksh was started in 1971 as a movement opposed to the destruction of Delhi's green area. It is a citizens action group set up to inculcate understanding and concern on environmental issues, especially among the youth. It also aims to conduct research in environmental problems, to campaign on environmental issues and to evolve a holistic environmental perspective. It imparts environmental education in schools and colleges by forming a network of nature clubs, conducting bird

watching expeditions and nature trails and has developed workbooks for the school level. It has conducted research on environmental subjects such as an impact assessment study on the Narmada Valley Project, pesticide use in India, air pollution in Delhi, mining activities in Dehra Dun district, protecting the Delhi ridge, are some of the works they have highlighted.

Narmada BachaoAndalon was set up in 1986 under the leadership of Medha Patkar. It aims mainly to educate those directly affected by large development projects, such as tribals, on the social and environmental impact of such projects,to protest against the construction of dams in the Narmada Valley in general; struggling towards a right to information and new environmentally sustainable water policy,to help the tribals get a substantial share of the government's development schemes/services and to unable them to undertake development activities themselves etc.. They mainly educate, mobilize and organize residents of the Narmada Valley on human rights and justice, alternative development policies, environmental issues related to big dams in general and the Narmada project in particular. They undertake surveys of the affected villages, protest against land and forest issues and government interference in this regard. They are fighting against displacement and disregard of the rights of the people.Narmada Samachar is its bi-monthly publication.

Ramakrishna Mission Lokashiksha Parishad was set up in 1952 in Kolkatha and its mission is to uplift the rural people with a view to making them self-reliant. It works in 11 districts covering about 4000 villages in West Bengal. It has been carrying out programmes for the development of the wasteland areas restoration of bundhs in the Sundarbans areas to protect the land from saline water. It has conducted studies on the status, expectation and contribution of non timber forest products for the subsistence of forest fringe dwellers. It has been promoting the use of smokeless chulhas, sanitary toilet linked biogas plants, solar energy; extensive tree plantation; preservation of the Sunderban biosphere; promoting eco-friendly farming. It is also working in the area of environmental education.

Srishti was set up in Delhi in 1988 to promote conservation and enrichment of the environment; to carry out research on all aspects of sustainable living; to foster concern for the environment among the people, making its preservation a shared responsibility. It has been working for the conservation of the Delhi Ridge by involving community participation; they have kept a bird count in the wetlands of Delhi. It has coordinated the Asian midwinter waterfowl census for northern India and has carried out tree plantation, conservation of biodiversity and waste management.It played a very active role in the drafting and finalisation of the Biodegradable

Waste (Management and Handling) Rules, 1998. It worked closely with the CPCB and the MOEF in the finalisation of the rules.

The Energy and Resources Institute (TERI), established in 1974,TERI is a wholly independent not-for-profit research institute. Its mission is to develop and promote technologies, policies and institutions for efficient and sustainable use of natural resources. It has been imparting environmental education through projects, workshops, audio visual aids and quiz competitions. It deals with policy related work in the energy sector, research on environmental subjects development on renewable energy technologies and promotion of energy efficiency in the industry and transport. TERI also has a major programme in biotechnology, the applications of which are oriented towards increased biomass production, conversion of waste into useful products and mitigating the harmful environmental impacts of several economic activities. Publications of TERI includes several books on energy, climate change, renewable energy, regulation, environment and sustainable development and forestry & biodiversity. They also publish research journals and digest journals, newsletters. There are also several databases and audio-visuals on various environment issues.Some of them are :TERI Energy Data Directory & Yearbook, Looking back to think ahead, Mahatma Gandhi: an apostle of applied human ecology, How global is global and how warm is warming?, etc.

World Wide Fund for Nature was set up in India in 1969. The coordinating body the WWF International, is located in Gland in Switzerland. Its main aim is the promotion of conservation of nature and environmental protection as the basis for sustainable and equitable development. This organisation has been working in the field of biodiversity conservation including field projects, consultancy and research and support to other organizations; forest management; environmental education and awareness. They also work in the area of eco-development, promoting and supporting local conservation networks (Community Biodiversity Conservation Movement). They are doing wildlife trade monitoring, and assisting CITES and related National Legislations; research in Indian and international laws; legal intervention on environmental issues; legal education on environment including Asia's only diploma course on environmental law. WWF has innumerable books, cassettes and data on various issues like WWW Indian Network Newsletter (Quarterly), Nature News, The Web of Life – a resource pack for children, The Law Digest, etc.

Challenges faced by NGOs

From the activities of the above organisations, it can be seen that they are performing excellent science communication with local participation and involvement. Many of the voluntary organisations could

create wide awareness on certain environmental issues so that the Government had to withdraw major power projects and other mega projects against protest based on the environmental impact. Even though the voluntary organisations work so powerfully, there are certain challenges that pull them back in effectively taking science to common people. Such challenges are :

- Poor financial support from Government agencies to organise science popularisation programmes.

- In view of the changing life style, only little man power is getting ready for voluntary work or social work. Strengthening manpower with emoluments becomes huge liability to the normal function of such NGOs.

- Poor training available to the people working in the NGO sector; and this in turn depends on the quality of programmes.

- NGOs are rarely invited for developmental planning process.

- Lack of scientific method or research that may or may not be academic, natural or applied, or participatory research.

- Lack of proper infrastructure to accommodate modern ICT and other technologies.

- Some NGOs act as critics or watchdogs for scientific and technological innovations such as genetic modification, synthetic biology or nuclear power. Biased actions of some voluntary organisation due to political interventions or other reasons cause loss of faith in people in the long run.

- Many a times, the leadership of voluntary organisations are person-specific and the absence of star performing leader causes the NGO to defunct. Therefore continuity of massive actions and activities is a major issue.

Conclusion

In India the level of science communication activities increased dramatically. As technology advances, the need for scientific information will also increase. Accordingly, there is urgent necessity for science communication and popularisation. In India there is a large number of science communication initiatives at government level, but due to diversity of languages and vast geographical area, such activities seldom reach the common man especially in the rural sector. However, NGOs are found effectively function in communicating / popularising science to the grass root levels. NGOs act as catalyst in bringing about local, national and international initiatives through community participation at regional / local levels. NGOs also help the Government to obtain relevant information for

promoting and implementing major environmental programs. It is also seen that sometimes they adopt innovative approaches for science communication.Some NGOs encourage partners or communities to use scientific knowledge and tools, while others use science themselves. They are also change agents who apply scientific knowledge in local environmental issues.

A country like India, which is the world's largest democracy, the seventh largest country in the world in terms of land area and the second most populous country in the world, the contributions of the NGOs as a vibrant means of science communication and popularisation and highlighting the concerns of the citizens of this country on environmental issues are noteworthy. It is estimated that, in India there are approximately 1.5 million NGOs working for different causes. However, there are major challenges faced by active NGOs. There is no doubt that the potential and the purpose of the NGOs can be better utilised for effective science communication especially in the case of rural mass. The Government of India has issued its National Policy on voluntary sector with the objectives to encourage, enable and empower an independent, creative and effective voluntary sector, with diversity in form and function, so that it can contribute to the social, cultural and economic advancement of people of India. However, concerted efforts at government levels are essential for encouraging and promoting NGOs and also to further explore the potential of such voluntary organisations in taking science to common man in view of the emerging scientific & technological advancements undergoing in the country.

FORM IV (See Rule 8)

Statement about ownership and other particulars about newspaper

SCIENCE COMMUNICATOR

1. Place of publication : Kochi, Kerala State
2. Periodicity of its publication : Half yearly
3. Printer's Name : Dr. S. Anil Kumar
   Nationality : Indian
   (a) Whether a citizen of India? : Yes
   (b) If a foreigner, the country of origin : NA
   (c) Address : Director
   Public Relations and Publications
   Cochin University of Science &
   Technology, Kochi -682 022
   Kerala State

4. Publisher's Name : Dr. S. Anil Kumar
   Nationality : Indian
   (a) Whether a citizen of India? : Yes
   (b) If a foreigner, the country of origin : NA
   (c) Address : Director
   Public Relations and Publications
   Cochin University of Science &
   Technology, Kochi -682 022
   Kerala State

5. Editor's Name : Dr. S. Anil Kumar
   Nationality : Indian
   (a) Whether a citizen of India? : Yes
   (b) If a foreigner, the country of origin : N.A
   (c) Address : Director
   Public Relations and Publications
   Cochin University of Science &
   Technology, Kochi -682 022
   Kerala State

6. Name and address of individuals who own the : Dr. S. Anil Kumar
   newspaper and partners or shareholders holding   Director
   More than one per cent of the total capital.   Public Relations and Publications
   Cochin University of Science &
   Technology, Kochi -682 022
   Kerala State

I, S. Anilkumar hereby declare that the particulars given above are true to the best of my knowledge and belief.   Sd/-
21/02/2016   **Signature of Publisher**

89

CONTENTS