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INDIAN JOURNAL
OF
SCIENCE COMMUNICATION



Indian Journal of Science Communication

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 - It excludes pure and applied sciences and anything bracketed as popular science writing.
 - The IJSC is a half yearly international journal, issued in January and July.
 - The IJSC is brought out and disseminated by Indian Science Communication Society (ISCOS), Lucknow, catalysed and supported by NCSTC/DST.
 - The NCSTC/ISCOS assume no responsibility for the opinions offered by the contributors.
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 - Address for subscription and advertisements : The Coordinator IJSC, Indian Science Communication Society, Chandrika Bhawan, 577-D, Near Dandahiya Masjid, Lucknow – 226 022, India, E-mail : info@iscos.org. Payments may be sent by demand draft/ cheque issued in favour of Indian Science Communication Society, payable at Lucknow.
 - Price per copy for Individual :
Inland : Rs. 100
Overseas : US \$ 5
 - Refer subscription form to subscribe IJSC.
 - Website : www.iscos.org
- © 2009, NCST/DST, New Delhi.



Indian Journal of Science Communication

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To Our Readers

Indian Journal of Science Communication invites readers' views and critical comments on any of the aspects of the journal. Suggestions for further improvement in presentation of the journal and its contents are also welcome. Selected letters would be considered for publication under the column 'Letters to the the Editor'.

Does science expertise matter for becoming a science communicator!

There are ample evidences and instances that even non-science experts in the past were pursuing popular science communication activities, be it science writing, science journalism, hands-on science or a public outreach programme. The situation today by and large is no different. With the rapid advancements in the super specialty and multidisciplinary areas in science and technology, a worldwide debate has started whether a science communicator should necessarily possess a science degree! The majority of experts feel that possessing a science degree may not be a pre-requisite for becoming a science communicator, however, it'll be an advantage, if a science communicator or a science journalist has acquired academic qualification in science or technology!

The debate has necessitated the need to assess various pros and cons being a science communicator without or with expertise in any or many discipline(s) of science and technology and to draw inferences from minute observations and opinions by a variety of stakeholders in this area and thereby influencing current and future policies for training, hiring and involving suitable people for different tasks in the field of science communication and popularization. A questionnaire survey was carried out involving science communicators, scientists, journalists, teachers, common people, students, authors and media persons, etc. Relevant literature and software materials were also consulted and renowned science communication experts interviewed. A broad range of interesting issues and indices emerged out of the study and most of them are vital while undertaking various tasks of S&T communication. It emerged that science communication amongst others largely has four major facets and therefore each facet demands for specific set of qualities and skills amongst science communicators:

1. Public Awareness of Science: *This facet of science communication deals with educating and making children and lay people aware of latest advancements and the science confronting to their day-to-day lives; 2. Science Activism, Advocacy and Negotiations:* *This facet especially deals with influencing, intervening and motivating people towards various issues and concerns and building and nurturing peoples' campaigns and movements; 3. Science Journalism:* *The basic strength of this facet of science communication is to safeguard public interest at large especially from the policies and practices of state that deals with journalistic principles; and 4. Scholarly Science Communication:* *It deals with communication between experts, such as publication of research journals, monographs, etc., that is why some of the respondents do not consider research journal staffers as science journalists as they are focused on highly technical subjects beyond comprehension of common people.*

Therefore, in the age of knowledge revolution and plurality of job profiles, it is crucial to continue with a single pattern of expertise or develop multiple bands of expertise! Through the study, we are able to divide the level of communication of S&T contents at a scale of "0" to "10" broadly in to 4 parts, where level "0" represents the simplest or softest and level "10" represents the toughest or hardest science contents:

1. Between 2-3: *Simple scientific contents are sufficient for children as they need a general appreciation of the subject concerned and may not require all the technical details; hence little formal or informal science knowledge may be sufficient; 2. Between 4-5:* *An average common man may require science contents a bit higher than those of children; therefore some formal science education may be helpful; 3. Between 6-7:* *The science knowledge at this level could be suitable for science students, science teachers and all those who are above average but below the upper strata; so here a science or technology degree may be an advantage; and 4. Between 8-10 and beyond:* *Science communication that deals with communication between scientists, experts and researchers belongs to this level and beyond, as these people are engaged with knowledge creation and therefore they require the highest level of science contents with highest technical and minute details; thus a postgraduate/ doctoral/ postdoctoral qualification may be an asset.*

It gives a clear understanding of the level of subject expertise that may be required for a specific set of target audience or a specific task of science communication. The 'knowledge hierarchical pyramid' based on the above findings could offer a tool to mark the necessity of the level of science contents with corresponding science expertise with precision. The clarity in understanding these complexities in science communication would lead to planning, formulating and implementing appropriate policies.

- Manoj Patairiya

[Based on a paper given by the author at African Science Communication Conference, February 2009, South Africa]

Nutrition communication thus far and further: A critical examination of research and practice

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Abstract

The terms 'education' and 'communication' are often used synonymously in public health nutrition. The practice of nutrition education and communication is usually viewed as a deliberate effort to improve nutritional well-being by providing information or other types of educational and behavioural 'interventions'. The earliest nutrition programmes only disseminated nutrition information. They perhaps assumed that if people were given information; they would change their attitudes and in turn change their behaviour. Realizing that effectiveness of programmes should not be assumed but measured, nutrition educators began to apply nutrition knowledge tests, which evaluated nutrition knowledge, but attempts were a few to measure attitudes and practices. Later, more studies were developed to measure effective and behavioural outcomes as well as cognitive ones. Currently, the concept of communicating nutrition has been introduced into the field of nutrition education. The obvious shift in development communication thinking – from modernization to dependency to multiplicity and to participation was more or less seen even in nutrition communication research and practice as well. Given this global context, the present paper attempts to review the trends in nutrition education and communication in India. Attempt is also made to document some efforts that used various approaches like 'social marketing', 'advocacy', 'participatory communication' and 'information and communication technology (ICT)' for nutrition education and communication.

Keywords: Nutrition communication, Nutrition education, Health communication, Nutrition policy

Introduction

Integration of nutritional concerns in various developmental policies is now being recognized as an important tool in planning. The Government of India adopted the National Nutrition Policy in 1993. The Government also developed a National Nutrition Mission with a view to address the problem of malnutrition in a mission mode. Nutrition surveillance in some states is receiving adequate attention and is being carried out as per the Nutrition Policy (FNB 1993). The National Plan of Action on Nutrition (NPAN) stresses the need for

synergistic relations among governmental and non-governmental agencies and private sector for ensuring good nutrition to all. The importance of nutrition education and communication is well documented in this plan when it emphasizes that "advocacy, communication, training and social mobilization play a crucial role in operationalizing this Plan of Action" (FNB 1995).

A surfeit of nutrition and health programmes was developed to cover all aspects of lifecycle. These programmes aim at elimination of hunger and associated diseases. The three most important nutrition

programmes viz., National Nutrition Anaemia Control Programme, National Prophylaxis Programme for Prevention of Blindness due to Vitamin A Deficiency, and National Iodine Deficiency Disorders Control Programme – are aimed at combating three important micronutrient deficiency problems namely anaemia, blindness and iodine deficiency disorders respectively. Despite implementation of these programmes for quite a long time, impact evaluations at different points of time showed poor coverage. The main bottlenecks being lack of proper orientation of health functionaries and poor beneficiary compliance are due to low-awareness among beneficiaries as well as general public due to weak IEC (Information, Education and Communication) component or its inadequate usage to create awareness (Vijayaraghavan *et al.*, 1982).

The Integrated Child Development Services (ICDS) scheme which was launched in 1975, tried to integrate nutrition education with nutritional services, primary health care and development programmes for children. The main beneficiaries under this scheme are pregnant and lactating women and pre-school children. Despite all these measures, proper communication and creation of awareness about these programmes to ensure compliance and participation is again the weakest link (ICMR, 1989; Sarma *et al.*, 1992; NIPCCD, 1992). There has hardly been any evidence of separate evaluation of the nutrition education and communication components in any of these studies, however the impact evaluations have in retrospect looked at nutrition education and communication component as the area that needed more attention. In India, while very negligible proportion of the research in community nutrition has been devoted to nutrition education and communication, there is a dearth of published literature even of the scattered studies and smaller experiments conducted in different parts of the country by NGOs, University Departments and students, etc.

Given this background, this paper attempts to define and document the trends in the area of nutrition education and communication research over the last century initially in a wider perspective and the specifically in Indian context.

Nutrition education

More than 2000 years ago Hippocrates wrote: 'let food be your medicine, and let medicine be your food'. The statement, made by the founder of physic, is often used by nutrition scientists as an advertisement to emphasize the need for knowledge and proper understanding of nutrition. Almost 200 years ago Anthelme Brillat-Savarin, a French lawyer and politician who gained fame

as an epicure, gastronome and the pioneer of the genre of the gastronomic essay said, 'the destiny of nations is determined by what and how they eat' (Cannon 2002). These draw people's attention to the need to educate themselves about the importance of food and right nutrition. In fact, the practice of nutrition education is about as old as any of the so-called 'helping professions' such as nursing and counselling. While there are many definitions of nutrition education, one striking characteristic is that it is viewed as a form of planned change that involves a deliberate effort to improve nutritional well-being by providing information or other types of educational/behavioural interventions (Sims 1987). Following are some of the important definitions found scholarship on nutrition education:

Nutrition Education is a means of translating nutritional requirements of food, and adjusting the food choices to satisfy nutritional, cultural, psychological and economic needs (Albasena 1971).

The process by which beliefs, attitudes, environmental influences and understandings about food are converted into practices, which are nutritionally sound and consistent with individual's needs, purchasing power, available food sources and socio-cultural background (Devadas 1977).

Nutrition education is that group of communication activities aimed at achieving a voluntary change in nutrition related behaviour to improve the nutritional status of the population. (Andrien 1994) .

A set of learning experiences designed to facilitate voluntary adoption of eating and other nutrition-related behaviours, conducive to health and well-being (Contento *et al.*, 1995).

Activities to inform the public about advisable food choices (based on scientific evidence) had started soon after the turn of the previous century (Sims, 1987). In the American context, W.O. Atwater, the first Director of United States Department of Agriculture's (USDA) Office of Experiment Station is credited with charting a new course for nutrition education at USDA, by using the scientific process to develop dietary guidance to improve the health and well-being of the population. In a *Farmers' Bulletin* published in 1902, Atwater emphasized the importance of variety, proportionality and moderation in healthful eating (Welsh 1994). Although nutritionists have been engaged in nutrition education for many years, few have questioned its efficacy. It was perhaps assumed that nutrition education research would result in positive outcomes. Even the very few evaluations that were conducted during the early part of the 20th century were subjective and more focused on finding out how well the audience liked a specific programme (Gillespie 1981).

Nutrition education programmes – Awareness creation or behaviour change?

A review of nutrition programme evaluations for three decades between 1930s and 1960s conducted by McKenzie and Mumford (1965) concluded that only a few were objectively conducted. Whitehead's (1973) review of the studies spanning 70 years found that nutrition education has been directed more towards the purpose of disseminating nutrition information than toward the purpose of improving dietary habits. Such an approach was effective in increasing knowledge, but was not very effective in changing dietary behaviour or practices. The assumption was perhaps that people were given information; they would change their attitudes and in turn change their behaviour to be consistent with their newly acquired knowledge. Realising that effectiveness of programmes should not be assumed but measured, soon nutrition educators began to apply nutrition knowledge tests. These tests measured changes in the cognitive domain. A review of studies conducted in the 1960s and early 1970s showed that many of these tests only evaluated nutrition knowledge, but few attempted to measure attitudes and practices (Gillespie 1981). Later, more studies were developed to measure affective and behavioural outcomes as well as cognitive ones. This gave greater insights into the degrees of success and failure of the programmes. Many studies still focus on developing a programme and testing it with a sample audience, while effective nutrition education should result not only end in the acquisition of knowledge and skills, but also bring out desirable changes in the eating habits of the learners.

A meta-analysis conducted by Johnson and Johnson (1985) reviewed all the available research in nutrition education till the mid-1980s in order to assess effectiveness of nutrition education and to delineate new directions for future research. They reported their observations on impact of nutrition education in terms of knowledge, attitudes and behaviour, since these were the most commonly measured variables. Their meta-analysis of 303 studies found that nutrition education resulted in an overall improvement of 33% in knowledge, 14% in attitude and 19% in dietary practices. They also indicated that a wide variety of instructional procedures were used in the studies and many of the studies involved participants not in designing communication methods but in planning menus, preparing and tasting foods. Finally the study concluded that as many as 80% of the studies used more than one educational method creating interactions among instructional strategies, thus, making

it difficult to determine the relative effectiveness of each.

Influences on nutrition related behaviour

Exposure to new information or services, which is thought to induce knowledge acquisition, may not result in change in attitudes and/or dietary behaviour. Ignorance largely is a result of illiteracy, socio-economic factors and food belief systems that may interfere with behaviour change, even though the awareness is increased among the people (Nayak 1999). Cultural pattern, socio-economic status, concept of health and illness are key factors in determining the dietary pattern of the community (Rau 1968). The approach that is used most often in health and nutrition education programmes is 'top-down' with the planners designing the media material to provide information to the community, from a central point without taking into consideration the regional and socio-cultural differences that exist within the populations (Nayak 1999). Smitasiri (1994) suggested that traditional nutrition education efforts in less developed countries are based on the assumption that people lack nutritional knowledge leading to nutritional problems, and that when people correctly learn about nutrition, they will act appropriately according to their knowledge. Lack of theoretical framework has been considered one of the weaknesses in communication programmes. Messages were usually medically oriented and mainly addressed nutritional diseases and how to avoid them. The information provided was what the planners perceived as important for the community to know. In most of the less developed countries, inter-personal communication was expected to be the main channel for traditional nutrition education. The volunteers in the existing health set-up, trained in basic nutrition without proper media materials, are identified as key communicators. These could be stated as some of the reasons for the failure of intervention programmes to make a measurable impact (Nayak 1999).

Nutrition education, communication and promotion

A distinction is often made between the terms *nutrition education*, *nutrition communication*, *nutrition promotion* and *information, education and communication (IEC)* (Graeff et. al., 1994). There is a great deal of overlap in actual practice. In the last couple of decades, a dramatic change has occurred in the definition as well as in methods of nutrition education. The traditional definition of nutrition

education is a process of giving the wisdom of how to acquire, prepare and consume foods that are good to eat (Gussow 1984). While the focus of education activities is on changing individual behaviour, there has been a growing recognition that the health of individuals and their health-related behaviour are products of that individual's continuous interaction with his or her environment. This includes the family, community, culture, social structure, and physical environment (Smith 1997).

Currently, the concept of communicating nutrition has been introduced into the field of nutrition education. Education activities can include *information* processes, which are generally designed to inform unilaterally, whereas *communication* is a two-way process. To communicate, based on its roots from Latin, means to have a common understanding. It is believed that this concept is broader and allows for consideration of 'people' as individuals in communities and not 'students' in a classroom (Smitasiri 1994).

One of the pre-requisites of good communication is that it should be continuous and reiterative. Communication research findings suggest that behaviour is a difficult and slow process that requires many messages and over a long period of time (Yarborough 1981). Campaigns should be based on multi-media approach and should be continuous while being culture-specific. Nutrition communication should be phased over a period of time, as people move through different steps of behavioural change (un-aware, aware, concerned, knowledgeable, skilled, motivated-to-change, trial and sustained behaviour change).

One of the major factors in bringing about positive behaviour change is creating an enabling environment. Recognizing this, the Ottawa Charter for Health Promotion (WHO 1986) developed by 38 countries identifies five interdependent domains for action in promoting the health (including the diet related health) of individuals, groups and populations. They are (i) building healthy public policy; (ii) creating supportive environment (iii) Strengthening community action (iv) developing personal skills (*education*) and (v) reorienting health services (*to promote health as well as treating illness*). In this way, educational strategies to bring about behaviour change in individuals are given structural and environmental support. This has led to definitions of *health (nutrition) promotion*, which still have *education* as a central activity. One such definition describes health (nutrition) promotion as a combination of health (nutrition) education and related organisational, economic and environmental supports for enabling behaviour change of individuals to promote (nutritional) health (Green and Anderson

1986).

Developing nations have a wide array of nutritional problems, and some countries have a mixture depending on their stages of development. Directing nutrition communication interventions precisely at such specific target groups is thus a real challenge. Experiments from different parts of the world have been directed at implementation of various media-based nutrition education strategies with positive results (Valyasevi and Attig 1994). Much of the present work in nutrition education and communication is now viewed from a broader framework as a process (ie., a mechanism for interaction among participants) and as a resource (applying a co-ordinated, multi-sectoral and interdisciplinary effort) toward improving and sustaining the nutritional status of the most vulnerable groups. Several approaches to nutrition education have been developed and effectively applied over the years. These include: *social marketing, social mobilisation, and development-support communication*. These approaches have some basic commonalities: (i) the ultimate goal is to improve the quality of life of people through a participatory process of communication, (ii) there is a demand to establish a dynamic relationship among the participants of the programme: the subjects of the nutrition education intervention, the policy makers, the planners, and the implementers, as well as the evaluators, (iii) information, education and communication (IEC) strategies are built into the process, and (iv) the core elements of the process are: formative research, assessment and analysis; capacity building; development of a multi-channel communication strategy; community organising; networking, alliance-building, and co-ordination with linkage and support systems; design, pre-testing, and development of messages and materials; and monitoring and evaluation (Stuart & Achterberg 1995).

While nutrition communication has been relying largely on inter-personal communication, a multi-pronged approach to educate the opinion makers, policy framers and implementers is being looked at as the need of the hour. After all, positive change in behaviour needs an enabling environment.

Participation and nutrition communication

Many communication scholars believe that involvement of people in the communication process may enhance the likelihood of program success by stimulating two-way communication. Bordenave (1994:43) defines participatory communication, "as that type of communication in which all the interlocutors are free and have equal access to access to the means to express

their viewpoints, feelings and experiences. Collective action aimed at promoting their interests, solving their problems, and transforming their society, is the means end.”

The rationale behind participatory communication is that it eliminates a one-way, prescriptive, and non-participatory approach to development. Thus, it involves people (development recipients) in two-way dialogical interactions in the design, development, implementation, and evaluation of development projects. Similarly, the involvement of people in a development communication process is very important, as they are the ultimate beneficiaries of development communication policies and planning.

Participatory actions rest on two-way communication and development. Two-way communication helps eliminate the lacunae of a top-down approach, which usually neither involve people in different phases of a development project, nor consider local conditions and constraints. Experience has shown that when a community is fully involved in the design, implementation, monitoring and evaluation of nutrition and other development projects, these are likely to be more effective and sustainable. Such participatory efforts more often meet the real needs of the people in the community and achieve results that can be continued with minimal external inputs (FAO 1994).

In view of the growing importance of the involvement of people in a development project, it appears that some of the nutrition-related projects in various parts of the world have already successfully applied participatory communication approach in their projects (Khadka 2003).

Some nutrition communication approaches

In their commentary, Valyasevi and Attig (1994) have listed four most common strategies being used today based on the experiences and reports given by 10 South and East Asian countries at the FAO-sponsored Inter-Country Workshop on Nutrition Education for South and East Asian Countries (held at Salaya, Thailand, in February 1993). They are:

Information dissemination: This model usually (but not always) is used more in least developed and developing nations, which have limited communication capabilities. This approach parallels the “knowledge dissemination” model. According to this model, if people receive the knowledge they need to change, then change will automatically follow. However, “knowledge” is here extended to “information” in general, since not all of what is transmitted can be

considered knowledge, at least in terms of how the receiver interprets it. The mechanisms for providing information range from posters to radio and television spots to non-participatory group counselling sessions where a “teacher” provides knowledge to target group members.

Educational communication: This approach is a mass media approach used to persuade people to adopt a new product, service and/or behaviour. It is close to the information dissemination approach, but often goes beyond information dumping to apply a social advertising strategy to encourage people to try something new. However, people are not always told how to use the product properly, and countless experiences have shown that use of mass media alone is not effective in leading to behaviour change (Achterberg 1993). At the other extreme, education can occur primarily through face-to-face instruction in non-formal health care clinics, such as village or district health stations. Some pamphlets, brochures or posters may be used, but the assumption is that a person can be convinced to adopt a new behaviour by using traditional teaching and educational approaches. This method was common in the 1950s and 1960s, and to some extent it did lead to behaviour change. The educational communication approach rests largely on a top-down model of communication where information is passed down the hierarchy from official or doctor to patient.

Participatory action: Many non-governmental organizations claim that their primary focus is on participatory action and empowering people to identify their problems, determine viable solutions and implement and evaluate interventions using their own resources. It is premised on the practical reality that nutrition-oriented development projects cannot be sustained at the grassroots level if these are planned from the top, focused on individual components and isolated from a total development process. This strategy relies heavily on a participatory action research (PAR) framework and a bottom-up development approach. The participatory strategy is very effective on a small scale and has the potential to be so, on a large scale as long as the momentum continues and people remain involved.

Participatory communication: Today, the communication component and the participatory action component are being joined into a combined top-down/bottom-up participatory communication process (Smitasiri, Attig and Dhanamitta 1992). Efforts in Thailand provide a good example of this strategy, where borrowing from approaches such as social marketing, planners have combined the traditional creative media and interpersonal education strategies of

communications with the learning-by-doing programmes of concrete participatory action.

Participatory communication has two very important characteristics. First, it focuses on people's felt needs through the use of formative research which entails the collection of data and information to identify important factors that may affect a programme's acceptance; these considerations are then incorporated into a communication programme's design. The intent is not to confront people with their inappropriate beliefs or resource constraints, but to use these beliefs to build nutrition communication programmes. The second important aspect of participatory communication is that it focuses primarily on changing the environment in which people see themselves. People are a product of their environment, and the latter must be conducive to change before people can be asked to change. Social mobilization is based upon creating a local need and demand for change by initially focusing on how people view their environment, rather than how they view themselves. Once again, this need and demand rests on formative research into the needs of the people themselves. In this context, the term "people" does not mean vulnerable target groups only, but target audiences. The general public is not a uniform mass and should not be treated as such. Rather, it should be separated into specific groups according to their characteristics, needs, wants and predispositions. Media and interpersonal action programmes can then take these characteristics into account and become more effective behaviour-change mechanisms (Achterberg 1993).

Trends in nutrition education and communication research in India

In the Indian context, in proposing his plan on nutrition research in India way back in the 1900s, McCarrison (the first Director of NIN) had included community nutrition education as one of the activities. Towards this end, popular books and pamphlets were prepared by him, which were continued later by his successor, Aykroyd. Although there were many such scattered efforts there was hardly any concerted strategy for education. It was in the late 1960s that there is evidence of individual nutrition scientists to develop 'appropriate' methods of nutrition education consistent with the socio-economic and cultural background of our population (Narsinga Rao 2005). In the early 60s many studies carried out by the scientists of NIN, have emphasized on nutrition education for schoolchildren. Studies examined various aspects like nutrition component in school syllabi and teaching nutrition in schools

(Chapakam and Balasubramanian, 1967a,b,c). In 1970s, studies looked into finding effective media in given settings to carry the message of nutrition to various groups of people (Devadas 1977); nutrition counselling as tool to disseminate nutrition information (Dastur et al., 1976) etc. Berg (1970) wrote that the Indian preference was to approach nutrition education as not so much a nutrition problem but as a communication problem. Earnest efforts were made through the mass media and by commercial advertising agencies to go beyond the 'four food groups' clichés of the standard nutrition posters. There are hardly any studies evaluating this communication drive. In the 1980s, some studies looked into the use of mass media for dissemination of nutrition messages and their relative effectiveness in doing so (Kaliperumal, 1986; Mathur and Joseph, 1986). Around the same time, studies conducted by Parvati Rau (1991, 1994) proved that folk art forms could also be used as effective media for nutrition education. In 1980s ICMR funded a string of projects on nutrition education to various groups (Narsinga Rao, 2005), most of them aimed at providing nutrition education interventions and assessing knowledge increment. However, the studies concluded that due to economic factors people were unable to put knowledge to practice. In this connection there are lessons to be learnt from the Tamil Nadu Integrated Nutrition Programme (TINP), implemented since the 1980s. TINP had integrated health and nutrition interventions with a major communication component. There were some lessons to be learnt from this project. The communication strategy segmented the audience into primary and secondary targets and strategies were carefully planned for both. Two-pronged communication was used for the primary target group and one-way communication for the secondary audience. The primary target group was mothers, mothers-in-law, and fathers. Counselling was used and was supported by flip charts and flash cards. The secondary target group was the rest of the population. The methods used were films - incorporating popular film tunes, filmstrips, and slides. Pamphlets were available for the literate and the popular folk medium "*Villupattu*" was also used. Although no separate evaluation of the communication strategy was conducted, it was well accepted that a major contribution of the communication strategy was to increase the community's use of services and it was emphasized that communication activities should be supported by other services/strategies which make it possible to act on the messages (Vijayaraghavan 1997). Studies by NIN have also used social marketing techniques for imparting nutrition education (Nayak 1999). In studies conducted over the past decade,

internationally accepted school-based education modules and computer-based education tools have also been used for nutrition education (Subba Rao et al., 2006; Vijayapushpam et al., 2003 and Raghunatha Rao et al., 2007).

Nutrition education/ communication - A multi-pronged approach

Today, nutrition education and communication is viewed from a broader framework as a mechanism for interaction among participants, and as a resource, applying a co-ordinated, multi-sectoral and interdisciplinary effort (Stuart and Achterberg 1995). Nutrition communication is now an umbrella term for a wide range of education and other approaches that aim to influence nutritional status (Smitasiri et al., 1993). Some of the following have been experimented with:

Social marketing: One reason why social marketing has become popular in recent years is that nutrition communication's goal is to facilitate change in nutrition-related practices and status. This usually requires increasing the demand for specific foods and practices (Smitasiri et al., 1993). Social marketing uses business marketing principles to advance a social cause or idea (Kotler and Zaltman 1971). It is described as a social change management technology that involves the design, implementation and control of programmes aimed at increasing the acceptability of a social idea or practice in one or more groups of target adopters (Kotler and Roberto 1989). The strategy adopts the four Ps of marketing, namely product, price, place, and promotion. In the 1990s, this strategy was successfully used in Thailand for promoting Vitamin A rich foods (Smitasiri et al., 1993). Elsewhere in the world, a great deal of experience has been documented in the social marketing of breast-feeding, weaning foods, oral rehydration salts, and immunisation (McKee 1992). In India too this strategy was successfully used to promote nutrition education in Anantapur District of Andhra Pradesh (Nayak 1999)

Advocacy: Advocacy is a planned communication effort to persuade decision makers at policy, planning, and management levels to adopt necessary policies and allocate resources for a cause (Stuart and Achterberg 1997). In the Indian context, international organizations like WHO and UNICEF have been using this strategy to encourage various stakeholders from different sectors of government realize the role envisaged for them in implementing the country's food and nutrition plans and policies. A workshop was organized in April 2005 in India for representatives from seven Southeast Asian countries and many such workshops are being planned

(WHO, 2005). Other efforts involve depicting the effects of malnutrition as functional and economic consequences for mobilising support for policy makers. International organizations like CARE-India with the support of WHO prepared advocacy material based on PROFILES programme developed by Academy for Education Development, USA. These material clearly elucidate the cost-benefit ratio of investments needed today to save the impending economic losses to the country due to less productive malnourished manpower (Subba Rao, et al., 2005).

Participatory communication: Bordenave (1994) defines participatory communication as that type of communication in which all the interlocutors are free and have equal access to access to the means to express their view points, feelings and experiences. It is believed that participatory communication may enhance the likelihood of program success by stimulating two-way communication in the program. The rationale behind participatory communication is that it involves audiences (people/communities) in dialogue, collaboration, and decision making while considering them as the ultimate and perhaps the most important beneficiary of development process. As a result, such communications process can address a whole range of social, cultural, political, economic, and environmental issues affecting people's nutrition and health (Khadka 2003). Experience has shown that when a community is involved in the design, implementation, monitoring and evaluation of nutrition and other development projects, these are likely to be more effective and sustainable. Such participatory efforts more often meet the real needs of the people in the community and achieve results that can be continued with minimal external inputs (FAO 1994).

Edutainment using information and communication technology: While the multimedia CD-ROM market is exploding with programmes for children, there are only a few nutrition education programmes. Although the ability of multimedia programmes to capture children's attention, increase their knowledge and change behaviour is widely documented in the developed world, there are very few studies that compared the efficacy of teaching tools in experimental designs. A study carried out by Turnin et al. (2001) concluded that using computer-based nutritional teaching method at school provides an additional and modern support to conventional teaching. In the Indian context, Vijayapushpam et al. (2003), documented that CD-Rom based intervention brought about significant improvement in the knowledge of the school children. Contrary to this observation, a study by Raghunatha Rao et al. (2007) proved that the CD-Rom intervention was not of any additional value over the classroom-based

intervention. It has also been observed that a majority of the adolescent girls paid attention to the classroom lecture given by the science teacher using folders, slides and charts and they interacted more with the teacher. During the intervention with audio-visual CD, the attention of the adolescent girls was very low indicating the effectiveness of the traditional classroom teaching method. The authors indicated that this could be due to the reason that most of the girls viewed computers as entertainment devices than educational devices.

Food labels as modes of nutrition communication:

In the west now food labels are being viewed as important modes of communication. This is one potentially powerful tool of communication not often considered when traditional channels are discussed (Goldberg 1992). In addition to the ingredients list, the nutrition-labelling panel gives important information about nutrient content, thus enabling the consumers to make healthy choices. This becomes all the more important in the Indian context too as over 59% households buy packed foods sometime or the other (Polasa et. al., 2006). Though studies in other parts of the world reported that about 40% of the consumers do not check the food labels (Surujlal and Badrie 2004; Yang et al., 2000), it was observed that women, especially those with higher educational levels, were more likely to check food labels than men (Yang et.al., 2000). In a study conducted in the south Indian states, Subba Rao et.al., (2007) too observed that the literate women were more likely to check label information and concluded that efforts can be intensified to familiarise quality symbols on food labels, which can be identified even by the illiterates.

The way forward

As the National Nutrition Policy of the Government of India recognizes that "...nutrition affects development as much as development affects nutrition..." (FNB, 1993:2), nutritional concerns are being integrated into various developmental policies and programmes being taken up at various levels by the Government. Non-Governmental Organisations (NGOs) and international organisations like WHO, UNICEF and FAO are also putting in considerable efforts in taking the message of nutrition to the community. In some cases all the three sectors (Government, Voluntary, and International Organisations) are working together. All these organizations are emphasizing the need to involve the beneficiaries in the process of evolving programmes and/or in implementing the same. But in many of these endeavours, there has hardly been any evidence of separate evaluation of the nutrition education/

communication components. There is a dearth of published literature even of the scattered studies and smaller experiments conducted in different parts of the country by NGOs, University Departments and students. This underlines the need for systematic documentation of all nutrition education and communication programmes.

This review indicates that nutrition education is a necessary but not a sufficient condition for bringing about the desired behaviour change. Hence emphasis should be laid on creating an enabling environment for adapting and maintaining positive behaviour change. The following conclusions arrived at by an earlier review done by Stuart and Achterberg (1997) also hold good in this scenario: (i) nutrition education and communication should be thought of as an integral part of a country's development plan; (ii) changing food and nutrition behaviours to improve nutritional status at a country level is a long process comprising many steps, in many sectors, at many levels; (iii) nutrition education and communication programmes need to be comprehensive and co-ordinated for effectiveness; and (iv) nutrition education and communication problems need to be participatory in nature for effectiveness. More studies are needed to document and evaluate advocacy as an approach to muster support from the policy makers for nutrition programmes.

Participation has become a part of development jargon. When the development bureaucracy, the local elite, and the people are working cooperatively throughout the decision-making process and when the people are empowered to control the action to be taken, only then there can be genuine participation (White, 1994). In real life situations, in different nutrition communication programmes too the extent of participation varies and accordingly the model adopted is likely to differ. In a country like India, which is in the phase of transition, more studies are needed to evaluate the efficacy of participatory communication strategies in raising the nutritional status of the people. More studies are also needed to evaluate the effectiveness of ICT and food labels as media of nutrition communication.

The above review has clearly indicated that integrated, multiple strategies seem to work, i.e., a combination of different actions is widely seen as responsible for the success of a holistic communication strategy. Although, communication strategies used interpersonal and mass communication interventions, in many a successful project, several stakeholders and organizations worked in many ways towards a common objective. The need for increased sensitivity to the problems of applying strategies that have been

successful in specific contexts to the others is also brought out. This means that the communication strategies that aim to mobilize communities for the cause of nutrition need to adopt different characteristics in different circumstances and the multiplicity of approaches is based on the context and 'felt' needs.

Moving away from top-down models of communication that concentrated on effects and effectiveness of an 'intervention', the focus of different approaches now seems to be on various aspects like beneficiaries, the consideration of various stakeholders, participation, outcomes, data gathering, analysis, and a multi-channel versatility. However, the strategies or approaches decide the content while the content is largely decided by the context.

Hence there is a need to critically examine different models, approaches and content for communicating nutrition in different contexts both at micro and macro levels. While attempting to do so, it is also pertinent to critically examine the context in which key actors in nutrition communication work and their considerations for choice of a model or approach for nutrition communication.

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The nature of coverage of environmental issues in the online editions of leading dailies in India

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Abstract

Worldwide people are increasingly aware of and concerned about the environmental issues and its impact on the humanity. The mass media should play a proactive role in creating awareness and persuading the masses in favor of a greener and eco-friendly world. An attempt is made to study how responsible are our media in the coverage of environmental issues in India. For this purpose, two English dailies (online versions) published from India namely *The Hindu* and the *Times of India* were identified based on their circulation and popularity in the State. Content Analysis was employed to study the extent of environmental news coverage given by these two newspapers addressing the following questions: What is the proportion of environment news in the two online versions of English newspapers? What are the content characteristics of environment news? What is the amount of space devoted to environmental news? How often government authorities and influential personalities support news? What is the average story depth (number of sources in each story, angle of coverage, tone of coverage and pictorial support)?

For this study, all issues published in 2008 by the two sample dailies form the population and a sample of seven composite weeks were constructed for the study. All news stories (except advertisement, external links and special supplementary materials) published in each online edition on the selected days were coded and analyzed. The unit of analysis considered in this study was a complete article. The variables such as story placement (front page [home page] or other pages [link pages]), length of the story (number of words used, links given [both internal and external]), type of story, appearance of government and influential political figures were studied.

Keywords: Environment communication, Content analysis, Environment news, Online newspapers, Supplementary material

Introduction

Worldwide people are increasingly aware of and concerned about the environmental issues and its impact on the humanity. The mass media should play a proactive role in creating awareness and persuading the masses in favour of a greener and eco-friendly world. The mass media, scientific research, and government policy, as well as public attitudes and behaviors, all intersect to influence how we perceive, interpret, and act on environmental concerns. According to Dorji media could

play in environmental education by extending coverage on environmental themes (Dorji, 1997).

According to Domfeh, in a typical developing nation like Ghana, where the wave of environmentalism sweeping across Western Europe, North America, and other developed countries is markedly lacking - and where the majority of the population is ignorant of the dangers of environmental degradation - the press remains an important channel through which various groups and individuals can be informed and can articulate their views on the environment (Domfeh, 1999).

According to Rice, the practical influences on media portrayals of climate change are misreporting or miscommunication, public misunderstanding, low levels of journalistic training in science, media time and space constraints (especially in television), commercial pressures on media to be more profitable, event orientation, the “technophobia” of many reporters and their editors (to say nothing of the audiences), confusion over complex scientific terminology, focus on “newsworthy” drama and novelty rather than the underlying environmental issue, dependence on official sources, and trends in communication of climate change (Rice, 2007).

An attempt is made to study how responsible are our media in the coverage of environmental issues in India. For this purpose, two English dailies (online versions) published from India namely *The Hindu* and the *Times of India* were identified based on their circulation and popularity in the State.

Review of literature

A study of Takahashi on “Framing climate change: A comparative analysis of a US and a Canadian newspaper reveals various factors influencing media coverage of climate change. They were the country’s political context, media ownership, and focusing events, among others (Takahashi, 2008).

Linda’s research work revealed that Environmental issues are far too complex and too critical to be handled with a spate of opinion pieces and a few feature articles, and then left up to locally affected communities to decide on issues which affect the future health and well-being of entire regions. The manner in which environmental controversies are covered in the media, can and will have dramatic impact on whether resolutions are merely quick-fix band aid solutions, or are viable, long-term, valuable solutions that will serve the future of entire regions and all its inhabitants (Lisle, 2006).

Sandman’s work on Mass media and Environmental risk revealed that Government is the number one source of environmental risk news. This was especially clear in the New Jersey content analysis. When unattributed paragraphs are eliminated, government officials accounted for 57% of all paragraphs in the New Jersey study. Industry spokespersons, by contrast, accounted for 15% of the attributed paragraphs; citizens accounted for 7%, advocacy groups for 6% and experts for 6% (Sandman, 2002).

According to Hoerisch’s comparative study on environmental awareness and environmentally beneficial behavior in India revealed that the focus of Indian

media when covering environment is definitely on local and typical Indian problems like water and air pollution, deforestation and on the campaigns launched by Ministry of Environment and Forests (e.g. against the use of crackers at Deewali or the promotion of bags out of natural materials instead of plastic) as well as government politics while ecological problems at the global level are neglected to a great extent. This fact gives strong evidence to the power of media in communicating environmental issues. She also appended that about 52 % of respondents declared that the information provided by media has been most important in making them aware of environmental problems. (Hoerisch, 2002)

The ‘dependency theory’ of Ball-Rokeach and DeFleur (1976) states that the influence of the media in the construction of meaning is dependent on how readily available meaning-relevant experiences are in people’s everyday life. Most people do not have any experience of global warming, so the media can play an important role.

The theory of agenda-setting states that the salience of an issue in the media has influence on the importance attached to that issue by the public. It says that maybe the media cannot tell people *what* to think, but can tell people *what to think about* (McCombs and Shaw, 1972). In other words, the media seem to have the power to turn people’s attention to global warming.

Ostgaard specified various factors that influence news flow. They were the news source, in the case of foreign news is the circumstance that news services produce news stories as ‘products’ on a market, the individual media company’s editorial policy and market orientation (Ostgaard, 1965).

The online newspapers studied

For this purpose, two English dailies (online versions) published from India namely *The Hindu* and *the Times of India* were identified based on their circulation and popularity in the State. *The Hindu* is the largest daily for more than hundred years in south India. *The Times of India* is the largest circulated daily in India and is popular in north India.

The Times of India is a broadsheet newspaper of Bennett, Coleman Co. Ltd. owned by the Sahu Jain family with the widest circulation among all English-language broadsheets in the world. In 2008, the newspaper reported that (with a circulation of over 3.14 million) it was certified by the Audit Bureau of Circulations as the world’s largest selling English broadsheet newspaper and making them as the 8th

largest selling newspaper in any language in the world. According to Indian Readership Survey (IRS) 2008 it has gained readership by 13.3 million ranking it as the top English Newspaper in India by readership.

The Hindu with a circulation of 1.45 million, is the second-largest circulated daily English newspaper in India after *Times of India*. According to the IRS 2008, *The Hindu* is the third most-widely read English newspaper in India (after *Times of India* and *Hindustan Times*) with a readership of 5.2 million. It has its largest base of circulation in south India, especially in Tamil Nadu operating from Chennai (formerly called Madras), *The Hindu* was published weekly when it was launched in 1878, that became a daily in 1889 subsequently becoming, in 1995, the first Indian newspaper to offer an online edition. The new website retains its core values of independence, authenticity, and credibility while adopting contemporary web design principles, tools, and features. The design is by Mario Garcia Jr., of Garcia Media, Tampa, Florida, USA.

Methodology

This study used content analysis, “a research technique for the objective, systematic, and quantitative description of the manifest content of communication” (Berelson, 1952).

The purpose of the study was to investigate the extent of environmental news coverage given by these two online newspapers addressing the following questions:

- What was the frequency of environment news in the two online versions of English newspapers?
- What were the content characteristics of environment news?
- What was the amount of space devoted to environmental news?
- How often government authorities and influential personalities supported news?
- What was the average story depth (number of sources in each story, angle of coverage, tone of coverage and pictorial support)?

Sampling

This study used the criteria suggested by Wimmer & Dominick and the sampling technique used by Bond, B. J. and Drogos, K. L., 2008 with some modification. For this study, all issues published in 2008 by the two sample dailies form the population and a sample of seven

composite weeks were constructed for the study. Thus, there were 52 days in the sample. All news stories (except advertisement, external links and special supplementary materials) published in each online edition on the selected days were coded and analyzed.

Categories and variables of the study

The content categories were developed drawing on those in previous studies (Kwame (1999), Sandman (1985), Cramer (2008) and were measured in terms of the frequency of environment news in online newspapers and the columns devoted to it (Bansal 2002 & Vilanilam 1975), placement, and themes.

The unit of analysis considered in this study was a complete article. The variables such as story placement (front page [home page] or other pages [link pages], length of the story (number of words used, type of story, appearance of government and influential political figures, source of the news item, actors in the news were studied. Analysis of data was based on descriptive statistics which included simple frequencies and percentages, graphs for these variables.

Operational definition

The definition of environment news used by Domfeh (1999) was adopted as an operational definition. The term “environment” comprised air quality, land quality, water quality, waste disposal, noise pollution, wildlife conservation, environmental additives, and the general or global environment.

Findings

Space devoted to environment news

The Times of India published the highest number of environment news than *The Hindu*. Besides, the mean length (the number of words used) of environment news was highest in the *The Times of India* (347) followed by *The Hindu* (292). The data revealed that *The Times of India* devoted more space for environment news than the Hindu.

In *The Hindu*, 189 stories were published during the sample period and it was lesser than *The Times of India*. In *Times of India*, 446 environment news stories were published during the same period.

Table 2: Frequency of news items in The Hindu

Table 1: The number of environment news stories and the mean length of stories (the number of words used) in Indian online newspapers in 2008

	The Hindu	The Times of India
Number of stories with environment news	189	446
Mean length of the stories	292	347
Percentage distribution of news occurrence	36.3 %	85.7%

Total news	189
Front page	48
National	36
Tamil Nadu	46
Chennai	36

In the online edition of *The Hindu*, they have not allotted any specific space for environment. Hence the front page, national and Tamil Nadu links were content analyzed. The data revealed that 48 times, environment news hit front page, 36 times national page and 46 times Tamil Nadu page respectively.

Table 3: Frequency of news items in *The Times of India*

Total news	446
International	222
National	214
Tamil Nadu	1
Chennai	6

The *Times of India* online edition has given special space for environment and categorized it as global warming, Climate change, Flora & Fauna, Among them,

222 international news, 214 national and only 6 Chennai news were found.

Appearance of government authorities

Previous studies found that media in developing countries very often quoted government authorities or influential political leaders when covering environment news.

Table 4: Frequency of sources used in the both online newspapers

Sources	Times of India	The Hindu
Official	182	96
NGO	46	24
Study	47	23
Commercial	23	7
Public	14	8
Court	8	5
Scientist	18	6

Official sources only dominated the environment news in both the online newspapers. Next to official sources, NGO sources and research studies were quoted. The research articles regarding global warming, fauna, climate change were given more importance in both the newspapers.

Content characteristics of environment news

Table 5: Frequency of themes used in the both online newspapers

Themes	The Hindu	Times of India
River linking	1	2
Pollution	14	31
Fauna	15	98
Waste management	2	15
Deforestation	4	6
Developmental issues	30	55
Global warming	11	75
GM food	3	1
Nuclear deal	45	70
Afforestation	11	9
climate change	2	24
Nature scene	2	--
Sand mining	4	6
Man animal conflict	3	13
Others	43	48
Total	189	446

Table 5 lists the environment issues published in each newspaper according to the themes. The table shows that both online newspapers published highest proportion of environment news on issues related to nuclear deal, fauna and global warming and least proportion on issues related to river linking, recycling, afforestation, deforestation, sand mining and genetically modified food. Others included the campaigns, awards, coastal degradation, etc. However, other aspects of environment issues covered differed among the newspapers.

Photographs

Table 6 lists the frequency of photos published in each newspaper. The table shows that both online newspapers published least number of photos of environment news. Also the photos published in the *The Hindu* were mostly of the officials.

Table 6: Frequency of photos used in the both online newspapers

Newspaper	Photos
The Hindu	22
Times of India	12

Table 7 lists the frequency of accredited sources used in each newspaper. The table shows that *The Hindu* depended less on wire services than *Times of India*. The *Times of India* depends more on wire services for reporting environmental news.

Table 7: Frequency of accredited sources used in the both online newspapers

Accredited sources	The Hindu	Times of India
Correspondent	96	107
News Agencies	13	297

Inferences drawn from the study

Based on the findings discussed above, the data supported that *The Times of India* gave more importance to environmental news than *The Hindu*. Both the online newspapers devoted a higher proportion space for environment news. Although the online newspapers are the Internet editions of print newspapers, the present study confirmed that media heavily depended on government sources when covering environment news. *The Hindu* gave more importance to local context. Most of the stories were reported by their staff reporters and special correspondents. Although *The Times of India* devoted more space to environment news, it was mostly sourced from the wire services.

Both the online newspapers have given more space and frequency of news regarding the nuclear deal between India and United States. This was considered important since it was placed as a political issue in both the countries. There was an intense discussion at the political level. *The Hindu* gave more importance to that 123 agreement and hence the special correspondents of *the Hindu* reported from New Delhi, US and elsewhere. Also *The Hindu* has given importance to *Coovum* river (a highly polluted river flowing across the Chennai city) that have been covered by special correspondents *Coovum* pollution.

The Times of India has given more importance to news concerning flora and fauna. News concerning fauna included their extinction, sudden death of wild animals from zoos and sanctuaries, wild life survey, poaching and smuggling of wild animals and the like. Global warming was also largely covered by *The Times of India*.

Regarding visual content, *The Hindu* published more photos of official functions concerning environment issues. *The Times of India* has given less importance to photos regarding environmental issues since most of them originated from news agencies. *The Times of India* has a television channel of its own named *Times*

now. So for important issues like nuclear deal news has video links.

The data revealed that both the online newspapers gave importance to environmental issues in terms of space and frequency. But most of them were event based, political discussions and research studies. Both the newspapers lacked in-depth reporting of environmental news.

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Teaching science fiction in India: Present and future

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Abstract

Science fiction (SF) as we know it today has evolved into a rich genre of literature in its relatively less years of existence. Though there have been many attempts to introduce SF in education, it has not gained a wide currency. Teaching or studying SF in India is almost unheard of; further, our children and young adults are rarely exposed to enough of SF writings. Because of this, we are missing out on using the potential of SF as a medium to popularize concepts from science & technology.

Science fiction being mainly about 'thought experiments', it is exploratory and extrapolative in nature. The richness of the genre is in its 'thinking' beyond the immediate. As SF involves itself in different frames of reference, discusses technological innovations, possibilities & perils, there is a wealth of SF writings that can be used at various levels of education. Further, due to SF's interdisciplinary nature, it can be used while teaching different subjects.

If we compare the situation with that of our western counterparts, we feel the lacuna even more. The strength of SF lies in the fact that it provides the largest and the most flexible space for debates on alternate histories and futures. Exploration and dealing with the problems of the 'otherness' being its natural subjects, it gives newer avenues to deal with different times, places, and beings. SF, at its best, compels the readers to think in a concrete way about the concepts that are usually dismissed as too metaphysical to grapple with. It lets us delve deeper into enquiries that keep emerging in the ever-evolving universe. However, when we study the attempts made to include SF in educational curriculum in India, we come across very few attempts in this direction. This article examines reasons for such a situation. It also attempts to see why this situation should be changed, and how it can be made. The paper ends with some possible directions in which we can work to introduce courses with SF content in different classrooms.

Keywords: Courses, Freshman courses, Future studies, Higher education, School education, Science fiction, Teaching

Our children should be studying Arthur C. Clarke, William Tenn, Robert Heinlein, Ray Bradbury and Robert Sheckley, not because these writers can tell them about rocket ships and time machines but, more important, because they can lead young minds through an imaginative exploration of the jungle of political, social, psychological, and ethical issues that will confront these children as adults.

- Alvin Toffler in Future Shock

Introduction

Science Fiction has become a literature of importance in the academic circles in many parts of the world. Creating, reading and teaching science fiction is being discussed at various forums. However, in the Indian context, there seems a lack of awareness about SF in the academic circles. Not many scholars engaged in literary pursuits are even aware of such a genre, its populist aspects, development of various sub genre, its interdisciplinary nature, etc. Very little effort has been done to introduce enough SF as a teaching tool. This paper studies the scenario in India, the wide gap between what can be done using SF in the classroom and what is being done here. The paper also studies various efforts that have been made in various educational systems outside India, especially in the western countries; this would help us to understand to what extent SF has made inroads into curriculums across the world and to gauge SF's position in education. The paper is forward looking as it suggests some ways of introducing SF as a teaching tool in our education systems.

At the very outset, it has to be noted that SF as an area of study has acquired currency for nearly five decades. Since the first course in SF, introduction of these courses have been happening mostly in the west and an attempt to find out about such efforts in India or even other Eastern countries does not lead us much further. Either, they are non-existent or they are not being documented. Literature survey and speaking to a few scholars in some of the universities in the western countries indicate that the whole issue is handled differently there. Be it the various efforts that were made to introduce SF at Universities, or be it documenting such efforts, they are systematically handled. This is especially so in the United States of America where the experiences by the pioneers are shared through publications in academic journals or conferences. Understanding the efforts made and the experiences gained in running courses in SF serve us a long way as they give us leads and allow us build on the existing modules. It is refreshing to note that the science communication courses initiated by the National Council for Science & Technology Communication (NCSTC) at various universities and institution have a significant module on science fiction, and the Indian Science Communication Society in association with NCSTC is already putting together a course on science fiction.

Teaching SF: An overview

At the very outset, it has to be noted that SF as an area of study has acquired currency for nearly five decades only. Since the first course in SF, introduction of these courses have been happening mostly in the west and an attempt to find out about such efforts in India or even other Eastern countries does not lead us much further. Either, they are non-existent or they are not being documented. As I wanted to understand what all has been/ is being done elsewhere in the world in the area of 'teaching SF' before I could venture into studying it in Indian context, I did a survey of sorts. Internet searches, referring to online journals and speaking to a few scholars in some of the universities in the western countries led me to see how differently the whole issue was/ is handled there. Be it the various efforts that were made to introduce SF at universities, or be it documenting such efforts, they are so neatly made that I am convinced of the importance of such documentation. This is especially so in the United States of America where the experiences by the pioneers are shared through publications in academic journals or even in conferences! Understanding the efforts made and the experiences gained serve us a long way as they give us leads and let us build on the existing modules of education sprinkled with courses in SF.

In this context, I would like to begin by saying that from the first SF non-credit course taught by Sam Moskowitz in the year 1953 to the formal entry of SF courses into the curriculum in the 1960's, and now to a world of academia which offers SF courses under different subjects of study is an impressive journey for SF. The fact that there are now study programs exclusively designed for SF studies, albeit very few, is an encouraging sign. The M.A. in Science Fiction at Liverpool University, M.A. in science Fiction: Histories, Texts, Media at University of Reading, B.Sc. (Hons.) in Science & Science Fiction at University of Glamorgan in Wales and this very University's program 'Center for the Study of Science Fiction' are pioneering efforts in this direction.

Yes, SF has made inroads into the college level curriculum in the west. As I was looking at various curriculums - mostly of colleges in U.S. - I found it heartening that SF has been included in many of compulsory freshman courses. Issue 70, of the Science Fiction Studies journal, documents the number of courses being taught in and through SF till the year 1996. In this issue of SFS journal, a list of about 200 SF courses has been compiled and the titles of courses in this list suggest very many interdisciplinary formulations of SF that have been tried since the first course taught in the 1950's.

Teaching SF in India: The present

For long, teaching science fiction has been almost an alien concept in India. If we consider the school, college and university level education, we find that rarely there have been attempts to incorporate SF works into the education modules. Of the various levels, it's the school level in which we came across some science fictional short stories from time to time. Even in such cases where there have been some attempts to introduce students to SF elements, rarely it came across as a self-conscious genre of literature. The focus in such cases has never been on SF and educators until recently seemed to have ignored the potential of the genre to expand the horizons of young minds.

Besides, we do not find many cases in which SF is being taught at college level. A course in Science Fiction introduced as an elective in Indian Institute of Technology, Madras is one rare attempt to teach SF at undergraduate level. In BITS, Pilani, a course titled Readings from Popular Science Writings, introduced SF writings of Asimov, Huxley, Haldane, etc., to the course takers. However, this course is not running now. Another such attempt has been at Delhi University where a Honours Course was introduced in the area of Popular Fiction (of which science fiction is an integral part). The course is successfully continuing today.

The case is the same at higher levels of learning too. Rarely research scholars take up SF for their M.Phil. or doctoral dissertation. On considering possible reasons for such a scenario, a few points emerged:

- i Science fiction is rarely taken up as a serious subject of study. This can be attributed to lack of awareness about the genre.
- ii The scholars engaged in literary pursuits at university level are hardly sensitized to the richness of the genre of SF.
- iii Not many attempts have been made to use SF in other areas of study, say, that of sciences and social sciences.
- iv Even when a school curriculum has had some sporadically thrown-in SF story, I doubt if the instructors have been sensitized to the 'world of SF' to make their teaching effective. As Dilip M. Salwi, a well-known science writer pointed out, the power of good SF as an educational tool is almost not realized in Indian context. He says, it is not realized that "good science fictions by showing the circumstances and novel milieus, the temperament

and reasoning of the protagonist inculcate scientific temper in a child and prepare him for the scientific and social developments that are to come".

There are some important reasons for this scenario. First and foremost, SF has been for long, an ignored genre of literature in India. By and large we do not have a SF culture in India as yet. Secondly, SF writing happening in India so far has been very less in comparison to the 'mainstream' literature being written. Even when we consider the huge publishing industry in India, SF output has been very less. The list of prominent names of SF writers from India is not very long, though it is growing. Thirdly, the exposure to good SF from different parts of the world is very limited.

Besides these, in the academia too, we have not had the much needed exposure or an atmosphere that is conducive to take up SF studies seriously at higher levels of education. Of the numerous doctoral theses being produced in the area of language and literature, one hardly finds studies in the area of SF. It is hard to find libraries that are self-sufficient to support such research. SF academicians even feel alienated if they focus only on SF studies.

There is yet another dimension to the whole issue: unlike in the West, in the Indian university system of education, there is not enough thrust given to courses in humanities including language and literature. The concept of compulsory freshman courses with some focus towards language, literature, and humanities is a well-accepted phenomenon in the west. In India, it is hardly so. For example, a student who gets into an engineering programme in India mostly studies courses in core Mathematics, Physics, Chemistry, Thermodynamics, etc., as a freshman without really studying any course in humanities. This leaves us educators with not much option in terms of designing courses with contents such as science fiction, literature or other such subjects.

Having earlier said that until very recently our school curriculum has not used much SF as course content, I would now like to draw your attention to the recent change - albeit very small - in this regard. Having been intrigued by this 'lack' of SF for long, and having observed some positive changes in terms of SF output in India, the author decided to examine if there have been some efforts to include SF in course books. At this point, it has to be noted that whatever little presence SF had in school education so far had been done through the course books and 'literature' sections of English. Hence, this search focused on various text books of English for class 4th to 12th as prescribed by NCERT,

after the recent revisions. And the search did not go in vain as the findings are somewhat encouraging. Following paragraph sums up the findings of this survey.

The new syllabus in English, prepared as a follow-up to the National Curriculum Framework 2005 draws on different genres and science fiction is one such genre. It spells out SF as one of the genres to be included in the course content. Being an SF enthusiast, I could not miss this interesting feature: some of the text books were named after the science fictional stories that formed part of the course content of the respective books. For example, the 8th class and the 10th class supplementary readers are named as 'The Alien Hand' and 'Footprints without Feet' - both being titles of SF stories that are part of these books!

On examining the course content as mentioned earlier, it was found that the recently designed books do include contents from SF in its syllabus and it is done in little more structured way. To be more specific, here is a list of the appearances of SF in different classes and the way in which the idea is introduced.

Inclusion of SF course content begins with class 7th literature section. The book offers two stories - 'An Alien Hand' by Indian astrophysicist Dr. Jayant V. Narlikar and 'The Pedestrian' by Ray Bradbury. In the beginning of the lesson, attention is drawn to the SF elements in the stories. Then again in Class 9th, 10th, 11th and 12th there are lessons with SF content in them. A student is exposed to SF short stories like 'The Fun they had' by Asimov, 'Footprints without Feet' by H.G. Wells, 'The Adventure' by Dr. Jayant V. Narlikar and 'The Book that Saved the Earth' a play by Claire Boiko. In class 12th there is something more: in the non-fiction category of English elective, students are introduced to some of the important issues in SF through Asimov's essay 'On Science Fiction'.

These lessons are preceded by a section that orients both the teacher and the learner; at the end of the lessons there are suggestions for further reading. Also some of the questions are designed such that a student gets to differentiate between a SF story and mundane fiction. The possibility of an encounter with aliens and the futuristic aspect of SF get more space in all these lessons and activities. I would like to take up one example 'The Pedestrian' by Ray Bradbury to substantiate the points just mentioned.

The title of the story does not orient the reader to the SF elements in it; but the introduction does this job: "the story is taken from Bradbury's *The Golden Apples of the Sun*. As is true of most science fiction, it presupposes an age of more advanced technology that we have at present and dramatizes its effect on man".

In between the lesson, there are questions and tips for the reader to remain in the SF diegesis. The questions at the end of the lesson too draw the student's attention to the idea of 'alienation' in a technologically advanced world: 'he was alone in the world of A.D. 2052, or as good as alone'. A well-equipped teacher can further enhance the understanding of the issues involved by making the students discuss what does the author suggest when he says 'the tombs, ill-lit by television light, where the people sat like the dead, the grey or multi-colored lights touching their faces, but never really touching them'.

This brings me to stress on the fact that it is crucial to have teachers who have been sensitized to the nuances of SF to benefit from SF in our curriculums. Unless we do something in that direction, SF will remain to be just another genre of fiction studied and forgotten soon after.

However, the good news is that slowly there are some changes that seem to foreshadow a brighter future for the inclusion of SF at least at school level. Indian SF seems to be coming of age, a self-consciousness seems to have set in among the few academicians indulged in SF pursuits. Associations like Indian Association for Science Fiction studies are doing their bit in bringing SF writers, scholars and enthusiasts together. And even school curriculum seems to have taken up the idea of introducing more SF seriously.

Having made these observations, we need to look beyond. Indeed, there is a very strong argument in favor of including more SF in our college curriculum. The next section briefly mentions some important points in favor of this argument.

An argument for introducing more SF at college level in India

Let's begin here by saying there are strong reasons for including SF at a higher level of education in India. The foundation for this argument is the very vibrant nature of SF itself, its visionary insights, its potential for interdisciplinary formulations and its sheer intellectual and imaginative energies.

Yes, science fiction being a literature of 'thought experiments' is both exploratory and extrapolative in nature. It thinks beyond the immediate, involves different frames of reference, discusses technological innovations, possibilities and perils, and projects the shape of things to come. Being the largest and the most flexible space for debates on alternate histories and futures, it has a stimulating effect on the readers and helps in expanding their horizons. Exploration and

dealing with the problems of the 'otherness' being its natural subjects, it gives newer avenues to deal with different times, places, and beings. SF, at its best, compels the readers to think in a concrete way about the concepts that are usually dismissed as too metaphysical to grapple with.

Science Fiction's power to inspire and trigger imagination of the young minds is recognized by many visionaries, writers, scholars, and technocrats. Carl Sagan, famous astrophysicist, science fiction writer openly acknowledged the influential role Clarke's SF played on his young mind. Ben Bova, a renowned SF critic, has a convincing argument in favor of teaching SF, when he says science fiction stands out "like a refreshing oasis of story and significance; a bad teacher must work hard to make it dull" (Bova, as quoted by Lorna S. Dils in *Science Fiction and the Future*)

James Gunn, Grand Master of SF and renowned scholar having spent more than forty years of teaching SF has this to say on what SF has to offer: "the opportunity to stretch the imagination as well as exercise the mind; it can dramatize contemporary problems and consider other ways of existing, behaving, organizing, perceiving, thinking. It is a literature of ideas and a literature of anticipation as well as a literature of change; it can be a literature of education".

These are good enough reasons for us to introduce more SF in our educational curriculums at college level in India. However, SF does more: while taking us beyond the confines of the immediate or mundane concerns of humans, it allows us to think of ourselves as a part of a bigger cosmic design, to outgrow some of our infantile or adolescent tendencies. It calls for expanding our moral horizons beyond the sheer dimensions of humanity.

It would indeed be sad if we continue to ignore the intellectual, imaginative, speculative and extrapolative powers of SF. A genre of literature that can keep pace with the pace of changes we are forced to encounter is going to be an interesting and creative way to educate our younger generation. Just to make one think beyond the immediate- what SF legend Clarke referred to as 'make one look beyond one's nose' - is good enough reason to have more courses with SF content in them.

Looking ahead

Having discussed various issues related to the topic of discussion, here I have attempted to give possible ways in which we can include more SF course content in the Indian context. One of the unique features of SF is the interdisciplinary formulations that are possible using SF. In designing courses we should not lose out on this

strength of SF. Also, the study covers the course content of many of the courses that are being offered in the college curriculum in various universities abroad. After carefully studying them, attempt is made to make various categories under which we can introduce such courses in India. The following categorization may help as a lead in this direction:

- i Genre courses in science fiction: Under this category, courses in SF can be studied as a genre. Science Fiction and Fantasy, Rhetoric of Technology, Topics in Twentieth Century Science Fiction, Contemporary Indian Science Fiction, SF and Postmodernism, Science Fiction in Film and Literature, etc.
- ii Courses in Philosophy: Philosophy courses can make use of SF as case studies. In one of my discussions with a Professor of Philosophy in one of the reputed institutions of India, the idea came up. He referred to his experience in using the famous SF story of 'brain in Vat' story for discussing skepticism. Some courses where we could use ample amount of SF are Science Fiction and Philosophy, Science Fiction of Mind, Introductory Philosophy, etc.
- iii Courses in Future Studies: Future Studies can tremendously benefit from SF. Some courses in this area could be Science Fiction: The Next Generation, Literary Visions of the Future.
- iv Courses in Science and Technology: The relationship of SF and S&T cannot be ignored. Apart from drawing upon interesting SF ideas to trigger a student's enthusiasm for science at school level, we can introduce courses like Biology in SF, Physics and SF at college level. This would be a stimulating, but, a challenging task.
- v Courses in gender studies: Science fiction's approach to issues of gender has been widely varying. Courses like Fiction of Gender and Science, Utopian Political Thought, Gender Images in Science Fiction, Science, Technology, and Society, etc., can handle issues of gender in more interesting ways.

This list is not exhaustive; it is only an initial attempt to see how differently we could use the richness of the medium in our teaching - learning environment. There are many more possibilities which can be looked at,

planned and delivered once the academia is convinced of the usefulness of such formulations.

Conclusions

This paper has attempted to examine various issues related to teaching science fiction in the Indian context. As there have been not many efforts to make SF's presence felt in the academia, the paper examines reasons for such a situation. It also attempts to see why this situation should be changed, and how it can be made. The paper ends with some possible directions in which we can work to introduce courses with SF content in them. One of the overriding ideas has been that we should not miss out on tapping the potentials of a genre of discourse that is very rich in exploratory, inspirational, and visionary quotients.

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Television news and environment

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The 'environment' and 'television' are the two aspects of human life in today's scenario. Both of them have drawn enormous attention in recent times. The environment has become significant mainly because all living and nonliving things depend on it. A good environment means health, prosperity and happiness for all. A bad environment means hunger, disease, deforestation and degradation of biodiversity.

Television, on the other hand, has entered into the everyday life of human beings. Television has the ability to effectively inform, educate and entertain the masses. It helps audiences to form opinions and to motivate them to action. Television can bring to the notice of audiences the wanton destruction of the environment, mainly caused by people knowingly or unknowingly, that threatens the survival of living creatures.

Rise of environmentalism

Scholars have been looking for the causes of rise of environmentalism and have given various explanations in support of their views. Heath et. al. (1985) believed that people usually develop political support towards the cause or issue these days, which has got universal values. Van Liere and Dunlop (1980) suggest that the main supporters of the environmental causes are the white collared middle class people who are educated and have leisure/ life style orientation. The post-materialist, like Inglehart (1990), argue that there has been transformation of value system in the advanced industrial society from materialist to post-materialist values. The basic material need of people in such societies have been met with.

Now they have become more concerned with the issues that affect the quality of life. The rise of the ecology movement is not only due to the fact that the environment is in a worse condition than it used to be but also partly because the public has become more sensitive to the quality of environment than it was a generation ago. There are yet another group of scholars

that thinks of an individual agency for the purpose. The action of pressure group related to environment and their media publicity raises the people's concern. These issues are later acknowledged and addressed by the governments and concerned official agencies.

Problems in production of environmental news

The scholars and professionals have been discussing the causes responsible for inadequate or insufficient media coverage of the environmental issues. One of the reasons is that the media coverage is mostly authority oriented. The World Association for Christian Communication (1989) had declared that the Mass Media and the information industries are structures of power. They are intertwined with national centers of political, economic and military power and are increasingly linked at the global level. Ordinary people are victims of media power and are treated more and more as objects rather than subjects. Hall et. al. (1978) had also expressed similar view. According to Hall et. al. news operates a 'structure over-accessing the media of those in powerful and privileged institutional position' who are thereby able to advance 'definitions of social reality' in accordance with dominant social interest.

Hansen (1990) found that media coverage of public body or authority representative accounted for 23 percent, government 21 percent, independent scientists or experts 17 percent as compared to environmental group who accounted for only 6 percent as primary definer for coverage of the environment. Patterson (1989) has explained how the reporting in American mass media of the Chernobyl nuclear accident was circumscribed by and inscribed itself in the then dominant cold war situation.

There are other reasons for inadequate coverage of environmental issues in media. Nelkin (1987) and Hansen (1991) have observed that several environmental phenomena, namely, Ozone depletion, greenhouse effect and particulate matter, etc., associated with diseases

like cancer, etc., are slow in nature they relatively find less prominence in mass media. But some of the unexpected and visible natural forces such as disaster or accident enter into the media agenda easily because of their high visibility. A similar study by Einsiedel (1990) has mentioned that the time span for unfolding of environmental issues can be over decades or longer, for example desertification of rain forest has been raising alarms since 1940s. Chapman et. al. (1997) says that chances of environmental issues receiving media attention are slim because they do not fall under the category of traditional news value systems. They have quoted the example of coverage of possible impact of Operation Desert Storm on the flora and fauna of the Persian Gulf. Gaber (1993) has mentioned that the media, public and politicians together form the 'national agenda'. This affects the selection of environmental stories in the media.

Another important reason for the inadequate coverage of environmental issues in the media is the problem a reporter faces in covering such stories. Friedman & Friedman (1988) consider reporting of environmental issues a complex task for journalists and often different from other stories because of the following important reasons:

- i Environmental reporting requires expertise in science, sociology, politics, economics, etc., along with the media reporting skills.
- ii Environmental and science writings has been called 'the journalism of uncertainty.' Many a times, experts do not agree on the causes or effects. Moreover, one scientist may contradict the findings of others.
- iii Environmental reporting is often technical and, hence, difficult for the audience to understand. It is a reporter's responsibility to explain the technical words for easy understanding. Often the environmental issues boil down to a battle of interpretation over technical information.

Friedman and Friedman (1989) and Ninan (1990) write that the environment is on the low priority list of editors both in the press and television. Chapman et. al. (1997) discussed two important points, apart from the other, about the problems faced by the journalist for environmental coverage. Some of the environment stories, they write, are well picturised on television. The drought in Ethiopia or the virus affected seals are appropriate stories to be visualized. But it is difficult to

picturise and actually show global warming or the depletion of ozone layer. The prohibitive cost of environment stories is yet another problem. The television crew has to rush to cover the story to the place where it virtually happens. If an illegal whale killing is to be covered in Japan, the TV crew's expenses to reach the locations and send the story via satellite would be substantial. Gaber (1993) has also mentioned of lack of resources at the media set ups to send reporting teams around the world for good footage on environment.

Several developing Asian countries, including India, are faced with some major environmental problems. Friedman & Friedman (1988) have reported that Dr. Emil Salim, Indonesian Minister of State for Population & Environment (who was also a member of WCED) had identified the following major environmental problems in Asia, which by and large hold true for India also:

- i The gap between decline in the birth rate and the decline in mortality rate is the cause of continuous rise in population.
- ii The annual growth rate of economic activity at around 5 percent is increasing the demand for natural resources.
- iii The increasing capital and technology – intensiveness of the production process is un-integrated, causes pollution and resource depletion.
- iv Poverty compels for over exploitation of natural resources and degrades environment.
- v Low prices of agriculture products in the international market leads to more use of natural resources.

Friedman & Friedman (1988) observe that there are many more environmental problems in Asia, which journalists must understand to communicate to the people. Another important problem in the country like India is the media codes imposed especially in the public media organizations. The media controlled by private business may have their own vested interests. Both the public and the private media exercise their direct control or influence through finance, or advertisement. Ninan (1990) has observed how environmental news coverage in India has been affected by pressure from these.

Chapman et. al. (1997) has cited the problem of translation of technical terms with reference to environment, from English to language media in India.

The journalists find it difficult to translate English words into the regional languages.

Environmental awareness and education

Researchers agree that media can play an important role in environmental awareness and education. Friedman & Friedman (1988) believe that the reporter, especially in Asia, must play the roles of informer as well as educator. The audience can be educated by providing in-depth and contextual information framed in a way to lead the viewers to redefine their judgment. They should also help the reader keep in mind environmental issues, even when they are not the headlines. According to Abraham et. al (1990), the 'critical public educator approach', in which a public educator tries to involve people in evaluating the issue, is the most dedicated one to educational function. For this purpose, the media has to be democratized to involve the public by open debates. Abraham et. al. argue that TV education should be entertaining and the TV entertainment be educative.

Portrayal of environmental issues in news bulletins

Research findings have established that the coverage of environmental stories have not only increased but has become a regular feature of television news bulletins. Nevertheless, environmental stories still lagging behind other stories as far as their number and duration are concerned. Hansen and Dickinson (1992) in his content analysis study of science coverage in British media had found that the four terrestrial television channels (BBC-1, BBC-2, ITV, and Channel-4) had environmental stories amongst the top four science stories:

A comprehensive work on media output on the environment in India and U.K. has been done by Chapman et. al. (1997). Their data collection of six weeks of BBC-1, BBC-2, ITV, Channel-4 and Doordarshan was spread over a period of one year. Their important findings related to environment on TV are given below:

- i The coverage of the environment ranged between 3 to 5% in all the channels except Doordarshan where it was 12%.
- ii Most of the Environmental news (that is 98%) in Doordarshan is about India only.
- iii The average position of the environmental stories in bulletins of the channels, namely, BBC-1, BBC-2 and ITV ranked ninth, fourth and sixth respectively.

The stories on Doordarshan are little more likely to occur in any place in the bulletin whereas in U.K. the tendency is to push the story lower.

- iv Public broadcasting in Britain is more distanced from government as compared to India. Doordarshan mostly reports government point of view. Mainly the development issues many a times go against the cause of environment.
- v The U.K. Channels depend less on documentaries, include drama element to some extent and studio location are least seen for environmental output as compared to Doordarshan which has higher percentage of studio location, documentary and discussion programmes.

In a study on media and biodiversity, Pavarala (2002) found that the issue of biodiversity is given low priority in the Indian news media. Compared to television, the print media gave more stories on the biodiversity. The newspapers (*The Times of India*, *Deccan Chronicle*, *The Hindu*, *Eenadu*, and *Navbharat Times*) had given 3% of their space to the issues concerning biodiversity during the period from January to June, 2001. The TV news, according to Pavarala, is indifferent to the topic. The DD News gave 0.54%, and Star News 0.23% of the time of their bulletins whereas ETV and Zee News did not carry the story on biodiversity during June to September 2001.

Ahmed (2004) in his research study has found that the stories on environment ranked fourth in number and second in duration in the news bulletins of Doordarshan (DD), Zee and Star. D.D. had more stories on environment compared to Zee and Star bulletins. In all bulletins of these T.V. channels, only a few stories on environment figured as 'hard news' and hence they do not figure amongst the top stories of the news bulletins. It was also found that the content and production quality of most of the reports on environment were not of high professional level when compared with other stories. Many stories on environment were included in the bulletins because they were personality oriented or event centred.

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News

Annual Conference on Science Communication Ignites Young Minds

The 8th Indian Science Communication Congress was organized by MTS Academy and National Council for Science & Technology Communication in association with Indian Science Writers' Association during December 10-14, 2008 at the Science City Auditorium, Tamil Nadu Science and Technology Centre, Chennai as scheduled.

A special lecture on Media Convergence and Knowledge Revolution was delivered by the Chairman, Science City, Government of Tamil Nadu on the 10th December 2008. In his Special Address, the speaker emphasized that all the media should popularize and technology among the general public through various formats so as to create scientific awareness, scientific temper, and scientific wisdom. In this information era, everybody wants to seek more information through various media. The media has a pivotal role in giving authenticated information and should motivate public for scientific way of life. Here the science communicators and journalists have responsibility to communicate the available information in a nut shell. As a result the importance of media convergence will be realized. Convergence of media should create knowledge revolution and establish knowledge society.



Prof. Dr. M. Ponnaivaikko, Vice Chancellor, Bharathidasan University addressing the ISCC-2008

In his presidential address, Shri S. Kiruthivasan, Correspondent and Patron of MTS Academy welcomed delegates, scientists and young researchers to the conference to air and share their thoughts and views freely in this national conference. The lecture was followed by Bharat Natyam performed by students of Sruthilaya Vidyalaya, Anna Nagar, Chennai. They also presented thematic dance items on energy conservation and preservation of environment.

Dr. Manoj Kumar Patairiya, Director (Scientist F), NCSTC gave an introductory address and presented mementoes to the Chief Guest and artists who performed the cultural items. Dr. P. Iyamperumal, Executive Director, Tamil Nadu Science and Technology Centre Chennai proposed vote thanks. Earlier Dr. Cheyon, I.B.S., introduced the guests and programme to the audience and detailed the scheduled of all the technical sessions, fields visits, cultural events.



Dr. Manoj Kumar Patairiya, Director (Scientist F), NCSTC delivering the keynote address

The inaugural function was held in Triple Helix Auditorium, Central Leather Research Institute, Adyar, Chennai. The formal Inaugural address was delivered by Prof. Dr. M. Ponnaivaikko, Vice Chancellor, Bharathidasan University, Tiruchirappalli. In his address he insisted that science communication should be in mother tongue so that creativity and thought process will be better than the elite languages. He profusely quoted the various examples from Germany, France, China and many of the developed and developing

countries of the world.. Further he added that knowledge revolution, knowledge marketing, knowledge economy, human capital and knowledge society can be developed only through the sincere, devoted and dedicated efforts of the media. All the media should promote the convergence technology and concentrate more on knowledge revolution. He also mentioned that more science journals and media programmes should be there in local languages for taking science and technology to the common men.

In his presidential address Dr. Manoj Kumar Patariya observed that the prime aim of this national conference is to integrate the scientists, professors, researchers, science students, science communicators, media experts and science journalists to meet in a common platform like this conference and discuss in depth and at length about a particular theme and find out solutions. He added that the prime aim of this ISCC-2008 is to redefine scope of media convergence in the age of knowledge revolution for harnessing the immense potential offered for S&T communication. The issues amongst others emerging out of this area of unpredictable possibilities will be addressed, such as: the balance between knowledge abundance and knowledge deficit; knowledge creation vs knowledge handling; open access of science research and knowledge marketing; quality of contents and quality of packaging; problems of getting desired information with solutions; studies on converging bilateral, trilateral or multilateral media for effective S&T communication; the other side of media convergence; the problems and prospects of knowledge revolution; role of institutional convergence; converging networks, methods, processes, practices, professions for S&T communication; and alike.



Special lecture

Shri Rajnish Tiwari, Researcher, Hamburg Technical University, Germany delivered Felicitation Address. He opined that our Indian Science students and I.T. Students are very well doing in Foreign Universities. They are very hard working and applying more innovative and imaginative ideas in their projects and earning more money as well as reputation. Hope this conference will certainly be an eye opener for the young science communicators to know more about the media convergence and knowledge revolution. Shri K. Srinivasa Raghavan, I.B.S., Director, All India Radion, Chennai emphasized that all the media can converge for a common cause to create public opinion and awareness about the knowledge revolution and knowledge society. He added that All India Radio is regularly broadcasting a number of serials on science and technology. So also this conference on will be reflected in all media. He also requested all the media to come forward to create knowledge society.



Dr. Nellai Sumutthu, Senior Scientist, ISRO in a question-answer session

Mr. Tariq Badar, Hony. Secretary, Indian Science Writers' Association, New Delhi proposed Vote of Thanks. Earlier Dr. P. Iyamperumal, Executive Director, Tamil Nadu Science and Technology Centre, Chennai welcomed the gathering. In his Introductory Remarks Dr. Cheyon, Dy. Director, All India Radio, Chennai and Hony. Secretary, M.T.S. Academy, Chennai explained the objectives of the conference.

“We build the knowledge that builds the nation”! This was the slogan floated during the conference by young researchers. More than 225 students, professors, researchers, science writers, journalists, communicators participants the 5 days conference. Selected abstracts were compiled and published prior to the conference for exchange of new ideas. 4 cultural events were

organized on all evenings. A field visit on Indira Gandhi Centre for Atomic Research, Kalapakkam, and Mahabalipuram – Historical and Cultural Heritage Site, Tamil Nadu was also arranged for all participants. Apart from 5 technical sessions exclusively for the selected abstracts on the said theme of the ISCC 2008, 2 workshops were conducted exclusively for young researchers/ students. Young researchers and students presented their studies on global perspectives in science and technology communication with all vigour. The session was chaired by Prof. Dr. A. Arivunambi, Dean, Pondicherry Central University, Pudhucherry. A souvenir of ISCC 2008 was also published.

Two special lectures were also organized: 1. Emerging Trend in Media Convergence, by Prof. Dr. M. Anandhakrishnan, Former Vice Chancellor, Anna University and Chairman, Science City, Govt. of Tamil Nadu, Chennai; and 2. Knowledge City, by Shri G. Rathnavelu, Managing Director, Trac Technologies Ltd., Chennai. The cultural Events included: 1. Bharatha Nattiyam, by Smt. Parvathy Balasubramanian and her disciples, Sruthilaya Vidyalaya, Anna Nagar, Chennai; and 2. Villupattu (Folk Music) Arivothayam (The Dawn of Knowledge), Kalaimamani Kavignar Subbu Arumugam and Party, Chennai. The two special scien-tainment events included: 1. Kavi Sammelan – Multi-Lingual Poet Meet, Kaviyarasar Ilandevan, Popular Tamil Classical Lyricist, Chennai, Chair Person –

Kaviyarasar IILANDEVAN, Hotel Savera, Dr. Radhakrishnan Salai, Mylapore, Chennai; and 2. Variety Programmes: a) Students of Makhanlal Chaturvedi National University of Journalism and Communication, Bhopal, Madhya Pradesh; b) Group Dance and Mime on Global Warming by the science communication students of Anna University, Chennai.

The valedictory function held in Triple Helix Auditorium, Central Leather Research Institute, Adyar, Chennai. The 1st copy of the Souvenir of the 8th Indian Science Communication Congress (ISCC-2008) – Media Convergence & Knowledge Revolution was released by the Chief Guest Prof. Dr. S. Ramachandran, Vice Chancellor, University of Madras, Chennai. The 1st Copy of the same was received by Dr. V.K. Srivastava, Senior Deputy Director General, Indian Council for Medical Research, New Delhi. In the valedictory address, the Vice Chancellor of University of Madras Prof. Dr. S. Ramachandran emphasized that media convergence is so essential to create a scientifically vibrant society. India is the second largest country in population next to China. China is becoming a big power because of its efforts in transforming the human resources into human capital. So also if our media experts and science communicators integrate their efforts to popularize science and technology among the general public in the utmost rural area with the technique of media convergence, our nation will certainly become



A technical session in progress



*Villupattu (Folk Music) Arivothayam (The Dawn of Knowledge),
Kalaimamani Kavignar Subbu Arumugam and Party, Chennai*

a knowledge power in the world. This 8th Indian Science Communication Congress 2008 has selected a wonderful theme and analyzed it in five various sub themes. The conference has facilitated the participants to exchange their thoughts and views in this regard and arrived at the final resolutions which will certainly reflect in their career and contributions to media.

Dr. Manoj Kumar Patairiya, gave an illuminating talk on scientific interaction and various aspects and stages of asking questions. He also highlighted the steps taken by the NCSTC and Department of Science and Technology to popularize science and technology among the general public. NCSTC and Indian Science Writers Association are jointly organizing this conference since 2001 in various parts of India and now the 8th is in Chennai. More than 130 papers were presented in the conference. Dr. V. K. Srivastava, Senior Deputy Director General, Indian Council for Medical Research, New Delhi insisted that all the scientists and science communicators should meet frequently for popularizing the research findings which should definitely motivate the public for developing their scientific awareness, scientific knowledge and scientific temper for practicing the same in their day to day life.

Dr. M. Sai Baba, Head, S&HRPS and SIRD, Indira Gandhi Centre for Atomic Research, Kalpakkam appreciated the programme and said that such a conference will promote fraternity among the

scientists and science communicators. The researchers and students will have more opportunity to know more about various topics in one place. It will also motivate them to increase their scientific knowledge and innovative ideas.

Two Best Paper Awards to in Senior and Junior categories were given. The participants gave their feedback with all enthusiasm. All the participants were given mementoes engraving Chandrayaan-1 to mark the occasion. All the participants were given participation certificates. Mr. Tariq Badar, Council for Scientific and Industrial Research, New Delhi and Hony. Secretary, Indian Science Writers' Association, New Delhi addressed the gathering and announced the ISWA Awards and Fellowships. Dr. Cheyon, Dy. Director, All India Radio and Hony. Secretary, M.T.S. Academy shared that the academy is promoting language and science as their two eyes and rendering its yeomen services to the society since 1986. They have published more than 50 books, CDs and Cassettes. In addition to that they are bringing out a quarterly science journal in Tamil *Ariviyal Poonga*, which received Sujatha Award. He thanked NCSTC, Government of India, Tamil Nadu Science and Technology Centre, Science City and all the participants for making the five days national conference with international participation a grand success. ■

[Dr. N. Murugan, Dy Director, All India Radio, Chennai, Tamil Nadu]

Dr. Atma Ram National Award for Dr. Manoj K. Patairiya, Editor IJSC



Her Excellency President of India Mrs. Pratibha Devi Singh Patil confers the Dr. Atma Ram National Award on Dr. Manoj K. Patairiya, February 16, 2009, Rashtrapati Bhawan, New Delhi

The Dr. Atma Ram National Award, 2007 was conferred on Dr. Manoj K. Patairiya, Editor, *Indian Journal of Science Communication* for his contributions in the area of science communication through popular science writing and development of apparatuses and innovation, by the Kendriya Hindi Sansthan, an autonomous institution under the Ministry of Human Resource Development, Government of India. The award consists of a cash prize of Rs. 1,00,000/-, a shawl and a citation. The prize money was to be

equally shared by the two recipients. Her Excellency President of India Mrs. Pratibha Devi Singh Patil conferred the award on Dr. Patairiya in a function organized on February 16, 2009 in this connection at Ashok Hall, Rashtrapati Bhawan, New Delhi. Hon'ble Minister of Human Resource Development Shri Arjun Singh was also present on the occasion. The award was given in recognition of Dr. Patairiya's overall contributions to the field of science popularization. ■

Forthcoming Events

The 9th Indian Science Communication Congress (ISCC-2009) *Science Meets Communication*

*Krishna Kanta Handique State Open University,
Housefed Complex, Dispur, Guwahat, Assam
December 20-24, 2009*

The National Council for Science & Technology Communication (NCSTC/ DST) and Krishna Kanta Handique State Open University (KKHSOU) would be organizing the ISCC-2009 in association with Indian Science Writers' Association (ISWA). The Focal Theme for ISCC-2009 is "**Science Meets Communication**". More information at: <<http://iscc2009.blogspot.com>>.

Objectives

- i) To encourage discussion and interaction on issues and aspects concerning S&T communication.
- ii) To bring science communicators, scientists, technologists, journalists, academicians together.
- iii) To offer budding S&T communicators a wider exposure and enable them to express their views/ ideas.
- iv) To address various issues vital to promotion of science and technology communication.
- v) To explore and share newer tools, ways, means for better target specific S&T communication.
- vi) To provide a forum for young and experienced researchers and practitioners of S&T communication.
- vii) To encourage the communicators to create and inculcate scientific temperament among the ethnic communities of the North Eastern Region, especially in the tribal areas.

Sub Themes : There will be 7 Scientific Sessions on the following sub themes :

- i) **Bridging the gap: scientists and the masses:** The session introduces and explores various

concepts, determines various facets, aspects, and sub-sets for bridging the gap between the scientists and the common people.

- ii) **Science in the media: development communication & scientific awareness:** The session finds out how science can be disseminated through various media for development process of the society. Innovation in approach towards creation of scientific awareness will also be given importance.
- iii) **Science and technology journalism to enlighten the society:** The session discovers the role of science and technology journalism to enlighten the common man.
- iv) **Science illiteracy: innovative approaches to address the issue:** The session examines role of scientific literacy, young science enthusiasts with training opportunities, S&T temper, and scientific wisdom.
- v) **Science communication in regional languages:** The session deals with various problems and prospects of science and technology communication in the regional languages like Assamese, Bodo etc. The role of regional print, electronic and other tools of communication will be analysed and discussed.
- vi) **Reaching the unreached: science and communication through distance learning:** This session deals the pedagogical knowledge proliferation through open and distance learning. It stresses on how pure science or popular science can be provided in an effective manner to the unreached of the society.
- vii) **Resistance to scientific temper:** Different issues and forces at work to sustain medieval thinking and beliefs and the role of media including knowledge-media interaction, effective methodologies and best practices to encounter such forces and inculcate scientific temperament in rural society will be dealt in this session.

ISCC Format

The technical sessions will have presentation of contributory research papers, review papers, survey

analyses, case studies, and invited talks. Discussions in split groups would offer close exchange of thoughts and ideas. Deliberations will be in English, Hindi and Assamese. A sub-theme cannot be the title of a paper/presentation; select a narrower topic under a sub theme and design your research study around it. Papers must be prepared in standard research paper format, i.e. title of paper, name(s) and address of author(s), abstract, key words, introduction, objectives, methodology, observations, discussion, analysis, inferences, conclusions, recommendations, references, along with illustrations, graphics, photos including captions. In addition to scientific sessions and split groups, there will be two workshops and an open ended roundtable. One workshop would be for young researchers/students; whereas the other will highlight global perspectives in S&T Communication.

Who can participate

Researchers and practitioners of S&T communication, i.e. scientists, technologists, academicians, writers, journalists, editors, scholars and faculty members of journalism, mass communication, public relations and information officers of scientific organizations, representatives of media organizations, newspapers, magazines, science cells of AIR/ TV channels, science activists from NGOs; and senior government officials/policy makers.

Exhibition of popular S&T publications and information products

The exhibition is being organized at the venue; participants may bring/ send their publications, articles, books, magazines, CDs, kits and software materials for display.

How to reach Guwahati

Guwahati, the capital of Assam state – the green paradise on Earth, nestled in the North Eastern Region, not just another part of the country but a universe within. It represents the diversity that is our strength. Guwahati is most vibrant and progressive city and serves as a commercial, academic, scientific and cultural hub in the region. Guwahati is well connected by Air, Rail and Road from all major cities in India. More details at : www.assamtourism.org

Weather

Weather remains cold in December in Guwahati. Proper woollens are recommended.

Registration/ submission of Abstract/ Paper/ Poster/ Lecture/ Workshop Proposal

Registration Fee (includes kit, stay, meals, visits):

Rs. 1000

Last Date for Submission of Abstract (500 Words):

November 20, 2009

Last Date for Application for Travel Fellowship:

November 20, 2009

Last Date for Submission of Full Paper: November

30, 2009

Last Date for Registration: November 30, 2009

Travel fellowship

Limited number of travel fellowships are available for selected/ invited delegates from India. International delegates will make their own travel arrangements; the organizers could offer free stay and meals. Best paper/presentation awards would be given in junior and senior categories based on independent evaluation.

Proceedings

All accepted papers will be published in the conference proceedings and should be asked for physical presentation at the conference. Selected papers may be submitted for publication in the *Indian Journal of Science Communication* <www.iscos.org>

Addresses for communication :

Dr. Ankuran Dutta

Secretariat (ISCC-2009),

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The 6th International Conference on Hands-on Science (HSCI-2009)

Science for All : Quest for Excellence

October 27-31, 2009, Science City, Ahmedabad –
380360 (Gujarat) India

Organised by:

International Network on Hands-on Science (HSCI Network), International Centre for Science Communication (ICSC), National Council for Science & Technology Communication (NCSTC/DST), Gujarat Council of Science City (GCSC), Science Technology and Development Initiative (STAD)

The importance of learning by doing has been an old adage. This is about internalising the concept and the phenomenon by doing hands-on experience at it, thereby synchronizing head and hands together to achieve excellence in every walk of life. This is how science has progressed to the present level, though slowly it went into shell for masses and remained confined to scientific world. But science and technology, not a matter of masses, is a dangerous preposition. This new awakening is to undo this very error and re-establish the public understanding of science and technology especially for those who supposedly cannot cope up with the abstract ideas and concepts of modern science. This is to spread far and wide that science can be befriended easily by understanding it by actually doing activity and try out experimentation at basic level. Hands-on Science has been emphasised by the experts and proponents of popularisation of science skill culture. Several organisations, groups and experts have been working in their own knowledge spheres in different parts of the world and achieving results which are encouraging. Hands-on science has been a movement for enhancing the level of human outcome and innovation in the society using formal and informal science education and communication channels. Many society organisations and associations of scientists and technologists have been propagating the idea and have generated lot of experience and devised methodologies to achieve these goals. It is high time that the subject finds coordinated platform, this time in India, which is evidently one of the fastest emerging economies as well as the powerhouse of traditional and modern technologies, knowledge and innovative practices. The ultimate benefit shall be for the people and the cause of science and technology focussing on scientific and technological temper as well to be able to serve the mankind better.

Objectives :

The HSCI-2009 is aimed at enhancing the culture of innovation and experimentation in the modern societies with a fine blend of knowledge and excellence for all. This conference shall be a mechanism for the researchers and practitioners of this thought to be together and forge ahead towards achieving the goal of higher degree of innovativeness and science appreciation amongst masses. This shall provide the much needed fillip to the efforts which had been focussing on bringing about the excitement of science into the minds of young people motivating them towards higher education and research in basic sciences. This will also be an opportunity for such efforts to be widely discussed and reviewed with national and international experts and votaries of the approach.

Special features : In order to enrich the conference and take optimum advantage of the luminaries gathered from across the world, following additional features are being planned as part of the conference :

- a) International Exhibition of Popular S&T Information Products and Hands-on Science Experiments
- b) Pre-conference Event : Hands-on Workshop on Popular Science Writing (October 27)
- c) Post-conference Event : Hands-on Training on Science Communication through Visuals (October 30)
- d) A Special Discussion on Science Communication in Developing World
- e) Interactive Hands-on Activities and Kits, etc.
- f) Showcasing India's Cultural Heritage; Folk Performances
- g) Enjoy Indian Spicy Food Recipes
- h) Local Visits/ Excursions (October 31). Additional visits and spouse activities can be organized on demand; i.e. Golden Triangle (Taj Mahal, Jaipur, Delhi), Geer Forest, Mount Abu, Khajuraho, Shimla.

Focal theme and sub themes : The focal theme of the conference is 'Science for All : Quest for Excellence'. It is an opportunity to explore the best measures, efforts, practices and innovations in the

subject to be able to make definite impact on the society and the ways it acquires knowledge and skills. There shall be 5 Scientific Sessions with the following Sub Themes :

- i) **Science, innovation and Hands-on science :** The session discusses on the innovativeness in the approach and methodologies to derive best advantages to develop spirit of innovation.
- ii) **Science communication through Hands-on activities :** Various science communication practices through hands-on science activities, their evaluation and impact assessment studies.
- iii) **Experiences in science fun learning :** Sharing experiences related to hands-on science and fun learning. Why the dilemma that classroom science is superior or above learning by doing? Is it just the matter of perception or inability to do it differently!
- iv) **Hands-on science and evolution of modern knowledge :** The genre of learning has its share in the evolution of modern knowledge too and this session is for all such issues.
- iv) **Promotion of Scientific and Technological Temper :** Hands-on science possibly can contribute to this effect more than anything else. A combination of appropriate knowledge and right kind of attitude can help achieve excellence.

Conference format : The scientific sessions will have presentation of contributory research papers, review papers, survey analyses, case studies, and invited talks. Discussions in split groups would offer close exchange of thoughts and ideas. Deliberations will be in English. A sub-theme cannot be the title of a paper/ presentation; select a narrower topic under a sub theme and design your research study around it. Papers must be prepared in standard research paper format, i.e. title of paper, name(s) and address of author(s), abstract, key words, introduction, objectives, methodology, observations, discussion, analysis, inferences, conclusions, recommendations, references, along with illustrations, graphics, photographs including captions. In addition to scientific sessions and split groups, there would be two poster sessions and two workshops and an open ended roundtable. One workshop would be for young researchers/ students; whereas the other would highlight global perspectives in Hands on Science and Innovation.

Who can participate : The conference is designed for the participants from all possible interest groups including government agencies, universities, science and technology institutions, research and development organizations, learned and professional societies, etc. It may attract researchers and practitioners of Hands-on Science movement, skill and Innovation, i.e. scientists, technologists, academicians, science teachers, writers, science communicators, journalists, editors, research scholars and faculty members of journalism, public relations and information officers of scientific organizations, science museums and science centres, representatives of media organizations, newspapers, magazines, science producers of radio/ TV channels, science activists from NGOs; and government officials, policy makers.

Travel fellowship : There is some provision of travel fellowships for Indian delegates. International delegates will make their own travel arrangements. The organizers may consider providing local hospitality, i.e. stay, meals, etc., for some selected foreign delegates.

Weather : Weather would be pleasant in October in India. Woolens are required if you plan to visit hill areas.

Registration/ submission of abstract/ paper/ poster:

Last Date for Submission of Abstract:
September 05, 2009

Last Date for Application for Travel Fellowship:
September 05, 2009

Acceptance of Abstracts:
September 10, 2009

Last Date for Early Bird Registration:
September 15, 2009

Last Date for Submission of Full Paper:
September 30, 2009

Last Date for Registration:
October 15, 2009

Registration Fee (includes conference kit, pre, main and post events, meals, receptions, visits) :

International Delegate

• 300

(School Teacher/ Student : • 150)

South-Asia Regional Delegate
(School Teacher/ Student : • 100)

• 200 **Dr. Manoj Patairiya**

Early Bird Registration
(School Teacher/ Student : • 75)

• 150

Indian Delegate
(School Teacher/ Student : Rs.1000)

Rs.2000

Proceedings : All accepted papers to find place in the conference proceedings. Abstracts shall be included in the conference souvenir. All accepted papers shall be asked for physical presentation at the conference. Selected papers may find place in the *Indian Journal of Science Communication* <www.iscos.org>/ *International Journal of Hands-on Science* <www.hsci.org>

Exhibition of popular S&T information products and hands-on science experiments : The exhibition is being organized at the venue on this occasion to show case various hands-on experiments from across the world; please bring/ send your publications, articles, books, magazines, CDs, kits, software materials and hands-on science experiments for display.

More information : More information is available on conference website : www.hsci2009.org. Kindly contact the following for further information, if any :

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Proposals, including information pertaining to title of the study, scope and objectives, methodology, expected outcome, budget estimates and time schedule, etc., may be sent to the Editor, *IJSC*.

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A Joint Publication of

National Council for Science & Technology Communication, New Delhi

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All above communications can be either in Hindi or in English language. Manuscript preparation is described below :

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Nanotechnology is a field of research and innovation concerned with building things and devices on the scale of atoms and molecules.

Nano in Greek means "dwarf". A nanometer is one-billionth of a meter i.e.(10^{-9} m): ten times the diameter of hydrogen atom.

The diameter of human hair is, on an average 80,000 nanometer.



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SCIENTOON

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"Sir! He says he is ready to go even to hell, but says he will never go on space mission to earth."