

National Seminar on
**Gender, Technology and
Communication**

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**Abstracts /
Presentations**

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Technologies for Rural Women

Satyawati Sharma*, Abhishek Sharma, Padma Vasudevan

Abstract

Rural women play a vital role in agriculture. They have extensive work loads with dual responsibility for farm and household production. In rural India, agriculture and allied industrial sectors employ as much as 89.5% of the total female labour. In overall farm production, women's average contribution is estimated at 55% to 66% of the total labour. However, their contribution does not receive due recognition and they are not able to reap the benefit of various rural development programmes which usually involve the men folk. The lack of resources, communication skills, and linkages with governing and non-governing agencies are causes of large gaps in adoption of new technologies by them.

The present paper deals with the experiences in technology transfer to rural women in different farm based activities/technologies such as sericulture, mushroom culturing, mycorrhizal technology, feed and fodder management (use of biofertilizers, silvipastoral technique etc). In all these activities, women (Self Help Groups) were involved. They were empowered through these training programmes in a participatory manner. The process has contributed to significant gain in knowledge, work efficiency, economics and improving various other parameters of quality of life.

Key words: Rural women, agriculture, technology transfer, Self Help Groups

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ABOUT VIGYAN PRASAR

Vigyan Prasar (VP), an autonomous organisation under the Department of Science and Technology, Government of India, was set up in 1989 to take on large-scale science and technology popularisation tasks. Vigyan Prasar aims to promote and propagate - as widely as possible - a scientific and rational outlook in the society. Its broad objectives include:-

- Undertaking, promoting and co-ordinating efforts in science popularization and inculcation of scientific temper among the people.
- Development of software for various media - audio, visual, audio-visual & print and different modes of communication to enable the masses to understand, appreciate and comprehend scientific principles and practices.

VP has established a network of more than 6000 science clubs in the country, called the VIPNET science clubs. VP regularly produces radio and television programmes in different languages. “*Dream 2047*”, Vigyan Prasar’s monthly newsletter-cum-popular science magazine reaches nearly 52,000 subscribers. VP’s website www.vigyanprasar.gov.in is a repository of information on science and technology. VP produces radio and television science serials and broadcast through All India Radio, Gyan Vani, Doordarshan and other channels. VP organizes workshops, seminars, symposia, training programmes, fairs, exhibitions, film shows, street plays, quizzes etc. on a variety of scientific topics and issues in an attempt to communicate science to the various sections of the society.

VP has also been utilising Edusat - Satellite for Education, Science & Technology. VP has established a network of Edusat interactive terminals for S&T communication throughout the country.

SOFTWARE DEVELOPMENT

Publications

Over the years, the publication programme of Vigyan Prasar has emerged as one of its major activities. Till date, 160 titles have been published under different series. Besides English and Hindi, Vigyan Prasar is bringing out publications in several Indian languages. The series that have evolved over the years are :

- Science Biography
- Science Classics Reprints
- Indian Scientific Heritage
- Natural History
- Health
- Planet Earth Series
- Astronomy Series

Video/Audio programme/ CDs

VP has an ongoing programme for development and production of audio/Video programmes (serials, films, documentaries, multimedia CDs.) on S&T. A number of radio/television programmes have been developed and broadcast on All India Radio/television networks in the country. VP in association with Development and Educational Communication Unit (DECU)/ISRO has setup a two way video - two way audio, Edusat interactive terminal network for S&T communication.

Charts and Posters

VP has developed thematic charts/posters/slides shows on various scientific topics.

Activity Kits/Toys

Development of Kits and Toys on various scientific topics has been undertaken by Vigyan Prasar. Under this programme Vigyan Prasar has developed activity kits on Earthquakes, Astronomy, Venus Transit, Eclipses and Electronics.

VIPRIS

VP Information System was conceived as a repository of information on various aspects of science and technology. The major activities are as follows :

Vigyan Prasar Website

VP's website www.vigyanprasar.gov.in is a dynamic and comprehensive website on Science & Technology communication in India. The website is available in Hindi and in English. New features are continuously added to it. Some of the facilities are:

Digital Library

All the publications of Vigyan Prasar are available online and most of them are freely downloadable by users.

Discussion Forum

Online discussion forum on Science and Technology. Participants can ask questions related to S&T and also reply to fellow participants' queries.

ACTIVITY BASED SCIENCE LEARNING FOR STUDENTS

A number of activities/ experiments designed and developed by VP are available online. Students can perform those activities using commonly available materials.

Online Chat Session

VP organizes online chat sessions on different topics of Science and Technology. Experts are invited to reply queries.

Audio/Video repository

Audio and Video science serials produced by Vigyan Prasar and broadcast by AIR/Doordarshan are also uploaded in VP website. Users can play/download serials in their preferred time.

Online version of *DREAM – 2047* and *VIPNET* newsletter

Dream 2047 - monthly popular science magazine of VP and "*VIPNET News*" - monthly newsletter of Vigyan Prasar Network of Science Clubs, are available online. All the back issues are also available.

Clipset

The fortnightly News Clipping Service "VIPRIS Clipset" covers S&T news from about 125 newspapers in the country. Special issues are brought out from time to time.

Multimedia CD-Rom

VP develops and brings out educational multimedia CD-Roms on popular science topics. These CD are disseminated and used for training programmes of VP.

Vigyan Prasar Newsletter "*Dream 2047*"

Vigyan Prasar is putting in efforts to bring various Government/non-Government institutions/ organizations, associated with science popularization / science communication under an umbrella. To achieve this, VP brings out a monthly newsletter-cum-popular science magazine "*Dream 2047*" in English and Hindi. The newsletter has become quite popular and has over 52,000 subscribers.

Vigyan Prasar Network of Science Clubs (VIPNET)

VP has established a network of over 10,000 science clubs all over the country, called VIPNET. As part of this, Vigyan Prasar has been organizing workshops/ training programme in different parts of the country including remote and tribal areas. Every month about a hundred new members clubs join VIPNET. A monthly Newsletter "*VIPNET News*" is published to highlight and report the activities of VIPNET clubs.

STUDENTS' ACTIVITIES

Ham Radio (Amateur Radio)

Ham radio popularization is a major activity of VP. An amateur radio club – VU2NCT has been established at VP. For school children and others interested in ham radio, workshops and demonstrations are organised by VP from time to time. The club station renders communication services during emergencies and in the aftermath of natural disasters like floods, earthquakes etc.

Astronomy

Vigyan Prasar has been engaged in popularization of Astronomy for many years. VP organises telescope making workshops for school students, teachers and amateur astronomers.

A variety of resource material has been developed in the form of multi-media CDs, activity kits, manuals and books. VP also organise special programmes in the form of national campaigns during special events like solar/lunar eclipses and transits etc.

Research & Development

Vigyan Prasar is engaged in the development of new training modules/ methodologies/ strategies/tools/ equipments/devices for S & T communication.

Scientific Experiments using PC

Science Experiments using a PC is a novel effort to explain to the students how computer is useful in measuring and controlling physical parameters and processes. Scientific Experiments using PC uses a software and hardware interface, designed, developed and disseminated by Vigyan Prasar. A Kit is available with ten sets of experiments.

Innovative Experiments in Physics at School Level

VP and Department of Physics, IIT, Kanpur, have jointly undertaken a project for developing innovative open-ended experiments in Physics for school students. The objective is to develop an interactive physics, methodology by evolving a series of experimental activities in physics. About 200 experiments/activities have been developed under the project.

OTHER ACTIVITIES

Field Programmes

VP organises national campaigns and field programmes/activities for S&T popularisation from time to time including science melas/fairs etc.

Services

VP extends consultancy services to school and educational Institutions to supplement education through non-formal activities by establishing science clubs for specialised activities like ham radio and astronomy.

Ongoing Programmes and Activities

- Activities Relating to International Year of Planet Earth 2008
- Activities Relating to International Year of Astronomy 2009
- Activities Relating to International Year of Biodiversity 2010.

“When the Going Gets Tough, (for women) the Tough Gets Going – Balancing Family, Commitment and Career Development”

Professor Kaiser Jamil*

While celebrating our **Technology day** today –on “technological developments”; we may think of energy security through non-conventional sources in the country, remembering Dr. Homi Jahangir Bhabha, who gave a vision of three-phase programme of nuclear power to ensure energy security, building pressurized heavy water reactors. Dr. Vikram Sarabhai the visionary, who developed Fast Breeder Reactor, with a power capacity of five hundred thousand mega watts. And ever since India got independence it has witnessed astounding strides in all fields of science and technology development. India has also strengthened agriculture- contributions of M.S. Swaminathan are known world over. All the factors like high-yielding varieties of seeds, fertilizers, chemicals and mechanization in agriculture led to the Green Revolution and more recently nanotechnology- revolutionarizing the medical arena, and cosmetic Technology. Our health and nutrition standards have increased magnificently. The country has made significant achievement in the IT industry, to which we have received global acknowledgment.

Knowing fully women’s contributions in the Agriculture and Sericulture sector and at home front ! this is the time for us to reflect on gender issues. Worldwide, women and girls bear the brunt of poverty, hunger and discrimination, comprising more than 60 percent of the world’s chronically hungry – now charted at a record one billion people. Inherited hunger – when malnourished mothers give birth to malnourished children – is a huge obstacle to development. Human development cannot be achieved if 50 percent of the population is excluded,

Over the months that I have served as president of TWOWS, - representing more than 102 countries , plus 3-5 supporting developed countries I have witnessed a growing awareness of our activities among our members and a growing interest in TWOWS among other

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organizations. TWOWS has taken the lead to bridge the gap of gender divide in science and technology and I believe in expanding human dimensions for sharing, learning and transforming. Working with the executive committee of TWOWS from **9 different countries: Nigeria; Yemen China; Bolivia; Tanzania; Egypt; Malaysia; Mexico** and from **India** has been an enormous learning experience for me, to know closely from each country/region their priority areas and gender issues.

The most important thing for any woman is the health of her family and education for the children, to provide such necessities it is important to see that things such as -clean water, safe food, health care, employment, education, and training are needed and must be provided. Age-old ingrained ideas of gender roles deny Women's participation in decision- making and social and economic development. Rural women make up the majority of the world's poor – unpaid household work and additional burden of harassments by –family- we are not limited to these, but many more issues remain unlettered. But we can surely crossover to new Initiatives and express novel developments in this direction to break the glass ceiling, and let the women come out in more numbers till gender equality is reached in all spheres of life and in science and society as well

AJP Kalam former president of India, emphasized that “empowerment” created by knowledge will lead the country ahead. “If women are empowered to do science,” he predicted, “state-of-the-art research will follow, and science and technology will find application in all of our endeavors” automatically entrepreneurship will take the forefront. Prof. M. Hassan (Executive director TWAS) emphasized the relevance of few initiatives aimed at empowering rural women through access to modern Information and Communication Technologies.

As a fulltime working mom and as a President of TWOWS and Director, School of Biotechnology, I am fascinated by this topic. I would love tell you how I have figured out all this, and I continue to work on this and have since the day my first child was born. I am happy to share with you a few learnings along the way. Remember too, for most women this is not a choice. The forces which pushed women out of their traditional role as homemakers to executives /professionals seemed to rise from two opposite directions. On the one hand the socialist ideologies insist that women must join the labor force as a matter of establishing equality, while on the other hand, economics required women to work to support their families. Yet in spite of all of this, women in the workplace were more the exception than the rule. We are still working our way up in a man's world and hope one day we will reach our goals. My

parents always taught me to plan, prioritize, and organize, my thoughts which is the key to achieve the balance that allows a woman to enjoy a rich family life while also gaining fulfillment from career. I will talk about some of my achievements in my career as a woman research scientist, the discoveries that made my life so complete and meaningful.

Personally, I think it is a real shame that most women are not naturally inclined to build strong networks and acts as mentors to each other and role models are hard to find. I'm convinced that all of us would profit so much from strong female support networks (in a learning / business context). Fortunately, with the rise of the Internet, there are now at least a few such networks and I'm looking forward to these communities gaining even more momentum over the next few years. One of the things which we can label under the glass ceiling- is the predicament of women's rights.

One strong message is that taking simple actions as a woman... can have significant impacts; very much, like the "think global act local" aphorism.

What does ‘Gender’ have to do with ICT ?

Dr. Swapna Mukhopadhyay*

Most people would take Gender and Women as interchangeable words, and would go into the many and varied ways in which ICT may have enriched the lives of women from different socio-economic groups in India. It has enabled urban educated women with domestic responsibilities to stay in paid employment in relatively stress-free manner by providing flexible working hours. It has opened up lucrative career options for many. Through easy access to mobile telephony, it has replaced the need for travel over long distances to enable women to keep in contact with family and kin. It has facilitated the functioning of thousands of rural women’s collectives and Self Help Groups across the country in keeping in touch with information and marketing their products, and so on.

ICT does, and can, do all this and more. But in order to appreciate what more it can do for the Indian woman, one needs to differentiate between the connotation of the two terms: ‘Women’ and ‘Gender’. In spite of the fact that they are generally used interchangeably, they are not the same. Unlike the term ‘woman’, which is biologically defined, ‘Gender’ is not about biology. Gender is about a relationship between men and women, a two-way relationship of power and control, as well as of cooperation and endearment.

As it happens, in much of India, the social construction of Gender is unduly hierarchical, defined by norms of patriarchal control and subordination. Such control often provides little space for women to grow as individuals, resulting in not only poor Gender Development Indices, but also in mental and physical violence on women as instruments of societal control. One can cite countless examples of the gender discriminatory nature of Indian society.

This is where DST can come in with invaluable help. The huge network of DST-propelled ICT initiatives penetrating into every nook and corner of India can on the one hand be profitably utilized to provide training and information on career options to women all across

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the country no doubt. But more importantly, the DST network can act as a conduit for genuine interactive programmes of women's empowerment. Those who work with women in far corners of the country would know how vital such an interactive service would be for millions of our women who have little access to such support structures.

Clearly a lot of work needs to go into the design of such a programme. A whole bunch of professionals with knowledge of the technology as well as of the social tapestry of the country need to put their heads together to make it a reality. DST is best suited to take the lead in such an endeavour where the set of seemingly gender-neutral technology can play an immensely valuable role in the social transformation of the country. No other network as of now has either the reach or the potential for providing such a service.¹

¹ These ideas were first presented in a booklet titled 'Information and Communication Technology (ICT) and Gender' by Swapna Mukhopadhyay and Vinay B. Kamble and published by Vigyan Prasar, Department of Science and Technology, Government of India, 2006. Possibly nothing very concrete on these lines have come about since then.

Representation of Women in Media

Prof. Gauri Srivastava*

The present decade has witnessed an explosion in the arena of information technology. Presently, accessing information related to the domain of any branch of knowledge has become simpler. Expansion of internet facilities, availability of different search engines, e-mail and mobiles have brought greater connectivity amongst people from different parts of the world. Techo savvy revolution has reduced temporal and spatial boundaries at the national and international levels. In this fast moving technological age media has revolutionized the lives and conditions of the people. It is therefore important to see the kind of information that gets disseminated through this powerful medium. In the context of women, studies and researches conducted by different agencies have highlighted that media either perpetuates biases, stereotypes and in a limited way depicts continuity and change in the status of women. It has also been very rightly highlighted that media influences gender relations and shapes attitude and beliefs of children belonging to different age groups. It is therefore pertinent to see how different types of media, print and audio visuals portrays women: Are they depicted as producers or consumers, decision makers or passive recipients, leaders or as mute spectators and as agents of social change or as transmitters of traditions and customary practices.

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Enabling for Women Empowerment: Role of Technology and Communicator

Padma Vasudevan Sen and Mamta Tandon*

Abstract

The importance of women empowerment in the context of sustainable development is indisputable. They constitute around 50% of the population and are responsible for the physical and mental development of children. Also many environmental issues like water and waste management as well as energy conservation stand to gain through active participation by women, who can inculcate the right attitudes and practices in the present and future generations. Thus on a wider framework the role of the communicator is to spread awareness at different levels on the importance of women empowerment. However, today inspite of many good government policies, technologies & programmes targeted for women, they are not able to access these. There are barriers arising out of biological, economic, infrastructural, social, religious, political and other constraints. The level at which these constraints operate is situation specific. Broadly, the women may be grouped under urban rich, urban poor, rural rich and rural poor and the severity of constraints increase in this order. Keeping this in view, the process of enabling women empowerment has to be tailored to the type of group. Specifically, it must be understood by the communicators that technology is not beneficiary neutral. Technology has to be designed and transferred as appropriate to the given women group, adopting a system approach. Technology communicator should take the responsibility of selecting the right technological systems and not only create awareness, but also direct efforts at enabling adoption ultimately leading to empowerment.

In the presentation, a few successful cases will be discussed by way of illustration.

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Edusat Talk Back Terminal for Tribal Women Health Issues: Study of Jalgaon Sit

K. B. Patil*

R. B. Gore, M. S. Netkar, S. T. Bendre**

EduSAT Talk Back Terminal has been installed in the Tribal sector of Maharashtra State for conducting many activities of Vigyan Prasar, a portal for Science popularization amongst the society. We have made use of this advanced technology of communication to address the issue of women health awareness, education in girls, female-foeticide, dropping out from schools etc. especially in women of tribal origin. The participants for this study includes girls/women from Jalgaon, Dhule and Nandurbar districts of Maharashtra State. The programs of Vigyan Prasar have really stimulated the tribal women in terms of their poor health and created a great awareness regarding various problems and curiosities in their minds. The work has started only recently and will take shape in the coming future. In fact our own organization, North Maharashtra University, Jalgaon is also trying to assist us by providing modern technological aids like mobile science Lab Van etc. address this issue effectively. The few results will be highlighted in the seminar.

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ENGENDERING Management: *through equality in natural resources*

Shelly Praveen* and Mansi**

Gender refers not to women or men per se, but to the relations between them, constructed socially. It is a central organizing principle of societies and often governs the processes of production and reproduction, consumption and distribution. Like race, ethnicity and class, gender is a social category that largely establishes one's life chances, shaping one's participation in society and in economy. Despite the progress, significant gender inequalities in rights, resources and voice persist globally. Women continue to have systematically poorer command over a range of resources including the natural ones. Since time immemorial, women have been associated with activities involving natural resources. The responsibility of resource use and management often falls heavy, on their shoulders. It is important to address the issue of gender in light of natural resource management whether it is land and soil, forest and trees, plant and agriculture, animal husbandry and fisheries, water or sources of energy. Women play an important role in land and soil management. As farmers, they have been effective in conserving soil fertility using traditional methods. They must be involved in policy-making and planning to ensure the most productive and efficient use of land to meet present and future food and agricultural demands. Rural women are major caretakers and users of forests. Women's knowledge of forest products represents a vast database of species which scientists are unable to catalogue. They also play a key role in agro-forestry, a farming system that incorporates trees, crops and livestock production. Rural women in developing countries hold the key to many of the planet's agricultural systems for protection of agro-biodiversity, seed selection and food production. Also they play a central role in the development of sustainable agricultural systems, particularly in improving crop and grassland productivity. Besides agriculture, women are most often the collectors, users and managers of water in the household and have considerable knowledge of water resources. Natural resource management is important aspects in itself, involvement of gender perspective broaden the landscape of discussion. Fostering broader participation and transparency in policy making has the potential of tremendous payoff in gender equality in management of natural resources and contribution towards developmental policies.

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NGO's Experience in Evolving of Science and Technology Communication in Communities for Conservation and Rejuvenation of Natural Resources viz Water, Greens and Bio Diversity

Er. Ajit Seshadri*
Ms. Sakshi Saini**

Abstract

Due to rapid industrialisation and urbanization, pressure on naturally available resources has increased manifold. Deteriorating natural resources coupled with climate change are the main reason behind the hardships faced by the community. In urban areas people belonging to rich section of society can always adapt to these adverse conditions and sustain however it is the poor who is suffering due to the lack of these basic amenities. They spend quality time and a large portion of their monthly income in accessing them. Women are the main sufferers as their physical hardships, vulnerability to problems increases with the absence of water and sanitation. The living condition in the habitats is deteriorating and due care is required to be afforded.

This paper describes the process of evolving science and technology communication in the form of Eco-literacy Programmes for evolving Natural Resources and Bio diversity including water resources, waste as a resource and indoor/outdoor greens. Organisation has implemented various eco water literacy programmes in the community applying the concept of Science and Technology Communication to increase awareness and participation of the community in conservation and management of natural resources.

Various media such as traditional, modern, print etc were developed and integrated to be used in the form of a campaign to increase the awareness in the community. The NGO also made various Rain Water Harvesting structures, Waste Water Treatment Plants, Composting Units etc. These working models were also used as a live model to create sensitivity amongst the community regarding sustainable use of resources and their decentralized management.

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Involvement of the community in the programme ensures better success and sustainability of the programme. Science and Technology communication with Eco-Literacy Trail Walks ensures that people are aware and motivates them to participate and take actions for their own betterment.

Key words: vulnerability, water poverty, community participation, sustainability

Poor visibility of women practitioners of Science: problems and possible rectifying measures.

Dr. Vineeta Bal*

The first woman scientist to receive the most prestigious prize in the field of natural sciences in the world, the Nobel prize, was Marie Curie. She was awarded the prize in 1903, in the 3rd year of its inception. There were very few women at the forefront of science then and unfortunately the situation has not changed radically even after 100 years. What is seen in the case of Nobel prizes is true at the national level as well. Less than 5% of the Bhatnagar award winners are women. Their presence in National Science academies is poor and very rarely does one see a women director of the national research institutions. Only over the past decade or so this situation has been noted and commented upon. Over this period science academies have initiated work to identify problems and attempted to provide suggestions. A task force for women in science which was notified by the Government of India has come up with suggestions which can possibly be implemented for not only improving the status of women scientists in India but also to encourage young girls to opt for and pursue science as a career. A standing committee with power to implement initiatives has been formed and is working now on the recommendations of the task force.

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Gender and the Social Shaping of technology

Dr. Sudha Sunderraman*

The impact of new technologies upon women has been complex, and is closely interwoven with the socio economic system and the existing power relations within society.

In a structure laden with gender discrimination, this has often led to adverse effects for women. For example, mechanization has displaced women workers in large numbers. Assembly line jobs with little skill requirements, where women's employment tends to be concentrated, is more at threat from technological innovations linked to mechanization. Studies in the IT sector also show women getting relegated to lower end tasks, proving that the "revolution" in computer technology has not necessarily been to the benefit of women. In the agrarian sector too, modern technology has often been particularly unjust to women, given the male dominant, patriarchal system within which agriculture is still practiced in our country.

Such experiences have generated widespread cynicism about the role of technology in women's development, and there have been many learned voices that have opposed technology per se, and have postulated that traditional forms of production are more geared to ensuring women's advancement.

However, such a construct negates the role that technology can play in improving women's status, and her quality of life. It does injustice to her capacity for shaping existing realities, and becoming agents of change. The eventual emancipation of women can hardly occur if technology is not harnessed to make women's social participation in labour more productive and equitable.

Hence, in such a context, the attempt must be to analyse the reasons for the contradictory outcomes of technological innovations, which simultaneously increase productivity and decrease labour, and to choose technologies consciously in a woman friendly way. We must record the fact that where such attempts have been made, there are success stories which need to be understood and propagated.

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For instance, technology can help to reduce drudgery, and when combined with increased productivity, can enhance the value of women's work. The socialization of household work could increase women's opportunities for paid employment, and help to change the existing gender based work segregation within the household. It can also contribute to changing gender relations and enable women to become more independent and socially productive.

Examples of technological innovations that need to be examined from this perspective include

- a) the introduction of cycling as a skill for women in a development programme, which functioned as a means of reducing household drudgery and was also effective in reducing her dependence on males for mobility;
- b) the introduction of an agricultural implement - the semi mechanized weeder for women engaged in agriculture, as a means of increasing work efficiency in a task involving women in large numbers at minimal wages;
- c) the role of the smokeless chulha in improving women's quality of life by reducing exposure to smoke, and making cooking more efficient.

There are also instances of how women's participation in technology choices shapes outcomes in their favour. In one such case study, the inclusion of women in the tank associations formed to decide about water use at the village level served to engender water management, and equally importantly, broke taboos about women's participation in community level decision making bodies.

Ultimately, technology in itself is neither the cause of exploitation and appropriation, nor is it value neutral. Technology is shaped by, and has embedded in it existing relationships of gender and power. When women participate in technology choices, and their needs are prioritized, technology can be shaped to become progressive and pro poor, thereby contributing to women's emancipation and the building of a more egalitarian society.

Gender, Science and Public Communication of Science and Technology

Dr. T V Venkateswaran

Abstract: Recent work in the area of science studies has informed us of the ubiquitous imprint of culture and social ideas in the presentation of science. In so far as science is human activity, it is but natural that cultural and socio-political aspects influence science both in institutional terms as well as its public re-presentation. Recent scholarship has amply exemplified how the gender bias had clouds scientific thinking, in many instances.

Gender bias in science

For instance, imagery used to describe the fertilisation of ovum with sperm in textbooks and popular literature is fraught with stereotyping of gender roles. Often ovum and egg are personified and sperm is vested with active agency ('active', 'forceful', and 'self propelled') while egg cells are described in passivity (swept). So much so that the scientific community was very slow to recognize evidence of 'cryptic female choice' (the idea that a female could exert control over which sperm fertilized her ovum after insemination) as it did not fit with the beliefs about the role of the female because scientists were still entrenched in a male view of sexual selection.

Popular treatment of paleoanthropology continues to perpetuate the notion of females as passive actors on the stage of human evolution, quietly foraging and raising children in the background while males manufactured the stone tools and were regarded as being at the heart of communicative and trade networks. This picture crystallised around 1960s with the "Man the Hunter". "Killer Ape and Man the Hunter" theories that sought to explain the evolutionary trajectory of human prehistory with man's aggression and big-game hunting in cooperative groups. It was posited that these processes kick-started language, communication and civilisation. Man was placed at the centre of a positive feedback loop linking cultural and biological developments, associated with hominid origins.

Men might kill one giraffe and talk about it around the fire at night for a year until another is killed; they often fail to catch enough prey to sustain the family, and this task falls

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to women. Hunting, it appeared was not the main source of calories in the primitive societies, but foraging and gathering – typical work relegated to women - was. Supported by data from hunter-gatherer peoples and other primates, researchers suggest that women’s foraging for plant materials and tool-making skills were centrally important in human evolution. Yet gender bias has clouded the scientific thinking and pictures / illustrations of past age routinely depict women in the hearth, with a group of men hunting a big game. In like manner, careful scrutiny of many other areas of scientific enquiry illustrates how deeply entrenched gender bias is in our representation /re-presentation of knowledge.

In like manner studies that reveal and unravel gender bias in neuroscience (women have lower mathematical ability); primatologist; animal behaviour, medical sciences, drug testing are abound.

Role of science communicators

In one particular imagination, science communicator is akin to a film critic a la Maurice Goldsmith. Perhaps, science communicator does not produce ‘science’, but nevertheless a crucial element in its cultural re-production and re-presentation. Maurice Goldsmith argues that as a science critic, the science communicator is expected to see the whole picture, with grounding in history and sociology of science, interpret and communicate science to public. In doing so, as a critic s/he may also hold a mirror before the science community even while creating a public sphere for science.

As a science critic, it is important for science communicators to be aware and critical of the gender bias that pervade various aspects of our social life including that of science. If the objective of the science communication is to reduce the inequalities among different strata of the population; empower disadvantaged sections of the society and create a just, fair, rational and equitable society, then addressing the gender bias is as much important as issues pertaining to rationality. A science communicator needs to :-

a) present positive role models – Studies have shown that girl students often do not opt for sciences and this trend is closely related to, among other things, absence of role models. Except for a few canonical icons like Mary Curie and few others, women in science are hardly known. To illustrate; first ever computer programmer is a women- Ada Lovelace; Lise Meitner’s contribution to the understanding of nuclear fission is crucial; painstaking study of

Henrietta Leavitt that resulted in development of ‘standard candles’ for measuring the distances of deep space objects in the universe (Cepheid variables); Marie Tharp discovered the mid-Atlantic ridge and paved way for the modern theory of ocean floor spreading. However, hardly women scientists are highlighted in the popular science writings. Absence of women in the popular narratives (including the textbooks) results in emotional alienation of girl students.

Further, often when science writers choose to profile women scientist, the lament factor (how they had to struggle and come up) predominates and the sense of fulfilment a women scientists is pushed backward. Indeed it is true that women, and many other disadvantaged sections, against odd make it, and their struggles needs to be documented and told. However to play a positive role model and attract young girl students to science, we need profiles that highlight how women achieve and feel the sense of elation (like any scientist would), wonderment, sense of fulfilment and joy at solving a puzzle of nature.

b) critical of gendered images: Stereotypical images that media produces also contribute to gender bias. The stereotype of computer scientists as geeks who memorize Star Trek lines and never leave the lab, addicted to computer games, and junk food may be driving women away from the field, a new study suggests. When people think of computer science, the image that immediately pops into many of their minds is portrait of masculinity that it evokes which repulse girls, the study points out. The attributes and adjectives that we associate with scientific activity, perhaps unwittingly, impinges the perpetuation and reinforcement of gender stereotypes and result in lower participation of women in science.

c) be aware and wary of patriarchal interpretations: History is often depicted as HIS-story. Role of women is blacked-out. Take a look at any illustration or painting depicting humans before Stone Age. While the women are depicted at hearth, surrounded by children, men would be seen to be hunting big game. Women may be slender; men with strong physic. The depictions actually arise not from any evidence, but our unexamined presumptions of fairer sex; and strong male; Man the hunter and so on. The bias gets reflected in the illustrations and imagery that in turn reinforces the prevailing gender bias. The gender roles that we see in the contemporary social world are then seen to be ‘natural’ which further bolster gender discrimination.

d) go beyond male/female Mars/Venus binaries: pop-science in the contemporary world is full of stories of how men and women differ fundamentally in a non biological sense. Men

are Mars and women are Venus is the pithy representation of this view. Often ‘studies’ would be reported in the public media that girls do bad in maths compare to boys and from that conclude the intellectual differences between men and women. Further, such poorly designed studies are used to assert that certain intellectual capabilities are differently hardwired in the male and female brain, which then goes to reify the gender stereotypes that are prevalent. However careful analysis of these claims will readily show that inter difference are more (if not comparable) to intra- differences. Yet the myth circulates periodically.

The social construct of male/female is so pervasive that we forget that even among humans there are more than two sexes – neuter (including biological hermaphrodites). In fact the cultural construct of male/ female binary constrains us to view, say neuter gendered or differently sex-oriented people as ‘deviant’ and deem such acts to be ‘un-natural’ which further leads to criminalisation of such acts. If we look the animal world, more than six sex class has been recorded; with diverse sexuality and sexual orientation. In fact the simplistic notion of a Noah’s Ark, with one male and one female specimen sustaining all species, is a far cry from scientific reality. In truth, biological sustenance and reproduction are dependent upon an incredibly complex web of co-dependent factors, including a third sex. Not only is nature more complex than we imagine, it is more complex than we *can* imagine!

Empowering women through science and technology: Social Construction

Dr. Ruchi Singh*

Successful social and economic development requires the unbiased gender participation and education, training and human resource development are the key components to obtain the desired results. However, world wide gender inequality is enforcing us to direct efforts to bring women into the mainstream by ensuring women's accessibility to modern development facilities and extends their participation in social, economic and political process and decision-making. Empowerment of women involves the improvement of their status in the family, community and society. High educational, technological and financial attainment has cultivated new aspirations and attitudes among women though in our country societal and cultural norms still dictate that women should be subservient to men both at home and at the work front. This imbalance often contributes towards desertion of women from the sight more precisely from the field of science. Technology is redesigning and restructuring patterns of social interdependence and every aspect of our personal life. It is forcing us to reconsider and re-evaluate practically every thought, every action, and every institution. Reflection on the use of science and technology for creating pro-women work environment and also level up or reducing the gap in genders will be presented.

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Communicating Science and Technology to Women

Dr. P. Iyamperumal*

ABSTRACT

Science Centres are influential in providing education on modern science and new technologies. Tamilnadu science and Technology Centre works with a keen view to build an effective and democratic Indian Knowledge society, and with the aim to stimulate the harmonious integration of scientific and technological endeavour in the Indian social web. The development of our society largely depends on its capacity to create, exploit and disseminate knowledge and, from there, to continuously innovate. Scientific researches by men and women play a major role in this regard, and should continue being one of the driving forces in promoting growth, welfare and sustainable development. The roles that men and women play in society are not biologically determined; they are socially determined. The roles of women are changing. These roles vary widely by locality and change over time. Science and technology have been an integral part of Indian civilization and culture. Women and men have been active in science from the inception of human civilization. However, due to deprivation of privacy and time to think, the percentage of Women Scientists in our country was very low. However, presently, the trend is reversing and we find more women scientists now. The great Tamil Poet Bharathiar, who was also a freedom fighter, insisted that the only way for a country to grow was through empowering its women. In his poem 'Puthumai Penn' (New Woman) he states that "When we realize that man and woman are equal, this world will flourish with knowledge". According to a study by United Nation's Population Fund (UNPF) about two thirds of the illiterate adults in the world are female. Higher levels of women's education are strongly associated with both lower infant mortality and lower fertility, as well as with higher levels of education and economic opportunity for their children. Education is one of the most important means of empowering women with the knowledge,

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skills and self-confidence necessary to participate fully in the development process. In fact, women require good training in ever advancing technological innovations. Realizing the significance of women's education in the fields of technology, Tamilnadu Science and Technology Centre is ceaselessly engaged in science communication activities exclusively meant for women empowerment. Special Programmes for the Self Help Group women to communicate the modern technologies to augment their craft, Computer training Programmes, Training on Vermicomposting for the Homemakers and self help groups, exclusive training programmes for the differently-abled women and many more are being conducted. The activities of the Centre and the experiences are explained in the paper.

Introduction

Science Centres are influential in providing education on modern science and new technologies. Tamilnadu science and Technology Centre works with a keen view to build an effective and democratic Indian Knowledge society, and with the aim to stimulate the harmonious integration of scientific and technological endeavour in the Indian social web. The development of our society largely depends on its capacity to create, exploit and disseminate knowledge and, from there, to continuously innovate. Scientific researches by men and women plays a major role in this regard, and should continue being one of the driving forces in promoting growth, welfare and sustainable development. The roles that men and women play in society are not biologically determined; they are socially determined. The roles of women are changing. These roles vary widely by locality and change over time. Science and technology have been an integral part of Indian civilization and culture. Women and men have been active in science from the inception of human civilization. However, due to deprivation of privacy and time to think, the percentage of Women Scientists in our country was very low. Presently, the trend is reversing and we find more women scientists now.

The great Tamil Poet Bharathiar, who was also a freedom fighter, insisted that the only way for a country to grow was through empowering its women. In his poem 'Puthumai Penn' (New Woman) he states that "*Aanum Pennum nigarrenak kolvathaal Ariviloanki ivvaiyakam thalaikumaam*" – (When we realize that man and woman are equal – this world will flourish with knowledge).

According to a study by United Nation's Population Fund (UNPF) about two thirds of the illiterate adults in the world are female. Higher levels of women's education are strongly

associated with both lower infant mortality and lower fertility, as well as with higher levels of education and economic opportunity for their children. Education is one of the most important means of empowering women with the knowledge, skills and self-confidence necessary to participate fully in the development process. In fact, women require good training in ever advancing technological innovations. Realizing the significance of women's education in the fields of technology, Tamilnadu Science and Technology Centre is ceaselessly engaged in science communication activities exclusively meant for women empowerment.

Science Popularisation

The popularization of science and technology is intended to provide broad sectors of the population with the challenge and satisfaction of understanding the universe in which we live and, above all, being able to imagine and build possible new worlds'. Today there are societies that progress, build and create, and others that passively contemplate such progress, with little chance of understanding and adapting to the changes that progress implies. One of the major challenges facing our nation is to make science and technology an essential part of the culture of men and women equally.

At Tamilnadu Science and Technology Centre we realize the need for dissemination of Science and technology knowledge to uplift the society and also several unique methods are being adopted to reach women and girl children.

Special Programmes for the Self Help Group (SHG) women

In the state of Tamilnadu Women Self Help groups are very active and are helpful to the society in many ways. SHG is group of rural poor women who have volunteered to organise themselves into a group for eradication of poverty of the members. The members of the group use this common fund and such other funds that they may receive as a group through a common management. The financial condition of the individual members safely improves generally with that of the group. Further, being a member gives them a secure feeling and enables them to gain knowledge, education and wider outlook. Tamilnadu Science and Technology Centre organises exclusive programmes to them in order to train them in various skills. To communicate the modern technologies to augment the skills of women SHGs, Computer training Programmes, Training on Vermi-composting, farming techniques to enhance the productivity, lectures on health and hygiene are being organised. SHG is group of rural poor women who have volunteered to organise themselves into a group for eradication of poverty of the members. The members of the group use this common fund and such other funds that they may receive as a group through a common management. The financial condition

of the individual members safely improves generally with that of the group. Further, being a member gives them a secure feeling and enables them to gain knowledge, education and wider outlook. There are over 21,000 SHG in Tamilnadu. The training provided at Tamilnadu Science and Technology Centre helps them to enhance their income and also help them to lead healthier lifestyle. Similar Programmes are also being organised at Tamilnadu Science and Technology Centre for the homemakers periodically, which enables them to earn extra income for the family and have healthier life. Professionals from various research institutions like MS Swaminathan Research Foundation (MSSRF), IIT-Madras, CPR Environmental Foundation, etc and Experts from leading farms used to interact with the participants.

Programmes for the Home makers

The development of the country depends on the attitude and the activities of the women who look after the needs of the every member of the family. Children spend long times intimately with the mother in the home. If the mother is empowered with scientific awareness then the children also will have brighter knowledge. According to Psychological studies environment plays an important role. Tamilnadu Science and Technology Centre organises Programmes for the Homemakers periodically. By way of doing so, they are being provided with methods of earning money also. The waste management methods, producing bio-compost, vermiculture, home gardening etc are also being taught.

Science Programmes for the Disabled

For the past five years Tamilnadu Science and Technology Centre is organising spend-a-day in science centre programme for the Hearing Impaired persons. A few sign language interpreters are being invited to accompany the students during the programmes. For the past two years, the Centre started organising such programmes periodically for the *dyslexia students, mentally retarded, physically challenged and visually impaired*. For the visually impaired, the planetarium programmes are being distributed in Braille language. Every gallery has a write-up in Braille explaining the content of the science gallery.

Programmes for the family-groups

The knowledge development of a child will normally be closely monitored by their mother, father or grand parents. The parents and grand parents know the behaviour and the knowledge level of the child in the residence. However, their performance in a group and in their school and the comparison with their peer groups will largely be unknown to them. The family science learning programme gives the family an opportunity to understand the standard of the children and enables them to effect ways to improve. Whole-day programmes

are being devised with combination of subjects and Psychological evaluation of the students by a professional Psychologist.

Conclusion

In the long past Indian women had access to education, they had gradually lost this right. However, from the twentieth century onwards there is a revival of interest in women's education in India. The Indian government, after the independence, has taken various measures to provide education to all Indian women. As a result women's literacy rate has grown over the three decades and the growth of female literacy has in fact been higher than that of male literacy rate. While in 1971 only 22% of Indian women were literate, by the end of 2001, 54.16% female were literate. The growth of female literacy rate is 14.87% as compared to 11.72 % of that of male literacy rate. Women's education in India plays a very important role in the overall development of the country. It not only helps in the development of half of the human resources, but in improving the quality of life at home and outside. Educated women not only tend to promote education of their girl children, but also can provide better guidance to all their children. Moreover educated women can also help in the reduction of infant mortality rate and growth of the population. However, gender discrimination still persists in India and lot more needs to be done in the field of women's education in India.

Realizing the significance of women's education in the fields of technology, Tamilnadu Science and Technology Centre is ceaselessly engaged in science communication activities exclusively meant for women empowerment. Also, newer and innovative methods of imparting scientific knowledge to the women are constantly being explored and implemented.

S & T : A holistic approach for women empowerment

Professor S.S. Lele*

It is aptly said that when we educate a man, we do that for one person, but when we educate a woman, we educate a house! Indeed the Indian woman has a significant impact in upbringing the child and in maintaining a culture of the house, may it be food, language or level of cleanliness and hygiene. Over last six decades, Government and NGOs as well have been continuously putting in efforts to develop scientific temper in the society, yet there is a long way to go. How can we further increase the effectiveness and meet the goal? This is an attempt to put forth the idea of application of scientific tools as applied to social reform in a holistic way. If one does SWOT analysis of Indian society, high manpower, large number of highly educated and talented pool of people including scientists and technologists, democratic set up are some of the strengths. Where as diverse cultural habits, agri based economy could be both strengths and weakness. Our weakness includes very high population and population growth rate, inadequate electricity, low level of education in rural and remote area, lack of infrastructure etc.

Let us see the principles of optimization of a fermentation process by one factor at a time verses a better statistical search tool like Response surface method or artificial neural net work or other methods where instead of random search, a directed search approach is used in order to reach the global optimum rather than be complaisant by reaching a local hill top – local optimum. This is holistic approach. Second example could be from a cane sugar factory distillery unit where we have proposed a holistic technology flow sheet that aims at zero pollution and complete utilization of resources. Thus instead of optimizing every step separately, one should look for a solution that gives overall optimization with criteria such as highest yield, lowest net energy consumed etc.

For holistic development of scientific temper in the society, we must empower the rural and urban women by training them for sustainable simple technologies like dehydration of fruits and vegetables, dispersing the value added product as mid day meal supplementation through NGO facilitators and social organizations.

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Our formal science education lacks two important aspects – economics-finance and human psychology. There is a need to link mind set development along with scientific approach towards life, only then the society in general can be a happy at all planes – creating wealth as well as knowledge. E.g. Good Cooking Practices (GCP) involves cooking with most nutrition retained, using less energy and reducing cooking gas wasted in the form of pressure cooker whistles and also saving the money in the household activities since less vegetable waste, lesser LPG used.

The “Don’t” based thinking has to be reversed to the “Do” based instructions by the mother to the developing child and at times it could be suggestive and indirect. Thus the proposed model for training urban and rural women involves following modules:

1. Developing scientific approach towards day to day life by having information, skill and insight.
2. Training for GCP, to save energy while cooking, retain more nutrition, discard less fibres etc.
3. Mind set development and positive approach towards life and while upbringing a child.
4. Joys of teamwork – from singularity to multiplicity to unity.
5. Training for simple technologies (for rural women) and distribution net work for value added products (for urban women), linkage through science and social organizations in the vicinity and linkage through mid day meal extra supplementation of vegetables / fruits.
6. Achieving success, happiness through generation of work, creation of wealth, participating in making the yonder generation healthy at body and mind and thus achieving the old Indian holistic way of life “Sarve bhavantu Sukhinaha : let all be happy”.
