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Editorial

Technology Communication and Societal Change

While analysing civilisations and societies and their advancement, there emerge certain qualities or traits that a society can be said to have acquired over the period of its existence. These qualities certainly can be said to have a role in their continuous shaping and development. In fact there is a whole range of these attributes, which help apparent and obvious character, and performance of this human collective. These can be cited as the general spirit of adventure, enterprising nature, inquisitiveness, rationality, reasoning, innovativeness, skill temperament, etc. Technological temper is yet another aspect of these societal attributes. It imparts to the society, the qualities associated with the conduct and appreciation of technology and related areas and their amalgamation into the social behaviour.

Communication of fire churning technology was an early example of technology communication for human civilisation. Technology is the practical and applicable part of science. It therefore derives that science has cognitive dimensions and technology has applied dimensions. It provides a way to human mind to shape the abstract and complex reasoning and concept into practical existence.

Technology communication is conceptually anticipated as the activity that enhances above trait in the society. It is also associated with technology orientation, technology generation and propagation and with the basic quality of converting concepts into technology. This also means the characteristic of identifying necessity and the ability to experiment, refinement and fine-tuning a process, product or service. A notable feature of technology and technology communication is that it is indeed a great leveller of gaps created on the fronts of literacy. Does it mean that technological concepts and traits can be communicated irrespective of literacy and education of the target recipient? And the answer is obvious.

Technology is the science that is associated with the practical dimensions. Technological temper can make a huge difference in today's world, where scientific knowledge is aplenty. One, who translates scientific concepts into technological applications, is able to create huge difference in social echelons. This leads to innovativeness in the society. It is one of the essential ingredients for prosperity of nations. Technological temper leads to creating a technological friendliness amongst the population. It will make an interesting study of the process of evolution of technology communication and technological temper in the history of mankind. The cause and effect vis-à-vis technological temper and technology communication shall be another such area needing probing. ■

Manoj Patairiya

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Science & Technology Coverage in Print and Electronic Media : A Case Study of Gujarat

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Abstract

A Study of media content was undertaken during October 18, 2002 - January 20, 2003 in Ahmedabad, Gujarat. It included electronic media — radio & television and the print media — newspaper & magazine. Three channels of cable TV — DD-I, Alpha (Gujarati) and ETV (Gujarati); two radio channels — AIR Ahmedabad, AIR FM, Ahmedabad and 19 Gujarati, 3 Hindi and 2 English newspapers and 4 magazines in Gujarati were taken into consideration for this purpose. Survey findings corroborated that about one quarter of programmes on TV had S&T coverage. Whereas for radio it was about 15 percent of programmes that had S&T content. Most newspapers covered S&T – about 3 to 4 items and were largely short in content size. S&T coverage was through news and articles; majority of the coverage was on medicine and health.

सारांश

संचार माध्यमों की सामाग्री पर आधारित यह अध्ययन अहमदाबाद, गुजरात में अक्टूबर 18, 2002 से जनवरी 20, 2003 के बीच किया गया, जिसमें इलेक्ट्रॉनिक संचार माध्यमों (रेडियो एवं टेलीविज़न) एवं मुद्रित संचार माध्यमों (समाचार पत्र व पत्रिकाएं) को शामिल किया गया। जिनका अध्ययन इसके अंतर्गत किया गया, वे हैं – केवल टीवी के तीन चैनल– डीडी–1, अल्फा (गुजराती) व ई टीवी (गुजराती); दो रेडियो चैनल – आकाशवाणी अहमदाबाद एवं एआईआर एफएफ अहमदाबाद; 19 गुजराती, 3 हिन्दी व 3 अंग्रेजी समाचार पत्र; तथा 4 गुजराती पत्रिकाएं। अध्ययन के दौरान लगभग एक चौथाई टीवी कार्यक्रमों में विज्ञान एवं प्रौद्योगिकी पर सामाग्री पाई गई। यही मात्रा रेडियो के लिए लगभग 15 प्रतिशत थी। अधिकतर समाचार पत्रों ने विज्ञान व प्रौद्योगिकी को स्थान दिया – औसतन तीन या चार विषय सामग्रियों में, वह भी छोटे स्थानाकार में। यह सामाग्री मुख्यतः समाचारों व लेखों के रूप में थी, जिनमें ज़्यादातर स्वास्थ्य विज्ञान पर आधारित थी।

Key words: S&T coverage, Extent of programmes on science & technology, S&T in mass media

Introduction

In any society, it is desirable to have S&T awareness among its population especially in the matters pertaining to day to day life – be it health, sanitation, disaster preparedness, weather forecasting, crop patterns and selection, environmental safety or issues like pollution. We need to have well informed population, which can make right choices. Rashtriya Vigyan Aiwam Prodyogiki Sanchar Parishad (RVPSP) has mandate of communicating science & technology among masses; stimulating scientific and technological temper and coordinating such efforts all over the country. The partners are institutions and organisations like, Science Cities spread over the country, NISCAIR and NISTADS (Under CSIR), Vigyan Prasar and educational institutions.

Audio and visual media is gaining ground as the preferred channel of communication. Print media has been there for a long time and will continue to stay so despite the onslaught of cable T.V., satellite communication, FM radio, etc., because of the obvious advantage of easy mobility, low cost and multiple language advantage.

Media plays a very important role in inculcating scientific temper but these days we see astrology, tarrot reading and superstitious beliefs taking daily and weekly columns in newspapers and even separate channels on astrology have come up. Therefore it is pertinent to measure the extent, depth, salience, etc. of various S&T issues by mass media. Strategies certainly have to be made to increase the coverage and substance of S&T coverage.

Keeping in view the importance of various mass media, a need was felt to measure the extent of S&T coverage as it is considered to be far from adequate. Media has to play an important role in creating scientific temper in society. In September 2003, a study of extent of coverage of S&T by various media in Gujarat was completed by TALEEM Research Foundation, Ahmedabad.

This study was carried out under a project catalysed & supported by RVPSP, DST, New Delhi to TALEEM, Ahmedabad.

Study of S&T Coverage

A study of Hindi and English newspapers was entrusted by Vigyan Prasar, an autonomous organisation under DST in June 2000 to the same group. The scope of that study was survey of science coverage in media through content analysis of 52 newspapers, 31 in Hindi and 21 in English from November 1999 – January 2000. For this purpose newspapers which were being published from various cities of the country were also taken into consideration, like for Hindi *Dainik Tribune* (Chandigarh), *Amar Ujala* (Meerut), *Hindustan* (Delhi), *Nai Duniya* (Indore) and for English *Assam Tribune* (Guwahati), Hindustan Times (New Delhi), *Western Times* (Ahmedabad) and so on.

Characteristics like page positioning, coverage in column centimeters, subject areas of coverage, type of presentation, message appeal, type of item and source were studied. The newspapers registered with Indian Newspaper Society and enlisted in INS Handbook 1997, provided the sampling frame. For this study, papers having high circulation were selected from all over the country but no Hindi newspaper could be selected from southern region as none was being published. Average number of science items coverage was 3.3 during this period; 4.3 items in English and 2.5 items in Hindi.

The largest number of science items were covered pertaining to health care (31.8%), whereas information technology (9.8%), environment (8.1%), space science (6.0%), etc., were some other areas which gained prominence. The maximum coverage was through news items (50.8%), followed by articles (28%), reports and features, etc. There was no set pattern for the science items and featured anywhere in the newspaper without following any consistent pattern.

Present study

The present study aimed at extent of coverage of S&T in Gujarat by print and electronic media. The scope of the study was enhanced to go beyond print media as electronic media is fast emerging as a powerful media. Universe of the study were 19 Gujarati newspapers like *Gujarat Samachar*, *Gujarat Today*, *Phlchhab*, *Saurashtra Samachar*, *Chitralekha,* etc., besides two English language and three Hindi language newspapers. Two radio channels i.e, All India Radio (FM & AM) and three TV channels namely DD-I, Alpha Gujarati and ETV were also included in the study.

Objectives

Main focus was to study the extent of S&T coverage, subject matter of S&T coverage, salience, and trends during the weekends and weekdays and type of coverage like news, articles, features, etc. Basic premises which were presumed and checked were that S&T coverage in various media is inadequate and is not prominently covered.

Above mentioned all three media were surveyed for nearly three months for the purpose during October - January, 2003.

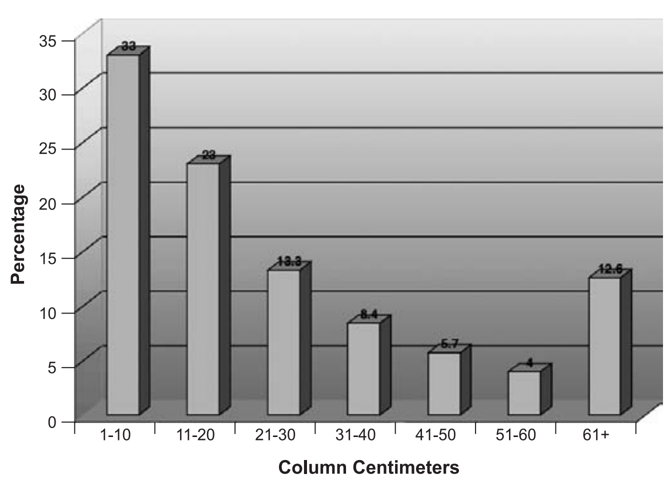
Methodology

For operationalisation of the project, 36 S&T categories and one category of anti-science were chosen for the analysis. Science per se is the process of accumulating knowledge through systematic observation and experimentation. It has limitless horizons, but for purposes of this study a few subject categories like medicine and health, IT, environment, space science, agricultural science, scientific research, science and society, technologies, disasters, inventions, discoveries, nuclear sciences, science popularisation, telecommunication, biotechnology, science policy, weather forecasting, S&T statistics, robotics, scientists and personalities, etc., were taken into consideration.

S&T coverage in print media

Newspapers numbering 28 with altogether 1926 copies were analysed for page position / salience, size of coverage, subject matter of coverage in S&T, types of coverage and presentation. Newspapers from Gujarat listed in INS Handbook 2001, were covered in the study. It was observed that 7.5% of newspapers did not give any S&T coverage, rest had some coverage which varied in form and substance. The average number of S&T related items was four in the newspapers which was usually short in nature i.e, 33%

Chart 1: S&T Coverage in Newspapers by Column Length



was of 1-10 column cms, 23% 11-20 column cms and only 12.6% coverage exceeded 60 column centimeters (see Chart 1). Newspapers have an obvious disadvantage compared to electronic media that it can be understood by only literate persons, they also lack speed. These days with 24X7 news channels, by next day any news item becomes stale when it comes in the newspapers. But there is an advantage also with print media that it can be referred to again and again.

Further in terms of salience, only 15% of S&T items got front page coverage whereas more than 70% of items did not follow any specific trend in page positioning. The results were more or less comparable in different language newspapers. Medicine and health continues to take the lion's share in any S&T coverage in this regard. Gujarati newspapers covered (48.9%), Hindi (39%) and English (30%), often running a regular health column (see Chart 2). Weather forecasting and new technologies also received prominence.

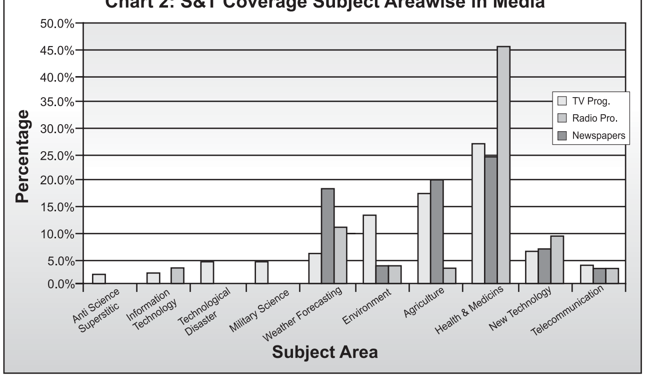


Chart 2: S&T Coverage Subject Areawise in Media

Foreign S&T news was more in English newspapers than any other language newspapers. Presentation of S&T items in newspapers has to be improved as only 10% of the text was with coloured pictures and 17% of the text with B&W pictures, rest all text. Sixtyfive percent of S&T coverage was in the form of news, 29% in the form of articles and 6% coverage was in other types (see Chart 3).

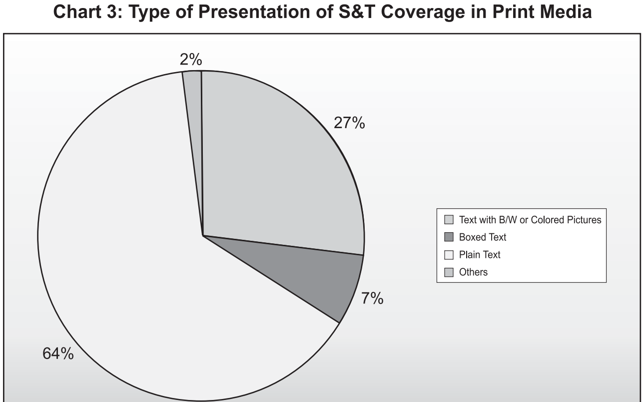
S & T coverage in radio

Radio, because of its mobility and the fact that it can run on batteries (transistor radio), continues to be quite popular mode of communication with common man. Ahmedabad's primary radio channel and FM channel were selected for the study for three months. FM is largely an entertainment channel and AIR is a mixed channel of entertainment, news and education. S&T coverage was much more in AIR Ahmedabad (18.9%) whereas in FM it was only 9.8%, bringing overall coverage to a low figure of 15% out of total programmes. On both the channels S&T coverage was mainly through news.

Medical and health information (24.4%) continues to hold dominant position amongst whole coverage followed by agriculture (20%), weather forecasting (18.4%), invention / discoveries (6.8%), whereas environment, military science and nuclear science gets meagre coverage. In FM channel too, subject matter of S&T coverage followed more or less the same trend.

S&T coverage was mainly through news and agricultural programmes. Other types of presentation which had some S&T coverage were radio-serials, expert interviews, etc. There was no particular pattern of coverage on any specific day of the week and S&T broadcasts were mainly of short duration (five minutes or less); (see Chart 4). Between the two channels AIR-FM had 60% programmes of one minute or lesser duration and AIR-Ahmedabad had 33% programmes of on minute or lesser duration. S&T coverage was maximum during the evening hours between 6-8 p.m. (25%) followed by 8-10 p.m. slot and 6-8 a.m. slot in the morning.

Chart 3: Type of Presentation of S&T Coverage in Print Media



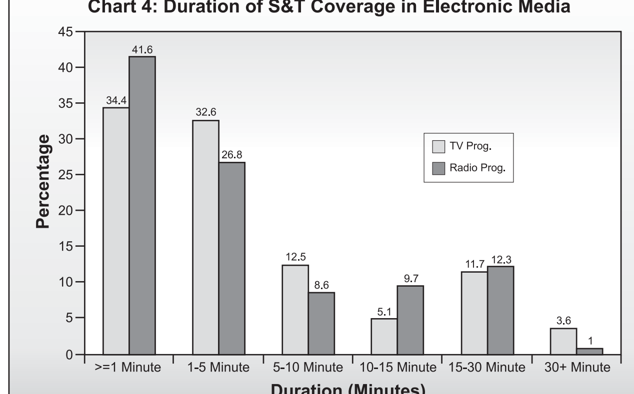


Chart 4: Duration of S&T Coverage in Electronic Media

S&T coverage on television

Out of more than 8500 programmes which were analysed 74.7% had no S&T coverage; only about 25% programmes had some S&T coverage. Again as in radio, S&T coverage was maximum through news based programmes (35%) followed by serial drama (22.5%), other types of programmes had minor coverage of S&T.

For S&T coverage on T.V., 3 channels — Doordarshan (DD-I), Alpha Gujarati and ETV were included in the study. Out of total coverage of 25%, DD-I had S&T coverage of 31.9% compared to 23% of ETV and 17.4% of Alpha Gujarati channel. Thirtyfour percent programmes were of one minute or shorter duration, 33% were of 1-5 minutes duration and the rest were of longer duration.

Here again like in radio, majority of the programmes were on medicine and health (27%), which was higher than radio coverage of 24.4% on medicine and health. Agriculture (17.5%) and environment (13%) were next in race followed by other subjects, which had minor coverage like weather forecasting, technological disasters, etc. and 2% programmes were found having some superstitions in their content. Most popular format here again was news and news based programmes.

There was no significant pattern of S&T coverage, i.e., S&T coverage on weekdays and weekends did not vary significantly but on Doordarshan S&T coverage was less on Sundays as it does not telecast educational programmes on Sunday. Majority of S&T programmes were of less than one minute's duration (34.4%). Only 3.6% programmes on S&T were of more than 30 minutes duration (Chart 4). Programmes were easy in content and presentation.

Fortyone percent of S&T based programmes came during the morning hours between 6-8 a.m. and 16% of the programmes came during the evening hours (8-10 p.m.).

Overview

The study once again throws a light on inadequacy of the media coverage on Science & Technology, as it lacks depth and is generally superficial. Though item wise coverage of S&T is not bad in Gujarat like on an average 3-4 items based on S&T comes in print media everyday, in television every fourth item is S&T based and so is the case for every seventh item on radio.

But in real terms as we have observed, duration and size whatever may be the case, is very short for S&T based items in all these media. All media cover medicine and health to large extent offering day to day remedies for common ailments.

Private channels have to become more sensitive and responsible in terms of S&T coverage, taking into consideration country's need of inculcating scientific temper among masses. S&T coverage is more in official media like DD than in private channels. There is need to introduce more variety and depth in S&T programmes rather than merely covering medicine and health and adopting news format mainly.

Senior writers, editors can make more efforts in giving analysis of latest S&T based issues and with greater prominence.

New formats like quizzes, interviews, dramatised programmes as serials, science based game shows, etc., may be attempted and adopted to inculcate scientific temper in the society.

Overall, media has to play a bigger role to change society from a laid back to environmentally sensitive, healthy and self reliant society. Masses can be given inputs on all S&T based issues for enabling society to make the right choices.

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Scope of Digital Media in Diffusion of S&T Communication Among Students

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Abstract

There is a gigantic possibility and scope for S&T dissemination in the country. Digital Media has emerged as a revolutionary medium and it is capable of producing new medium among masses. Though this medium requires net literacy as well as technical skills, and is able to bridge the gap of S&T Communication in the country. More important thing is assurance of affordable technology and local flavour in terms of language, style and presentation. In this study, an attempt has been made to reveal the medium preference, nature of information, opinion about S&T, reason for reading S&T and format for digital media. The study deals with the suitability of digital media with reference to S&T communication in Indian scenario.

सारांश

देश में विज्ञान व प्रौद्योगिकी संचार के विस्तार की अत्यधिक संभावनाएं एवं अवसर है। डिजिटल माध्यम एक क्रांतिकारी माध्यम के रूप में सामने आया है और आमजन के बीच नया लोकप्रिय माध्यम बनने में सक्षम हैं। यद्यपि इस माध्यम के लिए इंटरनेट का ज्ञान और तकनीकी दक्षता की आवश्यकता है तथापि यह देश में विज्ञान एवं प्रौद्योगिकी की खाई को पाट सकता है। महत्वपूर्ण यह है कि ऐसी प्रौद्योगिकी के साथ भाषा, शैली और प्रस्तुतिकरण का स्थानीय स्वरूप सुनिश्चित करना होगा। इस अध्ययन में माध्यम की प्राथमिकता, सूचना का स्वरूप, विज्ञान एवं प्रौद्योगिकी के संबंध में दृष्टिकोण, पठन का कारण और प्रारूप संबंधी विषय पर प्रकाश डाला गया है। यह अध्ययन भारतीय परिदृश्य में डिजिटल माध्यम की विज्ञान एवं प्रौद्योगिकी के सापेक्ष उपयुक्तता से संबंधित है।

Keywords : S&T communication, Digital media preference, Nature of information, Medium preference

Introduction

Communication is the basic need of human being. Communication enables us to understand various happenings and this is how we share our emotions, thoughts, ideas, etc., verbally or non verbally. Apart from this, science communication is an art which provides scientific vision towards problem, happenings, past knowledge and understanding. As communication requires a medium for its propagation, today digital media has arrived as a boon for the modern sophisticated society.

Digital Media: An overview

In 1973, the U.S. Defense Advanced Research Projects Agency (DARPA) initiated a research programme to investigate techniques and technologies for interlinking packet networks of various kinds. The objective was to develop communication protocols which would allow networked computers to communicate transparently across multiple, linked packet networks. This was called the internetting project and the system of networks which emerged from the research was known as the 'Internet'. The system of protocols which was developed over the course of this research effort became known as the TCP/IP Protocol suite, after the two initial protocols developed: Transmission Control Protocol (TCP) and Internet Protocols (IP).

In 1986, the U.S. National Science Foundation (NSF) initiated the development of the NSFNET which today provides a major backbone communication service for the internet. With its 45 megabit per second facilities, the NSFNET carries on the order of 12 billion packets per month between the networks it links. The National Aeronautics and Space Administration (NASA) and the U.S. Department of Energy contributed additional backbone facilities in the form of the NSINET and ESNET respectively. In Europe, major international backbones such as NORDUNET and others provide connectively to over one hundred thousand computers on a large number of networks. Commercial network providers in the U.S. and Europe are beginning to offer Internet backbone and access support on a competitive basis to interested parties.

Both public domain and commercial implementations of the roughly 100 protocols of TCP/IP Protocol suite

This paper/study has been commissioned by IJSC

became available in the 1980s. During the early 1990s OSI protocol implementations also became available and by the end of 1991, the Internet has grown to include some 5,000 networks in over three dozen countries, serving over 700,000 host computers used by over 4,000,000 people.* The Internet Activities Board (IAB) was created in 1983 to guide the evolution of the TCP/IP protocol suite and to provide research advice to the internet community.

During the course of its existence, the IAB has reorganised several times. It now has two primary components; the Internet Engineering Task Force and the Internet Research Task Force. The former has primary responsibility for further evolution of the TCP/IP protocol suite, its standardisation with the concurrence of the IAB and the integration of other protocols into Internet operation (e.g., the open systems interconnection protocols). The Internet Research Task Force continues to organise and explore advanced concepts in networking under the guidance of the Internet Activities Board and with support from various government agencies.

In 1980-81, two other networking projects, BITNET & CSNET, were initiated, BITNET adopted the IBM RSCS protocol suite and featured direct leased line connections between participating sites. Most of the original BITNET connections linked IBM mainframes in university data centres. This rapidly changed as protocol implementations became available for other machines. From the beginning, BITNET has been multi disciplinary in nature with users in all academic areas. It has also provided a number of unique services to its users (e.g., Listserv). Today, BITNET and its parallel networks in other parts of the world (e.g., EARN in Europe) have several thousand participating sites. In recent years, BITNET has established a backbone which uses the TCP/IP protocols with RSCS based applications running above TCP.

The Road Behind Digital Media

1938	Kanrad Zuse built the world's first binary digital computers
1946	The first glimpse of the ENIAC, a machine built by John Mauchy & J. Presper Eckert
1951	The UNIVAC-I developed
1953	IBM shipped its first electronic computer, the 701
1955	The first fully transistorised computer, TRADIC
1957	FORTRAN enabled a computer to perform a repetitive task from a single set of instructions by using loops
1958	Jack Kilby created the first integrated circuit
1960	• Dataphone, the first commercial modem • COBOL, designed for business use • LISP made its debugs as the first computer language designed for writing artificial intelligence programmes
1963	ASCII developed
1965	PDP-8, the first commercially successful minicomputer
October 1969	The first actual message, *' [H] e:lo' sent
December 1969	Four sites or nodes were connected - UCLA, Stanford Research Institute, UC Santa Barbara and the University of Utah
1970	ARPANET established
1971	The birth of e-mail, A simple programme developed by Ray Tomlison of BBN that sent messages across a distributed network; Further reworked in 1971 when the @ sign was introduced

* The study was completed in year 2005.

1972	Intel's 8008 microprocessor made its debute
1973	• First international connections to the ARPANET University college of London (England) and NORSAR [Norway] • Ethernet method of network connections devised
1974	Vint Celf and Bob Kahn published a paper detailing the design of a Transmission Control Programme [TCP] which was split into TCP & IP in 1979
1980	• The first hard disk drive for micro computers • The first optical data storage disk • The first Winchester 5.25 inch hard disk drive announced
1982	• First definition of an internet as a connected set of networks, specifically those using TCP/IP and 'Internet' as connected TCP/IP internets established • Philips creates an erasable optical disk • Intel introduces the 6 MHz 80286 microprocessor • The first IBM PC clone
1983	• Name server developed at university of Wisconsin • Desktop workstations come into being • The first personal computer with a graphical user interface • Philips & Sony develop the CD-ROM • Microsoft Windows & MS Word 1.0 • Pascal Programming Language
1984	• Domain Name system introduced • Apple computer launched the Macintosh • The first successful mouse driven computer with GUI • Hewlett-Packard introduces the Laser Jet laser printer
1985	• Symbolics.com is assigned on March 15 to become the first registered domain; Other first include cmu.edu, purdue.edu • The C++ emerges as the dominant object oriented programming language • The modern internet gained support when the NSF formed the NSNET • CD-ROM drives are introduced for computer use
1986	• NSFNET created with backbones speed 256 kbps • IBM & MIPS released the first RISC based workstations
1987	• Number of Hosts more than 10,000 by 1989 • Apple designed HyperCard • The first IBMs to include Intel's 80386 chip
1989	Virtual reality, a computer generated 3-D environment that allows a user to interact with the realities developed
1990	• ARPANET ceases to exist

	• First Commercial provider of Internet dial up access is in business
	• The world wide web was born when Tim Berners-Lee, a researcher at CERN, Geneva, developed HTML
1991	• The NSF allowed commercial use of the Internet for the first time
	• IBM introduces Think pad 700C Laptop computer
1993	• InterNIC created to provide Internet related services like directory & database and registration services
	• Intel introduces Pentium processor
	• Lomega introduces its Zip drive & Zip disks
1994	• ARPANET / Internet celebrates 75th birthday
	• E-shopping comes into being
1995	• The birth year of JAVA
	• Real audio and the year when domain registration was no longer free
	• The NSF decommissioned the internet backbone
	• Microsoft releases Windows 95
1996	CD-Rewritable (CD-RW) is announced
1997	• The portal emerges as a buzzword
	• E-Commerce develops further
1998	Motorola officially introduces the G 4 processor
1999	• First internet Bank of Indiana
	• The first full service bank available only on the Net, opens for business
	• Apple releases the Power Mac G 4 Computer
2000	• Compaq introduces the iPAQ pocket PC handheld computer
	• Intel announces Pentium 4
	• AMD ships 1.1 GHz Athlon processor
2001	Intel announces hyper threaded P4 capable of working as two processors; Napster close down

Objective

The objective of study were as following :

1. To identify the nature and readership of S&T matters in digital media.
2. To observe the effectiveness of digital media.
3. To check the acquaintance of S&T matters through this medium.

Area of study

The area of study was Indore. It is the most industrialised city and commercial capital of Madhya Pradesh. Indore is the main centre of higher education in the state. Devi Ahilay university is accredited as four star university by NAAC. The number of users of digital media here, is highest in the state.

Methodology

The study has been made with a view to know the suitability of digital medium with reference to S&T Communication and also devoted to explore the possibilities of enhancement in this medium. Survey research employed personal interview method to accomplish the desired objective. Sample size of 400 was selected in the survey study, out of which 200 were found to be in order. The target group, on whom the study was conducted, categorised as graduate and post graduate students of college and university. An attempt has been made to collect the heterogeneous sample of students by dividing it into; professional and non-professional courses. Professional course includes B.Sc. (Computer Science, Electronics, Information Technology), MCA, MIB, MCM, MMS, BCA, BTI and non professional courses includes graduate and post graduate students of Science, Mathematics, Arts, Commerce and Home Science. The questionnaire had two parts; personal information and objective type questions. The questionnaire of survey was mainly focused on area of interest in S&T, time spent monthly, utilisation of information, benefit from information and medium suitability.

Observations and Findings

1. The preference of digital media for information / reading is 3.0% which is second to radio in decreasing order. Digital media is more popular among graduate students with 5.37% as compared to post graduate students with 2.33%. Newspaper is still top most information source (45.50%) among students, TV-39.0%, Magazines / Books – 10.40% & radio – 1.5%.
2. As far as the information preference is concerned, S&T is second to the national affairs among students. Graduate students read national affairs 45.16%, while post graduate students 26.16%. An interesting fact was found that post graduate students read more S&T, 31.77%, than national affairs, 26.16% (see Table 1).
3. In S&T, Health & Medicine were the most preferred topic having 36.79% coverage. Computer ranked second position with 20.10%, nature third position with 13.34%. Among graduate students coverage of Health & Medicine was 40.86%, computer 21.50%, space 13.97%, Environment 10.75%, while post graduate students read health & medicine 32.71%, Nature 19.15%, Computer 18.69% & Environment 13.0%.
4. 49.0% student read S&T as a means of knowledge enhancement & 41.34% for the development of scientific temperament, 46.23% graduate student read for the development of scientific temperament and 41.93% as a means of knowledge enhancement. Post graduate student gave more weightage to means of knowledge enhancement with 56.07% as compared to the development of scientific temperament with 36.4% (see Table 2).

Table 1 : Nature of Information

S.No.	Nature	Total	Graduate Students	Post Graduate Students
1.	National Affairs	35.66%	45.16%	26.16%
2.	Politics	6.82%	4.30%	9.34%
3.	S&T	26.10%	20.43%	31.77%
4.	Art and Culture	4.55%	5.37%	3.73%
5.	Economics	9.86%	15.05%	4.67%
6.	Sports	7.29%	4.30%	10.28%
7.	International Affairs	9.69%	5.37%	14.01%

Table 2 : Reason for reading S&T

S.No.	Reason	Total	Graduate Students	Post Graduate Students
1.	S&T is by far the most important subject for reading	4.25%	4.30%	4.20%
2.	S&T is a means of knowledge enhancement	49.0%	41.93%	56.07%
3.	For the development of temperament	41.34%	46.23%	36.44%
4.	You read S&T because it is your subject	5.40%	7.52%	3.27%

Table 3 : Opinion about S&T

S.No.	Opinion	Total	Graduate Students	Post Graduate Students
1.	It is a subject related to laboratory	3.62%	5.37%	1.86%
2.	A research subject	18.13%	12.90%	23.36%
3.	A subject of daily life	67.30%	64.51%	70.09%
4.	An uncommon subject	10.94%	17.20%	4.67%

5. 67.30% students treated S&T as a subject of daily life and 18.13% found a research subject. The opinion of graduate students regarding S&T as a subject of daily life was 64.51% and as a research subject 12.90%. While the opinion of post graduate students regarding S&T as a subject of daily life was 70.05% and as a research subject 23.36% (see Table 3).
6. It is found that 85.93% think that digital media can revolutionise the dissemination of S&T even in common people.
7. Records found that digital media was mostly preferred for its ability to provide fastest information as replied 48.21% students. 21.72% prefer for wide information network.
8. As far as the nature of S&T information is concerned, 37.95% read news regarding invention / discovery and about 22.04% regarding application. Graduate students read 51.61% news related to invention /discovery while post graduate 24.29%. Post graduate students gave more weightage to developmental information at 25.23%.
9. The formats Internet news / Articles / Research paper was preferred by 54.26% and chatting by 13.18%, downloadable tutorials was rarely used format among graduate and post graduate students.
10. 61.61% student told that there is no need of new formats for enhancement of S&T readership in digital media and 38.39% showed the need of new formats. Major emphasis was concerned to the interactive and multimedia based format.
11. In case of controversy / dispute 29.33% students consult with subject experts and 28.98% see traditional medium like newspaper / magazines, 22.90% visits many websites. Study revealed that 48.38% graduate students consult with subject experts and 21.52% see traditional medium. In case of post graduate students 36.44% see traditional medium and 35.04% visit Web.
12. Google was found as the most competent search engine among students. 74.41% found it as a complete search engine, yahoo ranked second with 14.47% and indiatimes third with 11.12%.
13. The sites normally most visited by students for S&T were :
    www.newscientist.com
    www.sciencemadesimple.com
    www.stubrit.com; www.sciencenews.org
    www.vigyanprasar.com and
    www.howstuffwork.com
14. Monthly average net access time spent by graduate student is 14.10% hours and by post graduate is 18.38 hours.

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Article

Creating a Scientific Temper for the World

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The then President of the US National Academy of Science, here touches broad spectrum of nation building, which is true is every aspect for each nation and every society. His serious musings at the very purpose of science are revealing and thought provoking. He emphasised upon totalistic approach for creating a society that is firmly based upon the tenets of science for ultimately to achieve salvation of man. Can science commnicators take a cue.

Editor

Science is crucial for policy making

The benefits that are derived from science extend far beyond the obvious ones — such as improved medical care, labour-saving machinery and our rapidly increasing ability to store and access knowledge and to communicate with each other. Modern science has also provided us with such a deep understanding of the natural world that we can often predict what is likely to happen in the future. This predictive ability is what makes science so important for policy makers, and it is central to most of our reports (referring to reports brought out by the academy).

What our system does for providing advice to policy makers? First, unlike the situation in some other parts of the world, everyone in the U.S. government, on both sides of any argument, believes in science. Second, the press pays close attention to our work. We are often front page news, as we were on April 27 with our report on 'Guidelines for Human Embryonic Stem Cell Research'. This helps to guarantee that our advice has a major impact.

In addition, our review processes remove all non-scientifically based conclusions and recommendations from our reports, so we cannot be discredited for going beyond the science. I like to use our reports, 'Climate Change Science' and 'Arsenic in Drinking Water', both published in 2001, to make an important general point. These reports do not tell our government exactly what it should do about carbondioxide emissions or about establishing appropriate limits on arsenic levels. Instead, what we say to the government is, "If you decide to allow arsenic concentrations of five, 10, or 20 parts per billion, these are the effects that you are likely to see decades from now." We take pride in simply telling the truth — the scientific truth — to power. Finding a balance among the many competing needs in our complex society is the expertise of policy makers, and not ours.

It is irrational for a government anywhere to make decisions without sound scientific advice. This fact motivates our new 10-year effort, funded by the Gates Foundation, to strengthen academies of science in Africa as providers of national science policy advice. Initially, our effort will be focused on Uganda, Nigeria, and South Africa — with other nations to be added later.

But what about the 50 states of our nation? Many of them would seem to be no better off than developing nations in their ability to harness science advice. From time to time, the National Academies have been commissioned by a particular state or city to provide needed science advice. For example, at the request of New York City, we provided important advice on that city's water supply. And in response to a request from the governor of Alaska, we produced a well accepted report on their wolf and bear populations.

But many states will require their own organisation to provide the local science advice that they need. For this reason, we have begun an experiment designed to help strengthen a state analogue to the National Academies, the California Council on Science and Technology. We also have been forging closer ties with the National Association of Academies of Science,

• Based on his speech to the Academy's 142nd Annual Meeting on May 2, 2005.

representing the 43 state and regional academies in the United States.

Whether here or elsewhere, it is not enough to produce timely reports with sound recommendations — it is also crucial that there be trusted public servants in the government who are sufficiently scientifically and technologically adept to interpret our advice for the political establishment. These individuals provide invaluable links between the government and the scientific community. Acting as the 'translators' between two very different cultures, they are often the initial audience for our many policy reports (See Figure 1). It is hard to imagine how the U.S. government could function without them.

The American Association for the Advancement of Science (AAAS) deserves special recognition for its fellowship programs, which for 30 years have brought large numbers of outstanding scientists and engineers to Washington to serve for a year in the federal government. Many of these people decide to stay, and they have made a big difference by populating our government (and the National Academies) with critically important scientific expertise and talent. In recent years, we have provided help for this important effort by establishing our own Christine Mirzayan Science and Technology Policy Graduate Fellowship Program. This program brings about 80 young scientists and engineers to the Academies each year to work on policy issues.

Urgently needed are hundreds of thousands of 'citizen scientists' who devote part of each week to spreading an understanding of science, its methods, and its values to nonscientists.

As we work to extend the National Academies model at home and abroad, we encounter a major problem. Most U.S. state legislatures — and many foreign governments — lack the scientifically trained staff so indispensable here in Washington. We therefore hope to introduce AAAS-type fellowship programs in both California and Africa, to improve the access to science by their governments

But none of this is enough to ensure that science — and scientific judgments — will create a more prosperous and rational world. Because the pace of scientific discovery continues to accelerate, the scientific and technological advances in this century will almost certainly exceed those of the past 100 years. Already, there are clear signs that our societies are ill prepared for such changes. Witness, for example, the overwhelmingly negative reaction in Europe to genetically engineered improvements in agricultural crops — a sentiment that threatens to block the use of this technology to help poor farmers in Africa. And in the United States, far too many people are susceptible to dogmatic talk-radio hosts who promulgate simplistic solutions to complex problems. There is also a growing backlash against vaccination, and we currently face challenges to the teaching of evolution in 40 of our 50 states.

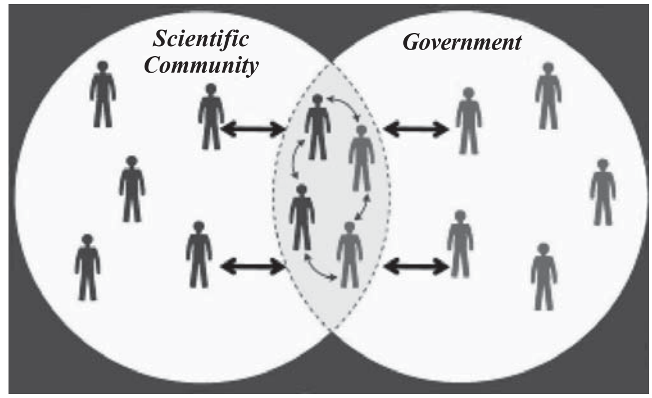

Figure 1

Much of today's anti-science sentiment stems, I believe, from fear that is fired by honest confusion on the part of the public. According to a recent poll, for example, a large fraction of Europeans believe that "only genetically modified plants contain genes." Most people have never encountered a working scientist, nor do they understand how science works or why it has been so successful. Far too many think that we are weird geniuses, when in fact the vast majority of us are neither.

Urgently needed are hundreds of thousands of 'citizen scientists' who devote part of each week to spreading an understanding of science, its methods, and its values to nonscientists. And, if we are to have any chance of success, our university science departments must change their mission : Rather than focusing solely on training future research scientists, they must also openly encourage — and design programs for — science students at all levels who want to pursue a variety of other careers where their skills are badly needed.

One of my favorite authors is Daniel Boorstin, who wrote so beautifully about the profound ways that new discoveries have changed the course of human history. In summing up, he said :

> *In my book, 'The Discoverers,' one of my themes was that the great obstacle to progress is not ignorance, but the illusion of knowledge… There's a mystery in the works of creation and discovery. And I think that to grasp that mystery, to be prepared for the unexpected, is the task of those of us who are helping others learn about the world.*

As I will discuss next, I am absolutely convinced that the scientific community will need to devote much more energy and attention to the critical issue of educating everyone in science, starting in kindergarten, if we are to have any hope of preparing our societies for the unexpected, as will be required to spread the benefits of science throughout our nation and the world.

Science education can be exciting and empowering for everyone

I came to Washington in 1993 intending to be an 'education president.' As things turned out, I spent an enormous amount of time in my first two years at the Academies working on the 'National Science Education Standards'. This was a great learning experience for all those who participated, including some 40 members of our Academy, because it forced us to collaborate closely with outstanding teachers and other professional science educators. For the first time, I came to recognise just how difficult it is to teach well. Never again will I equate good teaching simply with good lecturing, as I did in my first 25 years at universities.

But this so-called teaching of 'science as inquiry' demands a revolution in science teaching at all levels.

The type of science teaching called for in the Standards emphasises logical, hands-on problem solving, and it insists on having evidence for claims that can be confirmed by others. It requires work in cooperative groups, where those with different types of talents can discover them — developing self confidence and an ability to communicate effectively with others. But this so-called teaching of 'science as inquiry' demands a revolution in science teaching at all levels.

A brief anecdote may help. A few years ago, my daughter was distressed when her son reached the second grade without any sign that science would ever be part of his curriculum. She therefore volunteered to teach a few hands-on science lessons to the class. On the first day, she gave each child a hand lens and three different types of soil, and she asked them to describe what they observed in each sample. To her dismay, the class soon became paralysed, with no one willing to write the requested descriptions. Why? She discovered that, after two and a half years of formal schooling, these 7-year-old students had concluded that the entire point of education was to learn and regurgitate the 'correct answers.' A fear of making a mistake prevented them from writing anything.

An education that aims to fill the heads of students with correct answers is a disaster for many reasons. For one, different cultures will have different answers, and our diverse societies will suffer greatly from intolerance. Instead, all students must learn how to learn, so that they can solve new problems and overcome the many challenges that they will encounter in their adult lives.

Some of you may be unfamiliar with the type of science education I am promoting. A cartoon may perhaps be worth a thousand words (Figure 2).

The good news is that a science education of the type we want meets major practical needs of modern societies. First, properly delivered, it can provide a nation with the type of work force that business and industry say they need : that is, workers with inquisitive, 'can do' attitudes; the ability to use logic and experimental manipulations to solve problems; and the ability to function in collaborative work-groups. Second, by giving all young people the chance to function like a scientist, this type of education should enable a nation to do a much better job of encouraging and creating its next generation of scientists and engineers — people who will be absolutely essential for the nation to prosper in the global economy.

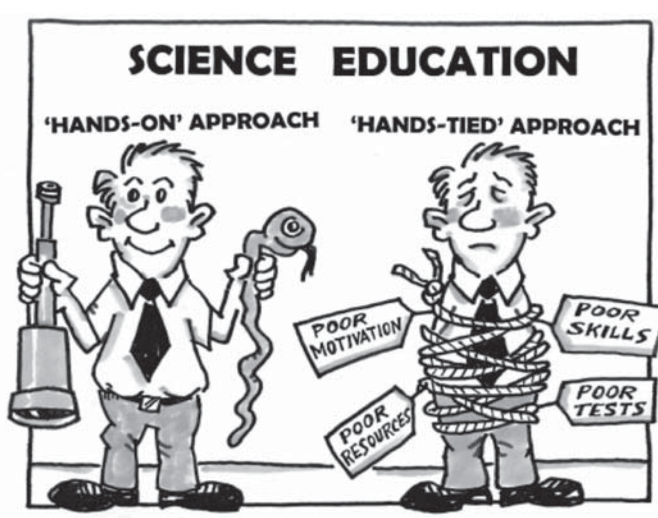

Figure 2

Science education can also help build a safer world

More than a hundred years ago, John Dewey wrote, "One of the only two articles that remain in my creed of life is that the future of our civilization depends upon the widening spread and deepening hold, of the scientific habit of mind; and that the problem of problems in our education is therefore to discover how to mature and make effective this scientific habit."

Dewey could not have known that science and technology would soon lead to the creation of nuclear weapons, or that a mass movement promoting suicidal terrorism would arise in the 21st century. As our distinguished foreign associate Georges Charpak has emphasised in his latest book, we now face a desperate situation. Unless we can greatly reduce the dogmatism that infects our world, the eventual spread of knowledge will inevitably put nuclear technology into the hands of people who are eager to blow themselves up, along with hundreds of thousands of innocent civilians. These people will be motivated, supported and then celebrated for this heinous crime against humanity by a large group of true believers.

> Fortunately the world's scientists agree that good science education in France, Sweden, India, China, Pakistan, or Chile is good science education anywhere.

Nehru had emphasised importance of scientific temper for India

This is why our Academy has put such a high priority on working closely with our colleagues in the Russian Academy of Sciences to prevent the proliferation of nuclear materials. And it is also why scientists all around the world must now band together to help create more rational, scientifically based societies that find dogmatism intolerable. More than 50 years ago, Prime Minister Nehru emphasised the importance of what he called a 'scientific temper' for his new nation, India. By this he presumably meant a society that exhibits the creativity, openness and tolerance that are inherent to science — a requirement for his diverse nation.

> Prime Minister Nehru emphasised the importance of what he called a 'scientific temper' for his new nation, India. By this he presumably meant a society that exhibits the creativity, openness and tolerance that are inherent to science — a requirement for his diverse nation.

Well, the world has been getting smaller and smaller, so much so that it is now clear that we will need a 'scientific temper' for 'every' nation, if the wonderful diversity of our world is not to end up destroying civilisation as we know it.

David Hamburg, one of our distinguished Public Welfare Medalists, has long stressed the worldwide need for education systems that create tolerance and reduce conflict, most recently in a book he wrote with his wife Betty called 'Learning to Live Together: Preventing Hatred and Violence in Child and Adolescent Development'. In my opinion, teaching science to children in the manner called for in the National Science Education Standards, with its focus on science as inquiry starting at age 5, provides the best platform we know for this purpose.

Fortunately the world's scientists agree that good science education in France, Sweden, India, China, Pakistan, or Chile is good science education anywhere. As a result, the science academies of the world have begun to work together very effectively on this problem of such crucial importance to us all.

To quote Bentley Glass, a distinguished Academy member who died a few months ago;

> *It is not safe for apes to play with atoms… For the scientific society to be democratic and to remain democratic, the people themselves must understand the nature of the scientific forces and problems that dominate their lives. For us who are teachers, this is our task and our commitment. …All levels of science instruction must change. The task will be costly and hard; but the end is not even the advancement of science, though that will accrue. The true end is quite literally the salvation of man.*

The critical role of the national academies

Despite the great advantages of the type of science education I have been advocating — the promulgation of rationality and tolerance, the preparation of a competitive work force, and the production of the best possible scientists and engineers — only an estimated 15 percent of the students in the United States are currently learning science in this way. We have been making progress, but it is slow. Unfortunately, most of our schools still focus on having students learn what science has already discovered, rather than having them take part in the process of discovery so that they can understand science as a special way of knowing about the world.

What are the Academies doing to keep us moving in the right direction?

1) Stimulating better research

It takes much more energy to prepare and support teachers to teach science as inquiry than it does to prepare them to teach science as memorising 'facts' from a textbook. We therefore have to demonstrate the added value of inquiry based approaches to science education with hard evidence, of the kind we get from science itself.

Based on one of our reports, the Academies have recently helped to establish a new nonprofit organisation, known as SERP, the Strategic Education Research Partnership, which aims to create highly collaborative networks to carry out this type of work. Without efforts of this kind, I fear that our nation's schools will continue to flounder.

The National Academies' first major attempt to 'make a science out of education' was a very popular book, 'How People Learn', which has recently been supplemented with a set of books for teachers on 'How Students Learn'. Here our committees took what has been gained from research on human learning over the last 30 years and explored its implications for our schools. In a program sponsored by the Inter Academy Panel, we are now planning a multinational research collaboration on inquiry based science education, in order to generate an objective analysis of what works and why.

> We must test students for science understanding rather than mere knowledge of scientific facts.

2) Improving science tests

In this era of increased testing and accountability, it is critical that we develop and apply the right kind of science tests. We must test students for science 'understanding' rather than mere knowledge of scientific facts. Science education should not be about memorising the parts of a cell and then taking a multiple choice exam to test scientific vocabulary. Producing good tests for science is challenging and expensive. But the wrong kinds of tests will trivialise science teaching by sending the wrong message about what kind of teaching and learning are valued — driving even more students away from both science and scientific careers. Within the next few months, we will release a major report designed to help guide each of our 50 states, as they prepare to meet the requirements of the No Child Left Behind program for testing in science by 2007.

3) Collaborating with industry leaders

In general, U.S. industry doesn't adequately recognise the fit between the type of science education that is envisioned in the National Science Education Standards and the work force that industry needs. In collaboration with several leading CEOs — including Craig Barrett of Intel, who currently serves as the chair of our sister academy, the National Academy of Engineering — the National Academies are reaching out to the major industry CEOs directly, so that they can become better advocates for their own longterm interests.

4) Giving a voice to our best teachers

U.S. school systems generally pay little or no attention to the wisdom of the most important people in their schools—that is, to their outstanding teachers and principals. Nor is there a strong enough voice for our best teachers when federal and state education policies are being designed. Three years ago, the National Academies established a Teacher Advisory Council (TAC), in an attempt to set a different example. This group of 12 carefully selected science, math, and technology classroom teachers—from elementary through high school—has been meeting three times a year, advising our staff on our education work and contributing directly to studies, projects, and reviews of products. They have also added individual teacher affiliates from nearly every state, and they are now helping to catalyse the establishment of similar state based TACs—with the first one recently established in California, and a second currently in the planning stages for the state of Washington.

5) Improving the teaching of science by university faculty

A major cause of inadequate science teaching at lower levels is our own system of higher education. Our teachers can't be expected to teach what they don't know. And the knowledge needed extends beyond disciplinary content. Most of today's teachers of science — whether at the elementary, middle, or high school level — have never experienced inquiry based science education themselves.

If we really care about creating a 'scientific temper' for the United States, we will need to completely rethink most of our introductory college courses — both to make them more inquiry based and to focus them on the goal of conveying an understanding and appreciation of science, and its relation to society, to all students. The Academy is the obvious place to catalyze such an effort, and led by Nobelist Carl Wieman, we have been increasingly active in stimulating change. I call on all of our members to support this effort at your own universities.

Nevertheless, much has occurred in the past decade : the construction of the Keck Center of the National Academies and our wonderful Marian Koshland Science Museum; the formation of two critical international organisations — the Inter Academy Panel and the Inter Academy Council; the completion of the 'National Science Education Standards'; the strengthening of our science education partnership with the Smithsonian Institution through the National Science Resources Center; the publication of a large number of landmark reports — including Allocating Federal Funds for Science and Technology; Our Common Journey : A Transition Toward Sustainability; The Evaluation of Forensic DNA Evidence; Teaching About Evolution and the Nature of Science; Effectiveness and Impact of Corporate Average Fuel Economy (CAFE) Standards; Reducing Underage Drinking : A Collective Responsibility; the Institute of Medicine classic 'To Err Is Human : Building a Safer Health System'; and the outstanding guidance of the nation's transportation efforts by our Transportation Research Board.

> Science is a marvelous community endeavor, one that enables new knowledge to be built upon old knowledge in unpredictable ways — ways that have enabled us to understand and manipulate this world to produce great benefits for humanity.

And last but not least, there is our tremendous success in making all of this information freely available on one of the world's best Web sites.

Science, a noble adventure

Science is a great, noble adventure — an unending frontier in the long struggle of human beings to understand the world that surrounds us. Scientists tend to be optimists, because each of us has witnessed a remarkable parting of the curtain of ignorance that once enshrouded each of our scientific fields. All of us who were graduate students 40 years ago would have laughed at anyone who dared to predict the spectacular increase in our understanding of the chemistry of life that has since occurred. As illustrated by the Academy's 'Beyond Discovery' essays, science is a marvelous community endeavor, one that enables new knowledge to be built upon old knowledge in unpredictable ways — ways that have enabled us to understand and manipulate this world to produce great benefits for humanity.

Armed with the confidence that comes from this success, we can now face the next seemingly impossible challenge, as we devote ourselves to the ambitious but critical task of creating a scientific temper for the world.

(Source : www.nasonline.org/2005address)

Article

Understanding Science Communication

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Introduction

Importance of science in contemporary society needs no reiteration. Thanks to the inventions and innovations in various fields of science and technology, human life and lifestyles have undergone phenomenal changes. Dynamics of science and scientific knowledge have redefined the ways human beings conduct their life, privately or publicly. Consequently, the forces mediating the understanding of science and scientific temper are threatening the existing socio-cultural institutions and community values & belief system. Those who do not change runs the risk of being left out from the mainstream of life; and those who trudge along, sometime unwillingly and unwittingly, feels the pain of having left their age-old traditions and practices.

Science is sometimes referred as great emancipator of the human race. It has comprehensively, if not completely, liberated it from the pains of hunger, sufferings due to diseases and isolated living conditions with no or little amount of interaction and communication. But, as it happens with every human enterprise, the benefits of advancements in science and technology have not benefited the humanity equally. Consequently, a great amount of disparity and inequality exists today between and within nation and regions. The societies of west show greatest amount of absorption of science, which is reflected in their standards of life, both material as well as non-material aspect. On the other hand, the nations / societies of Africa and Asia continue their interregnum with the past bedevilled by the perils of ignorance and exploitation.

What is Science?

Perceptions and understanding of Science display a great amount of variations depending upon the conceptual framework and the theoretical background. Science means different thing to different people. To a college student, science would mean studying Physics, Chemistry or Biology; and a scientist may come to relate it to what he / she and his / her colleagues do in their highly sanitised, well-polished and fortified laboratories. A layman (and woman as well) may come to say that it is the sole concern and prerogative of highly educated persons. In fact, science has been so much mystified that, although everyone irrespective of class, caste, region, religion and their levels of education / literacy experiences it, it is not recognised per se. Not a single moment in the life of an individual is left untouched by the gadgets / devices involving the applications of science.

Public understanding of science, however, does not display the kind of advancements made in this sphere, more so in the public sphere of developing and underdeveloped countries of Asia and Africa. Public understanding of science is symptomatic of the people's perception about science, how they experience 'science' in their daily social life; and how particular science-related concepts are negotiated in public discourse. Public understanding of science is reflected in the level of knowledge / perception, attitude and practices towards, the existing scientific outlook and temperament among the people.

Understanding science

The basic goals of science are : Prediction, Explanation and Control. The three dominant paradigms that describe the thinking and perceptions of people about science are :

1. Science as rational knowledge
2. Science as competitive enterprise
3. Science as a way of life

Science as rational knowledge

The development of scientific knowledge is seen as a dialogue between man and nature. Quest for knowledge is driven by the desire to accumulate more and more knowledge to unravel the myths and mysteries of nature and its various phenomena - both, observable and theoretical. Sheer curiosity about unknown, un-experienced and unforeseen also forms an integral part of this dialogue between man and nature.

This paradigm seeks to clarify what distinguishes 'science' from other human activities. It focuses on scientific discourse and explores the linkages it establishes with the reality of which it speaks. In fact, it is the science which distinguishes human from other forms of life on this planet. Science represents human being's power of imagination, expressions and invention. This leads the man towards a culture of rationality, i.e. to observe and establish whether there exists a relationship (of cause-and-effect).

All this empowers human beings to predict, explain and control the nature and various phenomena - both observable as well as theoretical. This helps in rationalising the reality - virtual as well as actual - in order to exercise a control over our own destiny. Science is thus developed in the form of a dialogue - first between scientists and nature, and secondly between scientists themselves. However, science should not be reduced to merely an intellectual process but as an adventure of man into the nature. Any distinction, in modern world between the world of scientists and that of laymen are inherently futile on one hand and it would lead to the isolation of 'science' from common man's experienced reality. This will be detrimental to the growth of science and scientific knowledge.

Science as competitive human entreprise

Knowledge is characterised by its novelty, originality and perhaps the degree of its utility to the society. Scientific knowledge is thought to be a public good. Hence, all applications of science and scientific knowledge should have, as its core objective, of doing social good. Human beings have a very keen sense of observation, analysis and calculation. Watching a bird fly in the sky fired human search for giving the similar capabilities to the human beings. Consequently we saw the development of airplanes of various fads and shades, which have undergone several tests of fine-tuning and standardisation. History is replete with anecdotes that played crucial role of motivation leading to several innovation and inventions.

Science and technology today permeates every single aspect of human life. However, it has acquired a competitive dimension. As happen with every human enterprise, the benefits of science and technology have not percolated downwards to the entire strata of society. People in some of the developed societies of the West enjoy the highest levels of absorption of advancements in science whereas the societies / countries in South Africa and Sahara regions live on the periphery being deprived of the benefits provided by advances in science and technology.

Science as a way of life

Science, as described earlier is a result of dialogue between man and nature. The context and content of this dialogue, which has been ever-changing, characterises not only man's understanding and knowledge about nature in all its manifestations but man's adjustment to and with the nature also. The ever changing pool of scientific knowledge has comprehensively altered the way human being conduct their life, their ways of thinking about and doing various works of daily routines. It has come to occupy a central place in the contemporary society.

However, science should not be limited to our knowledge and experience of newer and finer technologies that are redefining / redesigning human life. It should be inculcated as 'a method' reflected in our concern to the welfare of fellow human beings and relieve them from the shackles of ignorance and exploitation, as a culture of rationality explaining the myths about miracles and remove all the doubts, superstitions, magic and heresy.

Why communicate science

No one can doubt the immense impact the Science and Technology has had on society today. We face the challenges of not only understanding the current multiple revolutions in science and technology, but also how they affect the future of humanity and of civilisation on earth. The imperatives of communicating science and technology to the people demand that focus should be on public perceptions and attitude towards science and not on any specialised branch of science *per se*.

However, public perceptions of science, often referred as 'scientific temper', needs to be modified / rationalised so as to propagate, among the members of the society, a spirit of inquiry and questioning the existing order through creative thinking, experimentation, objective analysis and a commitment to scientifically establish the truth. This approach includes a deliberate and conscious attempt to distinguish between rational and irrational, apparent and real causes of natural phenomena supported by imaginative and qualitative thinking.

The most important single information source for the public about science and technology is the media. Thus motivating and helping science writers / communicators to produce factual, intelligible, timely information is critically important to the society. Besides, the scientists have an ethical obligation to the public / society to account for the public money utilised to undertake the research activities leading to the newer technologies and new and interesting explanations of the phenomena of nature. However, in addition to these obligations to the public and ethical motivations for science writers /communicators, there are practical reasons for doing that.

First, publicity helps generate interests and awareness about scientific inventions which could be of some use for the general public. Second, communicating scientific information among the researcher community may evoke curiosity and interest of fellow colleagues, particularly in the current era of interdisciplinary research. This may lead to useful collaborations and new insights into the scientists' work. Further, cooperating with media also makes it far more likely that the resulting stories will be more accurate. As research becomes more complex, even the most experienced science writer / communicator finds it difficult to keep updated with the field he / she covers. Regardless of the scientists' cooperation, science writers can develop stories based on their own understanding substantiated by secondary sources / facts and the press releases issued by scientific institutions. Finally, enhanced coverage of science and technology in the media, especially broadcast media would help fire-up the public imagination and attract more talented students for seeking career in science and technology.

Science writers / communicators

Science communication is not just limited to editing newspapers and magazines, reporting news for the electronic media, preparing exhibits or producing documentaries and video films. It is also concerned about creating scientific temper in the society based rational thinking and creative problem solving. Information dissemination alone will not bring about necessary changes in public perceptions and understanding of science and technology. This would require Science Writers / Communicators to undertake a high voltage and extensive campaign spraying information on peoples' minds for maximum impact.

In mainstream media including entertainment media like Television, Animated cartoon films and Games, science journalism is considered a high specialisation. Of the many kinds of specialised writers, the science writers have a unique responsibility of first understanding it themselves. Unlike sportswriters, for example, whose readers already know, often in extraordinary details, the rules of the game and who the players are, science writers must first introduce 'the game' to the readers every time. Imagine if a sportswriter covering a cricket match has to assume that readers had no knowledge of cricket. Then, he will have to tell the rules of game, the players, and then write about the match. How boring it will be for the readers / audience who are eager to know about the latest match between India and top performing opponent.

But, the science writers must first understand themselves 'the science' they intend to cover, and then tease out an evocative article or video or radio output. Then, the writer has to comply with a time limit, i.e. they must writer – frequently within a given time limit – translating it accurately into a form that is both interesting and intelligible to the layman.

Science writers tend to be most conscientious of scientists. However, they should remember that they are writers first and not scientist. Good science writers do their best to report critically and accurately incorporating and illuminating the 'science' element and then illustrating the same with appropriate explanations and examples. While writing, they should not forget the track of the target audience, their educational / intellectual capabilities, their interests, Socio-cultural background and finally the economic implications of a science story. Before proceeding to write about any science article, they should read a lot so as to firm-up their own understanding before they attempt to refine understanding of somebody else. They should regularly attend Conventions, Seminars, Workshops and Conferences besides paying special visits to important laboratories or interview eminent scientists. They may have to travel to different places, e.g. to Antarctica, watch the blasting-off of space shuttle, visit a nuclear facility or do the routine checking with persons / places / events of importance.

Besides all these, a science writer / communicator must have a keen sense of observation, an analytical mind and a penchant for illustration and explanation of events / phenomena related to science. A science writer should describe in simple and plain language avoiding jargons and verbosity, clarify the contentious and complex issues through paraphrasing and referencing to the appropriate context / background. For a scientist, facts are sacred but for a science writer the facts as well as opinion of the people are both sacred and sacrosanct. Therefore, the science writer should tread their path very carefully and cautiously.

Conclusion

Public understanding of science and technology is deemed to be an indicator of the level of the development, (and *ipso facto,* the under-development) of a society / nation. The advances in science and technology have definitely made significant impact on the lives of people but the gap between developed and developing countries remain. Science writers have the onerous task of upscaling the level of public understanding of science and technology to realise the goals of science and reducing the global disparity between rich and poor. Till that happens, the ball is in the court of science writers / communicators. They ought to wield the pen like an agent of change and unleash a science revolution.

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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 Editor'*.

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Short Communication

हिन्दी प्रसार व विज्ञान संचार में सहायक सॉफ्टवेयर

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विज्ञान ने आज सभी जगह प्रगति दर्ज की हैं। कम्प्यूटर के आगमन से कार्यालयी कामकाज में बड़ी सहायता प्राप्त हुई है। भारत में कम्प्यूटर के आगमन के साथ हिन्दी भाषा भी तेजी से बढ़ने लगी। सी.डैक (सेंटर फॉर डेवलपमेंट ऑफ कम्प्यूटिंग) पुणे ने कुछ बेहतरीन सॉफ्टवेयर विकसित किए जिससे कम्प्यूटर पर भारतीय भाषाओं का प्रयोग होने लगा। लेकिन हिन्दी के सॉफ्टवेयर काफी मंहगे थे। हर कार्यालय की अपनी वित्तीय सीमाएं होती हैं। शुरूआती दौर में कम्प्यूटर की कीमत में सॉफ्टवेयर खरीदने पड़ते थे। भारतीय भाषाओं का कारोबार धीरे-धीरे बढ़ने लगा। भारतीय भाषाओं के सॉफ्टवेयर अब सस्ती कीमत में प्राप्त हो रहे हैं।

विश्व स्तर पर भाषाओं के विकास में कम्प्यूटर ने अहम भूमिका निभाई हैं। अंग्रेजी भाषा के फांट यूनिकोड में परिवर्तित हुए हैं। अनेक सॉफ्टवेयर मुफ्त में वितरित हो रहे हैं। कम्प्यूटर की दुनिया में शेअरवेअर, फ्रीवेअर सॉफ्टवेयरों का बोलबोला है। इस बदलते परिवेश में हम कितने दिनों तक विदेशों का मुंह ताकते रहेंगे? भारत सरकार ने भारतीय भाषाओं के लिए इस प्रौद्योगिकी के विकास का मार्ग प्रशस्त किया हैं। सूचना प्रौद्योगिकी एवं संचार मंत्रालय ने www.tdil.mit.gov.in वेबसाईट जारी की हैं। इस साईट पर भारतीय भाषाओं के विकास कार्यक्रमों की जानकारी दी गई हैं। कार्यक्रम के अंतर्गत अनेक भारतीय भाषाओं के सॉफ्टवेयर इंटरनेट के माध्यम से मुफ्त डाऊनलोड किए जा सकते हैं। मुफ्त सॉफ्टवेयर डाऊनलोड करने से पहले आपका नाम पंजीकृत किया जाता है। पंजीकरण के बाद आपको यूजरनेम (प्रयोगकर्ता नाम) और पासवर्ड (कूट संकेत) दिया जाता है। इसके बाद आपकी कम्प्यूटर की आवश्यकताओं के अनुसार आप संबंधित सॉफ्टवेयर उतार (डाऊनलोड कर) सकते हैं।

कृपया ध्यान रखें कि डाऊनलोड करने से पहले आपके कम्प्यूटर पर डी.ए.पी. (डाऊनलोड एक्सलेटर प्रोटोकॉल) अथवा फ्लैशगेट सॉफ्टवेयर अवश्य स्थापित किया गया है। किसी सॉफ्टवेयर को इंटरनेट पर डाऊनलोड करने में यह सॉफ्टवेयर मदद करता है। इससे कम समय में डाऊनलोड प्रक्रिया तेजी से सम्पन्न होती है। www.tdil.mit.gov.in पर निम्नलिखित सॉफ्टवेयर मुफ्त डाऊनलोड हेतु उपलब्ध हैं।

- **देसिका (भाषा आकलन की सहज प्रणाली)**

  यह 693 के.बी. आकारमान का विंडो-95 प्लैटफॉर्म पर चलने वाला सॉफ्टवेयर सी डैक बेंगलूरू ने विकसित किया है।

- **गीता रीडर**

  धर्मग्रंथ गीता पढ़ने के लिए यह सॉफ्टवेयर सी.डैक बेंगलूरू ने बनाया है। यह विंडो-95 प्लैटफॉर्म पर चलता है। इसका आकारमान 3.29 एमबी है।

- **ए एल पी पर्सनल (भाषा संसाधन प्रणाली)**

  सी डैक पुणे द्वारा विकसित सॉफ्टवेयर 3.5 एमबी आकारमान का है जो डॉस 3.0 अथवा उससे उन्नत डॉस प्लैटफार्म पर चलाया जा सकता है।

- **कॉरपोरा (भारतीय भाषाओं का शब्द संसार)**

  सी डैंक पुणे द्वारा विकसित इस सॉफ्टवेयर का आकारमान 176 एमबी है। इसमें हिन्दी के सभी अपरिष्कृत शब्दों को पी सी आई एस सी आई आई (PC-ISCII) में संग्रहित किया गया है।

- **शब्दबोध (वाक्य विलेषण)**

  संस्कृत शब्दों का अर्थगत व वाक्यगत विश्लेषण कम्प्यूटर की सहायता से पारस्परिक अनुप्रयोग द्वारा किया जा सकता है।

- **श्री लिपि भारती**

  यह एक देवनागरी कीबोर्ड ड्रायवर और ट्रू टाईप फांट है। इसका प्रयोग पेजमेकर, कोरलड्रा, व्हेंचुरा, अडोब इलस्ट्रेटर, एम एस ऑफिस 97/98/2000/एक्सपी आदि प्लैटफॉर्म पर किया जा सकता है। यह फांट मुफ्त डाऊनलोड करके कहीं भी प्रयोग में लाया जा सकता है। इसका आकार 1.28 एमबी है तथा एम सी आई टी भारत सरकार ने प्रदान किया है। मॉडयूलर कम्पनी द्वारा निर्मित यह सॉफ्टवेयर एक उपयोगी कीबोर्ड ड्रायवर है।

- **बहुभाषिक ईमेल क्लाएंट**

  सी डैक पुणे निर्मित यह सॉफ्टवेयर 2.12 एमबी आकारमान का है और विंडो 95/98 प्रणाली पर कार्य करता है। इसमें आप दस भारतीय भाषाओं में ईमेल भेज सकते है।

- **आई लिप**

  सी डैक पुणे द्वारा निर्मित यह सॉफ्टवेयर 4.00 एमबी आकारमान का है और विंडो 95/98 एनटी पर चलाया जा सकता है। इससे वर्तनी सुधार, ईमेल भेजना, पर्दे पर कीबोर्ड सुविधा, डेटा आयात करना, बहुभाषिक एचटीएमएल, बनाना, शब्द संशोधक आदि कार्य किया जा सकता है। इस पुरस्कृत सॉफ्टवेयर द्वारा भारतीय भाषाओं में फाईल मेनू से एच ए टी ए एम एल रूप में भेजा जा सकता है।

- **अक्षर**

  अंग्रेजी हिन्दी में काम करने में सहायक सॉफ्टवेयर सॉफ्टटेक लि., नई दिल्ली ने बनाया है। विंडो 95 प्लॅटफॉर्म पर चलने वाला यह सॉफ्टवेयर 3.5 एमबी आकारमान का है। यह सॉफ्टवर्ड तथा वर्डस्टार की तरह कार्य करता है। इसमें वर्तनी संशोधक, शब्दकोष, मेलमर्ज, टाइपराइटर, की बोर्ड आदि सुविधा उपलब्ध हैं।

- **सुरभि प्रोफेशनल**

  ॲपल सॉफ्ट बेंगलूरू द्वारा निर्मित यह की बोर्ड इंटरफेस सॉफ्टवेयर विंडो आधारित सभी प्लॅटफॉर्म जैसे एमएस वर्ड, एमएस एक्सेल, पेजमेकर आदि में कार्य करता है। इसमें ऑटो फांट सिलेक्न, फाइंड अंड रिपलेस, ॲटोकरेक्ट तथा इंटेलिजेंट की बोर्ड मैनेजर सुविधा उपलब्ध है।

- **बुद्धिमान कुंजीपटल प्रबंधक (इटेलिजंट की बोर्ड मैनेजर)**

  ॲपल सॉफ्ट बेंगलूरू द्वारा निर्मित यह सॉफ्टवेयर विंडो 95/98 प्लॅटफॉर्म पर काम करता है। फाईल नाम, फांट नाम, आदि, हिन्दी में टाइप करते समय प्राय: हिन्दी अक्षरों की जगह मशीनी अपठ्य भाषा दिखाई देती है। इस समस्या का हल इस सॉफ्टवेयर द्वारा निकाला जा सकता है।

- **शब्दिका**

  यह एक लेखा परीक्षा, लेखा बैंकिंग प्रशासन, सूचना प्रौद्योगिकी संबंधित शब्द संग्रह है। सी डैक नोएडा व वैज्ञानिक तथा तकनीकी शब्दावली आयोग द्वारा निर्मित यह सॉफ्टवेयर विंडो की सभी प्रणालियों में कार्य करता है। यह एक मानक, प्रामाणिक द्विभाषी शब्द संग्रह है। कार्यालय में हिन्दी पत्राचार करते समय आप बैंकिंग प्रशासकीय, लेखा तथा लेखा परीक्षा, सूचना प्रौद्योगिकी के कठिन शब्दों का अर्थ आसानी से देख सकते है।

- **एच वर्ड**

  विंडो आधारित प्लैटफॉर्म पर कार्य करने वाला यह हिन्दी का शब्द संसाधक सी डैक नोएडा ने निर्माण किया है। हिन्दी भाषा पर केन्द्रित इस सॉफ्टवेयर में इन्स्क्रीपट, टाइपरायटर तथा रोमन की बोर्ड की खूबियां मौजूद है। रोमन की बोर्ड भारतीय लिपि को रोमन लिप्यतंरण तालिका पर (INSROT) मौजूद रहकर सहज सुलभ बनाता है। फाईल बनाते समय पत्र में तिथि व समय डालना, पर्दे पर दिखाई देने वाला की बोर्ड, फांट परिवर्तन (डी वी टी टी फांट से लेखिका फांट में परिवर्तन) आदि सुविधाओं का लाभ ले सकते है।

- **इंडिक्स**

  भारतीय भाषाओं के लिए लाईनेक्स प्रणाली पर आधारित यह सॉफ्टवेयर एन सी एस टी ने प्रदान किया है। बहुभाषिक आधार, वेब ब्राऊजर, मेन्यू लेबल, मेसेज आदि जीयूआई (ग्राफिकल यूजर इंटरफेस) स्थानिक भाषा में प्रदर्शित होते है। यूनिकोड प्रणाली, ओपन टाईप फांट विंडोज प्रणाली में सहायक, क्लायंट लाईब्रेरी से भारतीय भाषाओं में विकास, इनस्क्रीप्ट की बोर्ड, इस्की से यूनिकोड परिवर्तन, उच्च गुणता की छपवाई, आदि सुविधाएं है।

उपर्युक्त मुफ्त सॉफ्टवेयरों को संकलित करके कुछ अन्य फांट कीबोर्ड ड्राईवर, हिन्दी ओसीआर, फांट परिवर्तन, शब्द संसाधक आदि सुविधाओं को भारत सरकार ने स्वतंत्र वेबसाईट पर www.ildc.gov.in पर भी रखा है। हिन्दी सॉफ्टवेयर उपकरणों की सीडी सूचना प्रौद्योगिकी मंत्रालय, भारत सरकार ने नि:शुल्क सॉफ्टवेयर वेबसाईट www.ildc.gov.in पर उपलब्ध कर दी हैं। इस सॉफ्टवेयर का विमोचन नई दिल्ली में जून 6, 2006 को विज्ञान भवन में किया गया। इस योजना के अंतर्गत सभी भारतीय भाषाओं को क्रमबद्ध रीति से विकसित किया जा रहा है। अब तक तमिल व हिन्दी भाषा की स्वयंपूर्ण सीडी का मुफ्त वितरण किया गया है। इस मुफ्त सीडी के सहारे अब कोई भी व्यक्ति व संस्था, कार्यालय में अपने कम्प्यूटर पर हिन्दी भाषा का प्रयोग आसानी से कर सकते हैं। इस मुफ्त सॉफ्टवेयर में उपर्युक्त शब्द संसाधक (वर्ड प्रोसेसर), विभिन्न प्रकार के पांच सौ फांट, शब्दकोश, वर्तनी संशोधक, अक्षर से ध्वनि (टेक्स्ट टू स्पीच), प्रकाशकीय अक्षर पहचान तंत्र (ओ.सी.आर) मशीनी अनुवाद आदि सुविधाएं उपलब्ध हैं।

इस मुफ्त सॉफ्टवेयर में कुछ कमियां भी पाई गई हैं। लेकिन कम्प्यूटर पर हिन्दी भाषा का प्रसार करने की दिशा में भारत सरकार की यह महत्वपूर्ण पहल है। इस सॉफ्टवेयर को उन्नत करने की काफी गुंजाईश है। सॉफ्टवेयर के पंडितों को अपने सुझाव सूचना प्रौद्योगिकी मंत्रालय, भारत सरकार को भेजने चाहिए। हम आशा कर सकते हैं कि सूचना प्रौद्योगिकी के क्षेत्र में भारतीय भाषाओं का अस्तित्व निरंतर बढ़ता रहेगा। कम्प्यूटर के बिना भाषा का पीछे रहना खतरे की निशानी है। भारतीय भाषाओं की उन्नति का मतलब पूरे भारतीय समाज की सर्व प्रकार उन्नति है, चाहे वह ज्ञान का क्षेत्र हो या विज्ञान का। ■

Short Communication

Attitude Matters for Science Communicators

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For a true Science Communicator it is nothing short of joy of great achievement whenever he communicates sicence to people. Here, also important is that he must be confident about the importance and utility of science for the society. It is something like a marketing man's confidence in the good qualities of the goods he wants people to accept. His very tone must reveal his confidence in the immaculateness of his goods.

Communicators of science can among other things enumerate the following liberating effects science confers upon those who study it.

Every advance in scientific knowledge, automatically means getting rid of some ignorance much to the benefit of the society whose knowledge thus advances. Science is an attempt to obtain as much true and systematic knowledge of the given phenomenon as possible.

Ignorance breeds superstitions, some of them not only queer but even cruel and harmful. Obviously, with each advance in scientific knowledge we are liberated from some superstition or other.

Science is liberating us from pain, disease and suffering in a number of ways. It has increased the length, breadth and depth of human life. Because of science not only has human longevity improved but the very human living has improved in a sustantial way. All this is for any one to see.

Science has greatly freed us from drudgery and want. Early man's day was exhausted in satisfying just the primary needs of life and that too in a crude way. Human labour lacked effciency as well as productivity. Now, because of science, human labour is quite efficient. Power of man's sensory organs as well as motor organs has increased tremendously. Now not only can man accomplish much, he also gets enough leisure which he can use for either further research or for some qualitative improvement of our life.

Science has tremendously widened our horizons of knowledge thus liberating us from parochialism. Our outlook is now far more wide than what the early man's was.

Scientific research is based upon observation and experimentation. In experimentation the situation is under your control and you can manipulate at will the factors involved. Ignorant man is a helpless man. But now science is liberating humanity from the initial mentality of helplessness, surrender and fatalism. Modern man is quite self confident and to a large extent maker of his fate and future. Whether it is man's friends or foes, science has brought them down from the unseen heaven to this world to be dealt with suitably. Modern man's self-confidence has, in fact made man a self confident creator. What a joy born out of human achievements!

Scientific claims are never absolute; they are always open to correction and improvement. Scientific claims are true only upto their being proved false. A person with real scientific temper would gladly give up his claims whenever proved wrong. Thus science frees man from the evils of dogmatism and absolutism.

Orthodoxy has always claimed the power to perform miracles. But the truthfulness of such miracles has never been tested and proved. Performers of such miracles have refused to face the challenge posed to them by the scientists. But look, Science has provided knowledge and ability to the man that can be called miraculous. Man can now with the help of science, fly in air, walk on water, go to the moon; make lame man walk, blind man see, sick man healthy and so on. The list is quite long. Communicators of science should be aware of these miraculous achievements of science and adopt a self confident posture while communicating science to people.

Science Communicators should free themselves and the people from the delusions of all kinds. They should keep in mind that man's brighter days are in future, to be brought in by our itelligent efforts based upon the scientific knowledge. Thus communicators of science should be confident and optimistic in their communications.

Communicators of science will very soon realise that the present society, although it is enjoying the fruits of scientific knowledge, appears very much anti science. Science promotes questioning and this no establishment likes. Because of this, religion and the political administration are always against science. And again for their peculiar reasons artists, linguists and the media too are sometimes against science. The unthinking masses, of course, prefer to follow the beaten path. Therefore, science has to face a lot of criticism from various quarters of society. And hence the communicators of science should be equipped to answer the charges levelled against science. Some of the criticisms are as follows; we will also note as to how these criticisms are wrong.

Science has given us atom bombs and the like.

Answer – Role of science ends with knowing as to how can an atom bomb be made. The decision to make and use the atom boumb or any other such device and convert into weapons of mass destruction, comes from the ruling political class. It is they, not science, who are responsible for making and using atom bombs.

Science cannot teach morality but the modern technology is surely making evil men stronger than before.

Answer – Morality is associated with social value systems. Science surely cannot be held responsible for the immorality in people.

As regards evil becoming stronger, Science cannot be held responsible for the lethargy of good people and zeal if at all in evil people.

Science cannot answer all the question. In fact Science never claims that it can answer every question.

Science is unreliable since it does not stick to any particular position.

Answer – This objection is a mis-interpretation of the scientific activity. In science experimentation naturaly, very often errors undetected at an earlier stage are corrected at some subsequent stage. This every change during scientific discoveries are sometimes improvement upon the earlier explanation. We may even say that every change in scientific explanation makes the explanation better and more reliable. This fact the critics should not overlook.

How is it that diseases, etc. continue to be there inspite of the scientific advances?

Answer – Scientific research regarding various diseases, their prevention and cure is going on. Yet much remains to be done. It is an ever on going process.

When you choose to communicate science, what is it exactly that you wish to communicate? It would be incorrect to hold that you always have to communicate the innumerable findings of various sciences. Moreover, this is impossible.

Hence, when you choose to communicate science you should communicate the spirit and usefulness of scientific enquiry. Usefulness of science we have already discussed earlier. Additionally now keeping in mind its importance in human life we should communicate to the people the spirit of scientific activity as such. The aim is that people develop in them scientific outlook. The following can be enumerated as the important features of the scientific outlook.

In science; conclusions, findings and solutions are no doubt important but of still greater importance is the tendency of continuous search for greater truth and better explanation. This spirit of scientific enquiry should be our inspiration all along.

A scientific outlook obviously is an open minded outlook. It is always open to new evidence; it is always ready to learn. We may even say that it is relative in nature and not absolute. There is no room in it for obstinacy and dogmatism. Scientific conclusions are true only until proved otherwise.

In scientific enquiry, facts decide the trueness or falsity of something. If our statement corresponds with the facts, it is true; and it is false if it does not so correspond. In science facts are important and not the tradition, numbers, scripture or the person. Truthfulness of a statement is important and not as to who said it.

In the world of science, since a search for better explanation is always going on, errors made at any earlier stage get corrected at some later stage. Naturally, in science, the latest explanation is the best one available. Such a stand does not imply any disrespect to the elders. That is just the fact. Obviously, in science for any better explanation we have to look to the future and not necessarily to the past.

Science all over the world is one. There is no such thing as Indian Physics, American Physics and so on. This is so because in science objective facts dominate. The attempt is always to minimise the subjective element in our findings.

For a common man, may be a Science Communicator is his direct first hand contact with the world of science. This is either through his writings or an creative entity of science communication. For the common man; his, the communicator's unblemish confidence in science, creates a long lasting opinion upon him as regards science and scientific world. Therefore, a Science Communicator's actions, appearance, thought process and in fact his entire offering should exude confidence in the subject that he has chosen to profess namely 'Science'. ■

Answers Becoming Questions : Need for Critical Study

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Astrology has been attracting intense debate these days in scientific circles. We also submit to the fact that there are still a lot of superstitions making rounds. But these should be subjected to the same scrutiny that the scientific hypotheses are. There is a definite 'method of science' which proves or disproves a hypothesis. Scientific world should not approve or reject age old traditions just like that even if these supposedly are superstitions. As common man is no expert on method of science. He is to be shown by the facts and figures. Apply the criteria of science on all these traditional epithets and show it to the masses. If it does not fit the testimony go to the people and explain the findings to them. This will also affirm scientific thought in them. Here we present a viewpoint in order to ignite widespread thoughts and reasoning. We invite readers and scientific community to make our efforts successful in arriving at a definitive conclusion vis a vis such controversy prone subjects.

Editor

Introduction

Science and Technology both have progressed much in the walk of life. In this space age, we know various space-crafts encountered the solar system and uncovered a host of wonders concerning planets. Man has reached the Moon. Manmade satellites are orbiting around the Earth. India is also ahead in many fields. This is one side of the picture. Undoubtedly it is bright but!

This but is very important.

There have been incidences full of something that can be beyond scientific explanation in recent times. These incidences created a big chaos in the minds of the people in our country. Sometimes modern well-equipped Science multimedia are also employed to propagate misbeliefs and superstition. It is a great paradox. Utilising Science for misbelief is the depreciation of scientific outlook.

Then there are certain practices that need to be probed and evaluated on the basis of established tenents of modern science. Astrology has raised lot of hue and cry but there is need to apply the scientific yardsticks to approve or disprove it.

Astrology : The author's viewpoint

Astrology is misleading vast sections of people so it becomes necessary to investigate the most superficial axioms of astrology. I have analysed thousands of horoscopes and drawn the conclusion that Astrology is nothing but a great humbuggery. Let us see what astrology is and how it is totally baseless.

Astrology contends that which constellation the planets are in at the moments of your birth, profoundly influences your future. The root of this saying lies in primitive past. The primitive man's beliefs were moulded mainly by the events of nature which instilled awe and fear in his mind. Lightning thunder frightened him.

The phenomenon of total Solar eclipse which created darkness at noon had a profound effect on him. Earthquakes trembled him. Dreams and diseases were all mysterious to him. When the primitive man invented agriculture he had to change his mode of living. He limited his wandering for hunt. He had to take care to plant and harvest crops in the right season. He had to setup his time table. The ability to read the calender in the skies was a matter of life and death. The rising and setting sun; The reappearance of crescent Moon after New Moon. The Sun's absence at night were noted by people around the world. As ages passed man came to know that more accurately you knew the positions and movements of the Sun, Moon and stars, the more

(Contd. on page 30)

SCIENTOON

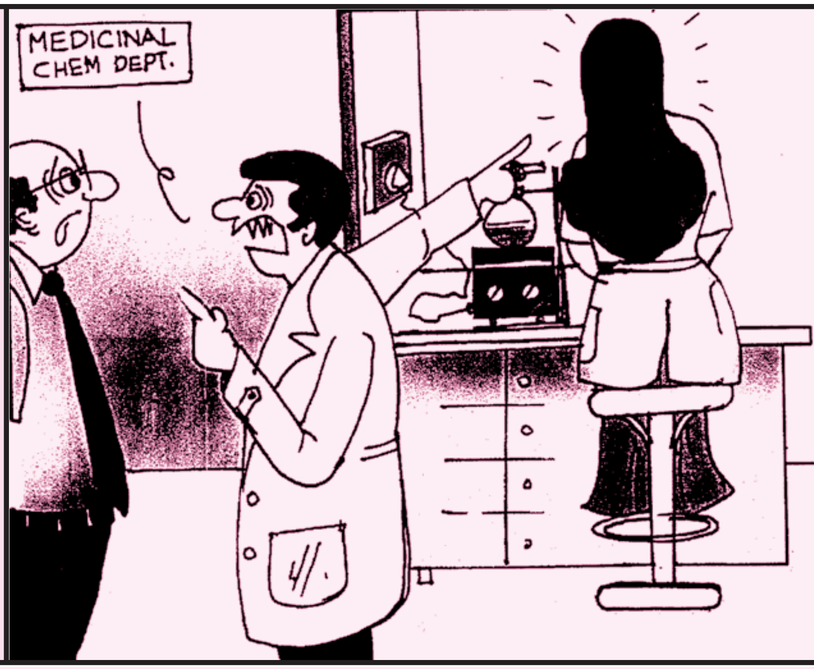
CONSAP:

It is a local contraceptive cream developed by using saponins from soap nut or reetha (Sapindus mukrossi). Consap is currently under phase III clinical trials in about 400 women volunteers in various Medical Colleges and Family Welfare centers, all over the country.

SPERMICIDES: (NEW LEADS)

Some novel compounds obtai-ned have shown interesting activity:

- Spermicidal action along with anti-HIV effect.
- Inhibition of sperm production in male



"Why I could not supply that new spermicidal cream? I think her shining hairs will tell you that where all the sapindus (reetha) has gone"

PYRETHRUM

HOUSE HOLD INSECTICIDE

Pyrethrum is cultivated for bio-insecticidal constituent Pyrethrins from its flowers. Pyrethrins have rapid paralytic action action on flying insects but low toxicity due to efficient enzymatic degradation in mammals.

World demand of pyrethrum flowers is 20,000 tonnes. India produces 10 tonnes of flower annually where as the demand is 300 tonnes.

Cost of extracted pyrethrum flowers is approx. Rs. 20,000/kg. It can be cultivated in Himalayas and North East region as well. CIMAP had developed technology for the extraction of pyrethrum flowers on pilot plant scale at 40 kg per batch.

"So what if he is a mosquito, he is out chief guest today. Who asked you to present him a bouquet containing pyrethrum flowers."

(Contd. from page 28)

reliable you could predict when to sow seeds and reap. When to gather tribes and when to hunt. Records had to be kept. This led to the path of astronomy, encouraged observations and development of mathematics.

The Sun and stars controlled seasons, food and warmth. The moon controlled tides and life cycle of some animals. The man also observed some wandering objects in the skies called planets. Curious man had curious idea, under assault by mysticism and superstition he linked indefinite vague to so called 'influences' of planets and signs and formed the frame of astrology. A few thousand years ago, the idea developed that the motions of the planets determined the fates of kings, dynasties and empires. Astrologers studied the motions of the planets and asked themselves what had happened the last time, say Mars was rising in the constellation Leo, perhaps something similar would happen this time as well. It was subtle and risky business. Astrologers came to be employed only by state.

In ancient times man had a very simple picture of the Universe. He thought that the Sun, Moon and Stars and planets were small objects moving around the earth. He believed that the universe was as it appeared to him with a vast, flat, immovable earth in the centre and a great dome overhead, sprinkled with thousands of little shining lights. Pythagoras who lived in sixth century B.C. seems to have been first to suggest that the earth is a sphere but he still thought that the earth was the centre of the universe and did not move. Aristarchus who lived in the third century B.C., believed the earth was a sphere that rotated on its axis and revolved around a stationary Sun. In second Century A.D. an astronomer named Ptolemy wrote a book called the Almagest. He thought the earth was the centre of the universe and he tried to show now the planets, the Sun and the Moon moved around the earth. His ideas were accepted for fourteen centuries. Copernicus in 1543 suggested the Sun as the centre of the Universe. Then came the discovery of the telescope which Galileo pointed to the starry sky in 1610. Kepler and then Newton developed the modern concept of our universe. Here the concept word universe is referred to our 'Solar System'. Uranus was identified in 1781 by William Herschel Neptune in 1846 and Pluto in 1930. Space probes have added a vast information regarding planets and their satellites.

Astrology has no concern with new revolution in astronomy. Astrologers still believe in 'Geocentric' primitive idea of our solar system. Astrologers consider 'nine' planets of whom the Sun and the Moon are not planets and Rahu and Ketu are non existent being two imaginary points of two imaginary circles. They are themselves the curves of inter section of the imaginary celestial sphere with the planes of motion of the Sun and the Moon. These points are useful only for astronomical calculations and they have no real existence. Only five are really planets viz; Mercury, Venus, Mars, Jupiter and Saturn. How astrologers define planet is a big question.

The path of planets in the sky is known as Zodiac. A belt stretching right around the sky nine degrees to either side of the ecliptic, in which the Sun, Moon and all principal planets apart from Pluto are always to be found. It passes through thirteen constellations, the twelve known commonly as the zodiacal groups (signs) plus a small part of Ophiuchus. Thus signs are Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius and Pisces.

Astrologers positively state that planets derive their strength or become weak according to their positions. Aries and Scorpio are ruled by Mars, Taurus and Libra by Venus, Gemini and Virgo by Mercury, Cancer by the Moon, Leo by the Sun, Sagittarius and Pisces by Jupiter and Capricornus and Aquarius by Saturn. Is there any rule for allotting these houses? The hewly discovered planets Uranus and Neptune are placed in Aquarius and Pisces. Poor Pluto is hanging in space. There is no accommodation for him as yet; Why?

When a planet is in a certain sign it is said to be exalted and when it is in the diametrically opposite part of the heavens it is said to be debilitated. As for example the Sun is exalted when in Aries and debilitated when in Libra.

Suppose your sign in Aries, and in your horoscope the Sun is in Aries. Is it possible that your clothes would immediately dry up in rains?

Rahu is simply a point but it is exalted when it is in Gemini or Virgo; How is it so? What are important? Signs or planets?

Some planets are natural enemies of a particular planet. Some others are its natural friends and yet others are equal to it, being neither a friend nor an enemy.

In horoscope Mars, Saturn and Uranus are evil planets. Through the telescope they appear most beautiful. Mars' polar cap, Saturn's rings and Uranus' greenish disc are attractive. What is the definition of evil?

In horoscope Mercury and Saturn are eunuchs. How the evil planet Saturn could be eunuch?

Astrologers claim that they can determine accurately the instants of the past, the present and the future. It is only possible if correct time is given to them. Watch or clock is the boon of Science. In olden items 'Ghatika Patra' was used to determine the time. So they could not get correct time. Now there is no question when quartz watches are at our service. There is no unique opinion for determing time among astrologers. One famous astrologer said to me. "The time when the conception took place is to be taken into account for predicting accurate future." Is it possible to determine such time?

In one maternity hospital many children are born at one time and at the same place. Unquestionably their horoscopes would be the same. Why have they different future?

In Hiroshima and Nagasaki owing to Atom bomb explosion, thousands of people were killed. The passengers in a plane meeting with fatal accident can't have a common 'fate' based on horoscopic predictions. We cannot bring out the conclusion that the horoscopes of earthquake and cyclone victims will be the same so far as their end is concerned.

Astrologers had frightened the people on the event of the conjunction of eight planets in 1963 and the conjunction of nine planets in 1981. But nothing happened. Such false predictions established the hollowness of astrology.

Murmanska in Russia is located near polar region. Here no signs and planets are visible during the period of six months. Horoscopes of the children born during this period cannot be made at all. Does it mean that these children have no future?

Predictions drawn from the same horoscope by two astrologers differ in many ways. Why so? Astrologers often use vague language like 'monetary gain', 'monetary loss', 'good health', 'bad health", etc. They never answer precisely. Why so?

Unscientific almanacs

Indian almanacs are totally wrong and misleading for calculations. The position of the vernal equinox, also called the first point in Aries, is the origin. Which is useful in determining the position of a planet by fixing its coordinates at any time. It is only when that origin is fixed that we can definitely ascertain the coordinates of a planet. Really the equinoctial points Vernal and Autumnal are varying. They are continuously moving backwards on the equator. This is known as the procession of the equinoxes. This value has not been taken into account by Indian almanac makers. Therefore in practice we notice jumbling in determination of any incidence with time. Astrological predictions which are valueless are also based on the background of unscientific Indian almanacs. In western countries almanac is a national property. No private individual or institution can publish it. In India private almanacs are published. Astrologers are practising without any licence; misguiding and exploiting illiterate, ignorant people. Even some scientists or science workers working in a laboratory or in other science oriented area, follow the faith of astrology which is totally unscientific. I invite astrologers to put forth explanations for the questions raised here.

Struggle against superstitions

In historical times scientists had to struggle against superstitions. Bruno, Galileo, Copernicus and so many other scientists struggled a lot in various ways to establish the truth. The struggle is as yet going on. Scientists have done great sacrifice for humanity in various ways.

There are various kinds of superstitions still deeply rooted in the minds of people. Some superstitions are connected with animals, some are connected with our body, some are connected with mal-observations, some are connected with stars, planets, comets, full moon day, new moon day and eclipses. Some are connected with days, figures, etc. Some are connected with psychical behaviour, add to these the believing of omens which also are superstitions.

In order to study the subject 'Superstitions' methodically and critically, with open mind, a study has been planned with following methodology :

1. Data collection
2. Preparing questionnaires
3. Taking interview
4. Telescopic observations
5. Representation of data in quantitative form
6. Representation of data in qualitative from
7. Analysis of the data
8. Representation of the data in tabular and graphical form
9. To draw inferences

It is earnestly hoped that this critical study of beliefs and superstitions will yield results, that will inspire future generations towards taking a scientific view while coming across instances of superstitions. ■

'Effective Science Communication in an Era of Globalisation' Workshop for Science Journalists from East Asia : A Repot

Introduction and summary

Under the funding from UNESCO (The United Nations Education, Scientific and Cultural Organisation), the Science and Development Network (SciDev.Net) conducted a workshop for science journalists from East Asia on March 13-16 earlier this year. The workshop was jointly organised by SciDev.Net, the Research Centre for Science and Technology Communication at the Graduate University of Chinese Academy of Sciences (GUCAS), and the China Society for Science and Technology Journalism (CSSTJ). Besides funding from UNESCO, the workshop also received funding from the UK embassy in China for the UK trainer's travel and accommodation, and the funding from British Council China towards publishing costs for a book detailing the results of the workshop.

Contributions towards the preparation and implementation of the workshop were provided by the Chinese Academy of Sciences (CAS), the China Association for Science and Technology (CAST), the China National Commission for UNESCO, *Science* magazine, the International Research and Training Centre on Erosion and Sedimentation (IRTCES), and US Environmental Defence.

A total of 26 science journalists and science communicators from China, Mongolia and the Democratic People's Republic of Korea (DPRK) attended the workshop, with training and lectures provided by 13 trainers and speakers from China, the UK, and the United States.

The workshop aimed to help science communicators grasp the key aspects of science policy making, science ethics and environmental science communication, and the production of timely and accurate news stories and features about research appropriate for different readers and audiences. Due to the increasing diversification and professionalism of the natural and environmental sciences, it was impossible to cover all fields in a five-day workshop. However, by selecting some typical subjects

Workshop participants and trainers.

Richard Stone, Asia Editor of Science, giving a lecture to workshop participants.

and with delicate analysis and training, the workshop organisers were still able to equip science communicators with the necessary skills and thinking on where to get science news, how to report science accurately and how to deal with a science-related crisis.

The main workshop training took place on 13 – 16 March at GUCAS, Beijing, where multimedia teaching facilities and Internet connections were available for both teaching and communicating. Workshop activities included a combination of lectures, group discussions and training in journalism skills.

The workshop also emphasised the benefits of using the Internet to find news stories and gain a greater appreciation of the vast range of science resources available, including SciDev.Net's own dossiers and E-guide to science communication.

The need for science journalism training

The role of the media in spreading news about science and technology has long been stressed. However, media reports of science in China have been criticised for low quality. A number of factors contribute to China's poor science communication. One is the lack of scientific knowledge among science communication professionals. Others include institutional factors such as a lack of competition between and within journals, the closed management system of scientific publications and science institutes, and the absence of a communication mechanism for scientists. A recent case study by workshop organiser Hepeng Jia highlighted the lack of professionalism among China's science journalists — such as a reluctance to check facts with scientists or science institutes or to reference academic publications, and a tendency towards sensationalism rather than scientific accuracy.

On the other hand, training on science journalism is scarce in China. In her application form, Li Chen from Science Times stressed that there have been virtually no activities of this kind in the science reporting field, yet it is one where training is even more important given the complexity of the issues are involved.

Aware of these problems, the workshop organisers planned the training programme with the aim of helping to improve not only science journalism skills but also to provide a starting point for mutual communication between science journalists and scientists or science policymakers. Accordingly, the workshop consisted of three parts, selective science or science policy knowledge, journalism training, and how to interview scientists or science policy researchers.

Workshop trainers and speakers

Yang Mo is the professor and the deputy director of Science Communication Centre of the Graduate School at the CAS. Before joining the faculty, Mo was a senior science journalist of China Industrial and Commercial News of the Computer World, becoming an assistant to the chief editor before leaving. She now organises and chairs the science communication programmes of CAST.

Julie Clayton is a freelance science journalist, editor and workshop coordinator for SciDev.Net. She previously organised three workshops on titled 'The Use of ICTs for reporting on HIV/AIDS research' for UNESCO and SciDev.Net, held in Uganda (April 2003), India (November 2003) and Thailand (2004), and another for SciDev.Net on reporting about malaria research in Cameroon (November 2005). She began her career as a research scientist in immunology, and then switched, 12 years ago, to science publishing and journalism. This included two years with the journal *Nature* as an editor, handling immunology and HIV/AIDS papers, and three years with the BBC. During the past six years she has reported from international conferences and written news and features for many publications including SciDev.Net, *New Scientist* magazine, *Lancet Infectious Diseases*, *Nature*, *Nature Medicine*, and Christian Aid.

Richard Stone is the current Asia editor of *Science*, based in Bangkok. He graduated from the University of California, Santa Cruz, United States, with a MSc in science communication in 1991 and has worked for *Science* as writer, deputy news editor, European news editor and now Asian news editor. Between September 2004 and July 2005, he was a visiting scholar at Kazakh National University, Almaty, Kazakhstan, where he researched the legacy of the Semipalatinsk test range in northern Kazakhstan.

Jianyu Zhang, China representative of the US-based non-governmental organisation (NGO) Environmental Defence. With a masters degree at Tsinghua University, China and a PhD in science policy at Carnegie Mellon University, United States. Zhang has been active in pushing China's environmental science programmes, especially the remission trading programme.

David Concar is the first secretary of science section of the UK embassy to China. He began in journalism career at *New Scientist* magazine and has a PhD in science. After starting his career in diplomacy in China, Concar has been active in supporting the development of science reporting. Under his strong promotion, the UK Embassy and the CSSTJ launched a science-reporting award for Chinese science journalists in 2005.

Lei Xiong is executive editor at China Features, affiliated to the Xinhua Agency. Xiong has been an investigative reporter in health issues. Her works include a series of investigative reports on illegal gene exploitation by the Harvard School of Public Health in China (2001-2003). She is the senior reporter of China's science-related issues for *Science* magazine. Xiong has also been an active communication researcher whose recent interests are focused in bioethics.

Hepeng Jia is SciDev.Net's regional coordinator for China and a science feature writer at *China Daily*, the country's only national English newspaper. In 2002, he became a frequent contributor to SciDev.Net and helped organise contributions from other correspondents. Since 2003, he has also written for *Nature Biotechnology* and *Nature Medicine*. He has authored papers on *The Media's Role in China's Transformation* and *An Analysis of Paid Journalism* and presented his research on SARS, bird flu and transparency at the Fourth World Congress of Science Journalists, Montreal, Canada.

Other trainers and speakers included:

- Zhouzi Fang: US-trained biochemistry PhD, chair of xys.org, science columnist.
- Luchuan Ren: professor at CAS's graduate school, secretary general, Risk Evaluation Committee, China Society of Disaster Prevention.
- Xiaomin Zhu: associate research fellow, Institute of Policy and Management, CAS, science communication researcher.
- Shouren Xue: director of the Institute of Journalism, *Science and Technology Daily*, former director of International News *Science and Technology Daily*.
- Zhiqiang Hu, science ethics researcher, Science Communication Centre, CAS Graduate School.
- Yangui Wang: professor and director of training department from the IRTCES.

Workshop programme

Day 1

Welcome address from Dr Zhonghua Ye, vice-president of GUCAS; Y. Aoshima, director UNESCO Office Beijing and UNESCO representative to China, DPR Korea, Japan, Mongolia and Republic of Korea; Tracy Driscoll, senior communications manager, Cultural and Education Section of the British Embassy (British Council China); Dong Liu, section chief for urban science popularization of CAST; and Ying Ding, director of science popularisation office of the CAS.

Session 1: Introduction to China's science communication and requirements on science journalists, Shouren Xue

Session 2: How to find science news, Julie Clayton and Richard Stone

Session 3: Key science issues in water sector and their relevance to reporting, Yangui Wang

Day 2

Session 4: The operation, management and evaluation of China's science system, Xiaomin Zhu

Session 5: Science ethics and its relevance to journalists, Zhiqiang Hu

Session 6: How to write science news and features, Julie Clayton and Richard Stone

Session 7: How to edit science news and features, Julie Clayton

Day 3

Session 8: Science journalism and the environment, Jianyu Zhang

Session 9: How to evaluate the quality and credibility of website information, Julie Clayton

Session 10: Science feature writing, David Concar

Session 11: Participants exchange views, discuss their projected assignments

Day 4

Session 12: Natural disasters and science reporting, Luchuan Ren

Session 13: Selling stories to the editor, Julie Clayton

Session 14: How to distinguish between real and false science, Zhouzi Fang

Session 15: Lessons of Columbia University's science journalism and conclusion, Yang Mo

Day 5

Session 16: Practising sessions for participants

References

1 http://www.scidev.net/dossiers.

2 E-Guide to Science Communication, http://www.scidev.net/ms/sci%5Fcomm/

3 Fang Z, Challenges to China's Science Popularisation (Chinese), http://207.152.99.250/~myscience/magazine/200211/021117.htm

4 Liu H, Science Communication under the concept of grand science (Chinese), http://www.gmw.cn/01gmrb/2000-11/02/GB/11^18592^0^GMC2-010.htm

5 Jia H, The Challenge of Internet on Science journalism in China, CSSTJ seminar presentation, November 5, 2005.

(Source : SciDev.Net; Website: www.scidev.net)

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Forthcoming Events

National Science Communication Congress (NSCC-2006)
Theme : Public Understanding of Scientific Research (PUSR)

December 11-15, 2006; Science City, Ahmedabad (Gujarat)

Pubic understanding of S&T is important and is necessary for the economic and healthy well being of the society as a whole and for the exercise of participatory democracy. It also implies the ability to respond to technical issues and problems that pervade and influence our daily lives. It does not mean detailed knowledge of scientific principles, phenomena or technologies, however, it rather points out to the comprehension of basic concepts of S&T confronting our day-to-day affairs and the scientific way of conduct.

Public understanding of research keeps people aware about the latest in the field of research and development and helps them lead a life with better understanding of newer advancements. Research communication must not be misunderstood merely as communication of data; it must go beyond data; the logical and rational interpretation must come up to the fore, enabling people shape their lives, ideas and thinking. Reporting research breakthrough in media could also be an opportunity to trigger and sustain public interest in S&T in general thereby preparing ground for enhanced public awareness of science. There has been an emerging need of PUSR in recent times to make people aware of the contemporary issues in research and developments which are going to change the way we think and conduct.

Realising the importance of the subject, the present NSCC intends to deliberate upon issues like emerging scientist-journalis t conflict, access to information from a scientific laboratory, barriers to scientist-media interaction, availability of research journals to science writers / journalists, revamping and activating communication wings of R&D organisations, creation of media oriented web contents, and preparation of media reports based on research papers from research journals, are some of the areas which can be further strengthened to help supplement efforts towards PUSR. How can effective communication contribute to develop capacity in PUSR, what strategies can be framed to make PUSR a reality, and which areas need to be strengthened to achieve the desired goal, could be some of the questions that the present NSCC may dwell upon. It offers a forum for formal and informal interaction between researchers and practitioners of science and communication as well as between young and experienced science communicators.

Objectives

i) To encourage discussion and interaction on issues and aspects concerning science communication.

ii) To bring science communicators, scientists, journalists, academicians and other interested people together for the common cause of development of science and technology communication.

iii) To offer budding science 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 science communication to discuss their views/ findings in order to accelerate the pace of science and technology communication.

Technical Sessions / Sub Themes

There will be 5 technical sessions on the following sub themes:

i) Understanding PUSR: This session introduces and defines PUSR; explores various concepts; determines various facets and aspects of developing PUSR.

ii) Role of R&D Establishments/ Universities in PUSR: This session discovers critical role of R&D organizations, scientists, researchers, media units, exhibitions, conferences, press releases in PUSR

iii) Research Journals and PUSR: This session examines role of journals as an authentic source for PUSR

iv) Reporting Research in Mass Media: This session deals with issues like resolving scientist-journalis t conflict, enhancing coverage of indigenous research, enhanced science-media interaction, effective methodologies and media practices and defining role of mass media in PUSR.

v) PUSR: Problems and Perspectives: This session studies various problems in PUSR with their possible solutions, past, present and future perspectives; suggests policies and strategies for enhanced PUSR.

NSCC format

The technical sessions will have presentation of contributory research papers, review papers, survey analyses, case studies, and invited talks. That apart, there would be discussions in different split groups. Discussions in split groups would offer close exchange of thoughts and ideas. Deliberations will be in English and Hindi. A sub theme cannot be the title of your paper / presentation; select a narrower topic under a sub theme. Papers may be prepared in standard research paper format, i.e. title of the paper, name(s) and address of author(s), abstract, key words, introduction, objectives, methodology, observations, discussion / analysis, inferences / conclusions / recommendations, and references, along with illustrations / graphics / photos including captions. In addition to technical sessions and split groups, there would be two workshops. One workshop would be devoted to young researchers/ students for encouraging interaction between them and science communication experts; whereas the other would highlight the global perspectives in public understanding of research.

Who can participate

The NSCC is of interest to active researchers and practitioners of science, communication and science communication, i.e. scientists, writers, journalists, editors, researchers and faculty members of university departments of journalism, public relations and information officers of scientific organisations, representatives of media organisations, newspapers, magazines, science cells of radio / TV channels, etc., and science activists from voluntary organisations.

Exhibition of Popular Science Publications and Software Materials

An Exhibition of Popular Science Publications and Software Materials is also being organized at the venue; please bring / send your publications, articles, books, magazines and software materials for display.

For further details contact :

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First African Science Communication Conference
Science in Society / Society in Science
Africa Forum 2006

December 4 - 7, 2006; Port Elizabeth

Introduction

The public communication of science and technology is expanding rapidly as a professional and academic field, with national and global networks being formed to facilitate collaboration and share best practices. While these networks are rapidly expanding in other countries, there is a low level of participation from Africa in this field.

The South African Agency for Science and Technology Advancement (SAASTA) will be hosting an African Science Communication Conference focusing specifically on the need to develop this field and establish collaborative networks on the African continent engaging academies, universities, public and private research centres and industry, the media, the education field and professional practitioners.

The conference aims to :

- Bring together Science Communication role players and representatives from African countries and internationally to develop the field of Science

Communication in Africa and forge / strengthen collaborative networks on the continent;

- Establish Africa as an international role player in the field of Science Communication; and
- Provide opportunities for skills transfer in the area of Science Communication.

Venue

The conference will be held at the Nelson Mandela Metropolitan University in Port Elizabeth. The university is located in a nature reserve, near the popular beaches of this coastal city. The main university hall will be used for the plenary sessions and three additional halls will serve for the parallel sessions of the conference. The extensive corridors will be used for exhibitions and posters. Port Elizabeth is the fifth largest city in South Africa and is situated in South Africa's Eastern Cape Province. It is the eastern starting point of the famous Garden Route. The city overlooks Algoa Bay, is known as the friendly city, and boasts 40 km of unspoiled coastline, golden sandy beaches and rocky shores, complemented by a perfect combination of warm water and sunny skies.

Organisers

The South African Agency for Science and Technology Advancement (SAASTA) is organising the conference. SAASTA is a business unit of the National Research Foundation with a mandate to promote public awareness, appreciation and engagement with science, engineering and technology via an innovative and synergistic approach. The organisation's priority aim is to bridge the gap between science and society and to develop the scientists and innovators of tomorrow.

Scientific programme

Every day there will be plenary lectures, parallel sessions and poster sessions focused on different themes. A preliminary programme will be available in September 2006.

The first day (5 December) will start with the Opening Ceremony. The next two days will start with a plenary session consisting of two engaging keynote presentations on the different conference themes (see below). Concurrent parallel sessions on the themes, one before lunch and two in the afternoon, will follow the plenary sessions. The parallel sessions will feature invited speakers and presentations of research from abstracts submitted to the Conference.

Conference themes and sub-themes

- Innovative approaches to sharing science with African communities;
- Public engagement, dialogue and debate: Best practice for Africa?
- Science and mass media in Africa;
- Communicating science from unique African angles: African skies; Indigenous knowledge; Biodiversity & conservation; African origins; and HIV/AIDS.

Contact details

Conference Secretariat :
Inkanyezi Event Organisers : Taskeen Henry
Tel: +27 +41 365 5634;
Email: taskeen@inkanyezi.co.za

Abstract submission :
Please send abstract submissions to Andrea Bandelli,
Email: andrea@bandelli.com

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National Seminar on Towards a Scientific & Technological Culture

November 22-25, 2006; Khajuraho (Madhya Pradesh)

Science and scientific culture have been integral parts of Indian culture for the ages. While the sages were practicing yoga in ancient age, they were specifically practicing the science of healthy living. Similarly, the modern science has revealed that a number of spices and flavoring plants used in Indian food, have medicinal values. The trees of Neem, Peepal and Banyan have been the centre of early human settlements, because of their pleasant shadow and healthy products. A number of rituals, traditions and customs being followed for the centuries have some elements of scientific principles and attitude. Over the period, unfortunately, many of these contaminated with a number of superstitions and mis-beliefs resulting into unscientific practices. It has to be revamped and the combination of science, technology and culture has to be restored to bring about a scientific and technological culture.

Being rational, analytical and systematic in our attitude, behaviour and conduct is attributed to a S&T culture. In recent times, scientific culture has become a phrase much discussed at all levels of public discourse. The term may have two dimensions: individual and social. There is a need for defining indicators of S&T culture and understanding recent developments regarding its diffusion into our society. Some scholars put school at center of S&T culture, some find family and parenting as critical factors, while others see popularisation as its core and thus communication and media come into picture as potential means. S&T culture is emphasised in terms of citizens' cultural development and is considered as a prerequisite for socio-economic development and innovation.

The social aspects of S&T culture enable people understand scientific basis as how a modern society works and behaves. The value of S&T culture lies in its applicability to individuals as well as to institutions and society as a whole. The social debates and decisions affecting masses have to be logical, informed and scientific. A scientifically cultured individual and society can contribute to this cause more effectively. The seminar intends to address questions as what is a S&T culture; how it impacts on various facets of development; and possible models for its measurement. The seminar offers a forum to discuss and deliberate on these issues and invites criticism, comments and suggestions on current issues in S&T communication as well as evolves future strategies.

Technical sessions / Sub themes

There will be 5 technical sessions / sub themes:

i) Understanding S&T Culture : This session introduces and defines S&T culture; explores various concepts; determines role of scientific literacy, scientific temper and technological temper in developing S&T culture.

ii) HRD and S&T Culture : This session discovers critical role of formal / informal education / training / parenting / social engineering in development of S&T culture.

iii) S&T Communication and S&T Culture: This session tries to find newer ways and means as how S&T communication can help develop S&T culture.

iv) Role of Scientists / Technologists in Developing S&T Culture : The session suggests effective methodologies and practices to be applied for defining the role of S&T personnel in diffusion of S&T culture in society.

v) S&T Culture and Development : This session studies as how administration, infrastructure services, policy / decision makers, etc., can be motivated towards S&T culture to enhance the pace of sustainable development.

Seminar format

The technical sessions will have presentation of contributory research papers, review papers, survey analyses, case studies, and invited talks. That apart, there would be discussions in different split groups. Deliberations will be in Hindi with some exceptions in English. A sub theme cannot be the title of your paper/ presentation; select a narrower topic under a sub theme. Papers may be prepared in standard research paper format, i.e. title of the paper, name(s) and address of author(s), abstract, key words, introduction, objectives, methodology, observations, discussion / analysis, inferences / conclusions / recommendations, and references, along with illustrations / graphics / photos including captions.

Who can participate

The seminar is likely to be of interest to those who have anything to do with science, communication and science communication, i.e. scientists, science communicators, science writers, journalists, editors, researchers and faculty members of university departments of journalism, public relations and information officers of scientific organizations, representatives of media houses, newspapers, magazines, science cells of radio/ TV channels and voluntary organizations active in this area.

Exhibition of popular science publications

An Exhibition of Popular Science Publications and Software Materials is also being organised at the venue; please bring / send your publications, articles, books, magazines and software materials for display.

Addresses for communication

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Secretariat (Seminar 2006), Hotel Clarks
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National Conference : Vision 2026 - Challenges in Science Communication

November 26-28, 2006; New Delhi

The National Centre for Science Communicators (NCSC) is organising a National conference Vision 2026 - Challenges in Science Communication. This conference is open to professionals from the fields of Education, Research and Science Communication as well as to postgraduate students of various Universities. It will be held on 26, 27 and 28 November, 2006 at the premises of the Indian National Science Academy (INSA), Bahadur Shah Zafar Marg, New Delhi,110002.

The National Centre for Science Communicators (NCSC) was established in January 1997 with a view to facilitate improvement in the Science and Technology communication in our country. The Centre provides opportunites for science communicators to explore and express their talents and creativity and also recognises such talents. Presently, th membership strength of NCSC is over 200 members across the country. The occasion coincides with 80th birthday of Prof. Yash Pal, Scientist and Science communicator is Padma Bhushan besides being recipient of numerous national and international awards. he is best known as the one who ushered insatellite TV education in the country with his pioneering experiment at Ahmedabad.

The National Conference will have five sessions that will focus on the following topics :

i) Challenges in Science Education
ii) Space Technology and Development
iii) Science and Society Interaction
iv) Science and Technology Policies
v) Igniting Young Minds

Call for Abstracts

The Organising Committee (OC) of the conference strongly encourages delegates wanting to submit a paper in the above-cited topics in the form of poster presentation. The last date of submitting the abstract for the poster is 21st July, 2006. the abstracts must conform to the following format :

Abstract, Title, author's name, affiliation and the text should be typed continuously without any line breaks in Times New Roman, font size 10, single line spacing, on paper size A4 with 25mm margin on both sides. Title should be in bold letters, names of authors and affiliation should be in italics and text in regular font. the total abstract must be restricted to seven lines. Please adhere strictly to these guidelines.

For further information:

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Commissioned Studies/Papers

Indian Journal of Science Communication encourages potential scholars to undertake short term studies/ research/surveys on specific area/ topic/sector concerning S&T communication. It is expected that such studies will also lead to writing of a paper/article and can subsequently be published in *IJSC*, if found suitable. A committee of experts will evaluate and recommend carring out of such studies. A nominal amount towards honorarium may be granted for undertaking such studies.

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*.