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Cover: Artist's impression of subnucleic particle interaction

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Balancing between Facts and Fantasies

A Bollywood blockbuster movie for Indian audience 'Koi Mil Gaya' had hit the silver screen in recent past in India and overseas and was able to attract young audience especially. The film had elements of science fiction in its storyline. Similarly, a number of science fiction films, like 'Jurassic Park', 'The Day After' and 'Polar Express' (a 3-D film), etc., have been special in inviting interest in science amongst viewers, particularly in children.

A balance between fact and fiction in science and technology can indeed be beneficial for mankind. Scientifically oriented creative imagination which may lead to concepts that may come true as well, sometimes in future! A science fiction as a genre has that potential of arousing one's creative imagination along with pure entertainment. More importantly, it can imbibe within you an analytical and rational approach along with information and enable you to foresee the futuristic perspectives. We all are aware of a number of classical science fiction stories and films which had prepared the ground for several landmark discoveries.

Moreover, because of its enormous potential in educating, motivating and entertaining the masses, especially the children, science fiction has been a popular means of science communication. It is important to start a series of discussions focusing on various aspects of science fiction and its role in communicating science and technology related issues to the commoners and the children. It is high time to examine as how science fiction input could be enhanced and successfully employed in various science communication modules currently in practice in India and abroad.

A variety of innovative initiatives have recently came to the fore at organisational as well as individual levels, which clearly confirm that there is an emerging urge for good science fiction software in all kind of mass media, be it print, broadcast, folk or even digital. The National Council for Science & Technology Communication, New Delhi; Vigyan Prasar, Noida; Marathi Vigyan Parishad, Mumbai; Indian Science Fiction Writers' Association, Faizabad; and Indian Association for Science Fiction Studies, Vellore, etc., are playing a major role towards further advancement of this genre and enhancing quality science fiction and fantasy in literature and mainstream media. Training courses on science fiction writing for different mass media, seminars and discussions on various aspects of science fiction are being organised from time to time. A recently concluded seminar at Centre for Science Communication, Cochin University of Science & Technology, on 'Future of Science & Technology : Facts & Fantasies' has been able to make the delegates appreciate the highly delicate issues of balancing between facts and fantasies.

An electrical engineer Hugo Gernsback had brought out world's first science fiction magazine 'Amazing Stories' in 1926 from New York. India's first science fiction magazine 'Vigyan Katha' was started in 2005 by Indian Science Fiction Writers' Association, edited by Dr. Rajiv Ranjan Upadhyay and Dr. Arvind Mishra, with an initiative and support by the National Council for Science & Technology Communication. Er. Anuj Sinha, Adviser and Head, Science Communication, Ministry of Science & Technology, Govt. of India, while addressing a gathering of distinguished scientists and science communicators, has put together yet another futuristic perspective for setting up a Science Film City for encouraging high standard science films including conceptualisation and production.

Taking advantage of high speed digital media, a highly intellectual and interesting discussion group has been functioning on Yahoogroups <indiansciencefiction@yahoogroups.co.in>, for over two years on the web. Most of the members of the group are creative science fiction writers, as also from other activity spheres spanning from popular science writers, scientists, researchers, and litterateurs from India and abroad. The group has emerged as a vibrant and active forum and is always engaged in fruitful debates and discussions on one aspect or the other. It has even developed an excellent science fiction piece in cooperative manner, which was an outcome of collective contributions by several science fiction writers. One can also find interesting information on science fiction in a numerous blogs.

Although, all these efforts are appreciable, still there is a need of in-depth analysis on a variety of issues emanating from science fiction which may lead to research studies. Science fiction and fantasy writers, scholars, critics, enthusiasts, social fiction writers, litterateurs and scientists can work together for developing modern day science fiction which can meet the challenges of today's fast changing world. ■

Manoj Patairiya

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Creating Awareness Amongst the Farmers Towards Judicious Use of Pesticides: Impact of Dramatization as a Tool

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Abstract

Agricultural knowledge is rising fast and is doubling every six years. Its transfer to the needy through appropriate media, is lagging behind. The knowledge transfer seems to be the weakest link. Majority of people are still living below poverty line, are illiterate and modern media is not accessible to them. Low literacy rate and inaccessibility of the modern knowledge can be overcome by the traditional media. The study found that there was significant hike in knowledge in all the three categories of the age and education level. The entire cross-section of respondents from different profession gained the knowledge after watching the street plays. About half of the respondents belong to high category of retention in knowledge.

सारांश

कृषि का ज्ञान बहुत तेजी से बढ़ रहा है और यह हर छह वर्ष में तकरीबन दो गुणा बढ़ जाता है। ऐसी परिस्थिति में जरूरतमंदों तक इसका संचार काफी महत्वपूर्ण है। परन्तु ज्ञान का प्रसार एक कमजोर कड़ी सिद्ध हो रहा है। देश के बहुत लोग अभी भी अनपढ़ है, गरीबी की रेखा के नीचे रहते हैं और आधुनिक संचार के माध्यमों तक नहीं पहुंच पाते। इन सभी मुश्किलों को परंपरागत संचार के माध्यमों से दूर किया जा सकता है। इसी संदर्भ को जानने के लिए इस अध्ययन के दौरान कृषि तकनॉलोजी को किसानों तक नाटकों द्वारा प्रसारित किया गया। देखा गया कि आयु के और शैक्षिक स्तर के हर वर्ग में ज्ञान में अपेक्षा के अनुरूप बढ़ोत्तरी पाई गई। इसके इलावा काफी ज्यादा किसान उस कार्यक्रम से जो कुछ सीखे उसे व्यवहार का हिस्सा भी बना सके।

Keywords: Dramatisation, Awareness in agriculture, Judicious use, IRM

During last 60 years, only 30 percent of modern agri-knowledge was disseminated among educated and progressive farmers in India. There still exist appalling poverty, glaring inequality and growing destitution among the people. It is irony that in spit of six decades of independence, very little science has reached the needy in villages. Agricultural knowledge is fast generating and is doubling every six years but its transfer to the needy through appropriate media is lagging behind. The knowledge transfer seems to be the weakest link.

The power of printed words is amazing. However, there are several problems in communicating through printed words, such as low literacy percentage and inaccessibility of printed material. The number of people who can read in rural India is relatively small. The number of those who read with any purpose is much smaller and the number of those who are too tired to read after a hard day's work is enormous. More exploration in indigenous communication techniques should be encouraged to promote more productive and relevant communication research in non-western societies.

Even the poorest man in India has access to the traditional media, cultural media, or folk media expressed in various forms such as story, poem, play, song, proverbs, drama, wall paintings, symbols, socio-dramatic paintings, 'kavad' and 'pad'. Folk media for non formal education programme is popular in Malaysia, Niger, Thailand, Pakistan, Taiwan and China. In each cultural region of India, there are various traditional media. Folk media, traditional media and cultural media are common terms, which include folk songs and dances. The folk media are based on the content of communication derived from the traditional beliefs and customs.

Dramatisation is one of the methods that makes a special appeal to farmers as it reproduces realities in life. Dramatisation depicts the characters proceeding through the use of language accompanied by facial expression, gesture and movement. Dramatisation methods not only help in quick learning but also in better retention. The farmers learn through recreation and make use of their sense of hearing and seeing, which results in permanent learning.

Keeping in mind the embeddedness of the traditional media in the cultural ideology of the Punjab farmers the strategies of the Insecticides Resistance Management (IRM) project were planned to be disseminate through the educational street plays. These street plays were organised in the IRM adopted villages of Bathinda, Mansa and of Abohar districts at local conditions.

Material and Method

The present investigation was conducted in the IRM villages of Bathinda, Mansa and Abohar districts. Street plays were held in the six villages of the area with two performances in two villages of each district. From each village 25 IRM farmers were selected. The data comprising a sample of 150 farmers was collected comprising different steps. Firstly the knowledge test was administrated to IRM farmers to judge this existing knowledge about the selected concept of environmental implications caused due to injudicious use of pesticide. Post-test was administered to the entire respondent immediately after the performance. After fifteen days the same test was again administered to find out the retention of knowledge. This formed the basis to see how far the respondents gained knowledge and extent to which they retained the knowledge.

A skit on pesticide awareness being performed

Table 1 : Comparison of variance in gain in knowledge of the farmers regarding judicious use of pesticides

Variables	Mean score			F value
	Pre-test	Post-test	Gain in knowledge	
Age (yrs)				
1-23	12.00	33.6	21.6	3.87**
23-45	14.00	37.16	23.16	
45-67	16.70	40.20	23.50	
Education				
Illiterate	12.79	35.33	22.54	5.95*
Primary	15.10	41.30	26.20	
Matriculate	16.77	45.42	28.65	
Graduate	16.80	46.37	29.57	
Occupation				
Agriculture	14.99	40.37	25.88	2.55^{NS}
Business	12.10	37.43	25.33	
Service	16.90	44.57	27.67	
Family Income				
Low	13.97	40.94	26.67	3.92**
Medium	14.96	41.72	26.76	
High	16.69	45.85	29.16	
Operational land holdin(acre)				
1-44	12.79	37.64	24.85	4.04*
44-87	16.85	38.12	21.27	
87-130	12.62	36.40	23.78	
Area under cotton crop (acre)				
1-23	12.93	37.90	24.97	3.87**
23-45	16.89	38.49	21.60	
45-67	13.05	36.66	23.61	

* Significant at 0.05 per cent level
** Significant at 0.01 per cent level

Table 2: Distribution of the respondent according to their retention of knowledge score

Retention of knowledge category	Frequency	Percentage
Low (9-19)	35	23.34
Medium (19-27)	74	49.33
High (27-36)	41	27.33
Total	150	100.00

It was found from the investigation that there was significant hike in knowledge in all the three categories of the age and similar results were observed in the case of education level. The respondents who were graduates gained more; i.e., 29.57 units as compared to the respondents who were matriculate (28.65), primary (26.20) and illiterate (22.54). The results in Table 1 also showed that all the respondents engaged in different profession got enhanced their knowledge and F value showed that this enhancement is not significant to any profession. In case of family income, more the family income, more the farmers gained the knowledge from the pre-test evaluation and hence gain in knowledge is significant to family income. At the same time land holding and area under cotton crop were significant to gained knowledge. The F value for the operational land holding and area under cotton crop was 4.04 and 3.87 respectively.

The keen interest shown by the respondants in the streetplays lead to gain in the knowledge level of the respondants. The data in Table 2 shows that about fifty percent of the respondents retained their knowledge up to medium level (fifty percent), whereas 27.33 percent and 23.44 percent of the respondents belong to high level and low level of retention of knowledge respectively.

Conclusion

Although Indian agriculture has been successful in recent years but there is a noticeable gap between research and its application in the field of agriculture, animal husbandry and home sciences. This gap has to be bridged by effective communication of useful information. Though modern channel of communication are available but there usage is limited largely to the urban population and the upper segment of the society, only the educated audience benefitted from modern media. The study showed that there was noticeable hike observed in the knowledge level of farmers after watching the street play and it gives an ever lasting impact on the knowledge level of the farmers. Thus efforts should be made to impart the knowledge to farmers through traditional media also.

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Innovative Reviewer Selection as a Tool for Checking Plagiarism: Role of Journal Editor

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Abstract

An innovative technique has been developed for use in identification of reviewers to help in the evaluation of research papers submitted for publication in the Indian Journal of Radio and Space Physics, a peer reviewed journal. Various steps in the technique, using Internet, have been elaborated. The technique has been found to be useful to identify most appropriate reviewers, leading to excellent critical reviews. The technique was found not only to do value addition to the papers but also to check plagiarism.

सारांश

शोध पत्रों के समीक्षकों की पहचान हेतु नवोन्मुखी तकनीक को विकसित किया गया है और इसका इस्तेमाल समालोचित शोध पत्रिका *'इण्डियन जर्नल ऑफ रेडियो एण्ड स्पेस फिजिक्स'* में प्रकाशन हेतु प्राप्त शोध पत्रों की समीक्षा के लिए किया जा रहा है। इस तकनीक में प्रयुक्त इंटरनेट आधारित व अन्य तरीकों को यहां विस्तारपूर्वक दिया गया है। इस तकनीक को उपर्युक्त समीक्षकों की पहचान में उपयोगी पाया गया। इससे समीक्षा का स्तर बढ़ा और साथ ही शोध पत्रों की गुणवत्ता में वृद्धि हुई और साहित्य चोरी रोकने का अच्छा तरीका विकसित हुआ।

Introduction

Skyrocketing ambition and peer pressure on scientists to perform have resulted in a new kind of corruption in science publication that of fudging data, based on which spectacular results can be arrived at. In many cases such misadventures were caught by workers after such papers were published, due to failure of attempts at repetition of such work. Dr Hwang Woo Suk[1,2], a senior South Korean researcher was recently caught publishing a paper on cloning of Human embryonic stem cells fraudulently in the journal *Science* in 2004. The data were found to be not reproducible and fudged.

In the above example of Dr Suk, the data were fabricated to arrive at spectacular results. There is another kind of dishonesty practiced in the world of science publishing, where experimental data, illustrations, results are lifted out of a published paper and reproduced verbatim and submitted in one's own name for publication, without giving due credit to that particular paper at all, by not including it in the reference list. This is a very common case of plagiarism attempted by researchers keen to have some published papers quickly, without much effort, more often without the knowledge of the senior co-author or research guide.

In several cases in the past after the whistle is blown, very often charges are traded between the senior and junior authors, the blame for which finally falls on the senior most author, who has little or no contribution as far as actual collection and presentation of the data are concerned. Such authors have mainly an advisory role and at times help in polishing the final paper before submission. The junior authors also feel obliged to include the senior author's name so as to get the paper sail through smoothly for publication, by virtue of the standing of the senior author in academia. Some very senior authors have fallen victim to such happenings, because of misadventure of their junior students and lost face and position at the same time.

Conventionally the first author in the list of contributors has done most of the work and the last one the senior author and guide. Now it seems it should be incumbent on the part of the different authors to detail their specific contributions in the paper submitted, and each must sign a statement that they agree with the conclusions arrived at in the paper, so that they cannot shirk their responsibility later on, in case of a problem. It would however be in the best interest of both science in general and the journal in particular, if such cases of attempt at plagiarism are detected before they are published, where the editor

of the journal has a major role to play along with the reviewers he selects for the paper.

Methodology for checking plagiarism

Progress of science over time has taken place gradually in small steps piggybacking a ride on the already available literature at any particular point of time. Credit to the existing literature is given in a very systematic manner by citing full bibliographic details in the paper. In order to safeguard from duplication and plagiarism, the research journals so far followed a three pronged strategy. (i) A declaration by the authors, stating that the paper has not been sent anywhere else for publication and all sources consulted and facilities used for the study have been acknowledged. (ii) Selection of proper reviewers and alerting them about possibility of plagiarism. (iii) Attempt to access the Internet and do some detective investigation, at the times of looking for most appropriate reviewers for any particular paper. Such efforts have so far borne fruit in detection of cases of attempt at plagiarism and desisted authors from trying to pass off other's work as their own.

Importance of reviewer selection – role of editor

Selection of reviewers for a paper assumes importance all the more, from the point of view of checking plagiarism, because of the fact that if the reviewer chosen is himself working in that field, he is more likely to have read the existing current literature related to the paper and is more likely to identify any blatant copying without proper references having been cited in the paper. The question then is how the editor of a reviewed scientific research journal goes about searching such reviewers! What role does he play in this exercise? To what extent is he responsible? These are some of the big questions of the day.

It is true that enormous routine exercise is required on the part of an Editor to publish a journal and maintain a strict schedule, following every stage in time, one after the other. However at the hindsight there lies an enormous responsibility, for at the end of the day he has to take a decision as to whether a paper is to be accepted for publication or not. On the one hand he cannot do injustice to a deserving author, on the other hand he cannot afford to include a paper that is unpublishable. Whereas an editor has to be alert and like a detective see through the designs of an unscrupulous author, he cannot afford to have a bias in favour or against an individual author. Here integrity and commitment are the keywords – a paper from an arch enemy is welcome and a bad one even from a friend is to be returned.

An Editor, even if holding a PhD and a practicing research scientist cannot be an expert in the entire spectrum of subjects covered by a journal, howsoever specialised the journal may be. He has to depend on reviewers / subject experts in the field of study of each paper. The more pinpointed the reviewer selected, the more objective will be the review, leading to proper revision of the paper, which is beneficial for both the author and the editor. Then again the editor cannot depend on comments of one reviewer alone. He has to have a set of atleast three, to obviate a possible personal bias of the reviewers for or against publication of a paper. After a thorough scrutiny and analysis of three sets of comments alone, he can take a judicious view at to the publishability of the paper and decide further course of action regarding its revision by the authors.

Very often he has to redraft the comments and refine them, laying stress on certain comments forcefully and ignoring certain others in tune with the general policies of the journal. I admit, in the course of such an effort, a personal bias of the editor may creep in. Most of the data, on which the editor banks upon for a decision, however are from the comments of the reviewers. Consequently, selection / search of reviewers for a paper assume so much importance.

Reviewer selection, psyche

The easiest course of action is to maintain a list of scientists in different sub-branches covered by the journal and send papers to them. It is easy to keep a tab on them and find out who are the ones that respond faster and spread the papers among them, taking care that a single individual referee is not overburdened. A list of 500 active referees is enough, if your total receipt is 100 papers in a year. The calculation is as follows :

1.	No. of papers	100
2.	Number of reviewers to whom each paper is sent	3
3.	Average number of times each paper is sent to a reviewer	2
4.	Weight factor covering all other factors	0.8

So, number of reviewers required
$= 100 \times 3 \times 2 \times 0.8 = 480$

However, it is not necessarily the best way. There are various reasons as to why a reviewer agrees to review a paper without any remuneration. Some of them are as follows :

1. He feels responsible to the scientific community and thinks it is his duty as other scientist / referees are doing the same for his paper, sent for publication.
2. He feels that he thus joins an elite peer group, sitting on judgement on other's research work.
3. The subject matter interests him as it is very much related to his work.
4. By going through a research paper, he comes to know the latest trend in research in his area or sub-area, first hand, even before the work is published.

There may be a combination of the above or various other reasons. However, from the editor's point of view, the reason number 3 suits him best, as a reviewer with a perfect or near-perfect subject match can give the most objective, critical and in-depth comments. These are the only reviewers who can assess the data presented, know whether any portion of the paper he has come across in some other paper he has gone through recently as well as newness of the work done by the authors, apart from the correctness of his theory and calculations.

It is a different story however, when you want to identify such reviewers and they more often than not, will not figure in your existing list of reviewers. So, how do you go about locating such reviewers! How do you motivate them to do the required service you demand of them? These are big questions, not easy to answer. However, I present below a method I have evolved over the years, through trial and error, through trouble shooting methods I came across in the process of running a reviewed research journal in Physics.

Innovation in reviewer selection methodology

In the *Indian Journal of Radio and Space Physics*, the following technique was tried with spectacular success. The first step involves the paper in question itself. One has to go through the paper, proverbially with a magnifying glass, trying to understand as much as possible. It is imperative that most often much of it go over the head. But try to grasp the contents – the aim of the paper, the methodology involved, the experimentation, the results and conclusions. Read the abstract, if required a second time, go through the references. Identify the main subject area – areas if the study is interdisciplinary. Then identity the important keywords and the important authors referred to in the text and included in the list of references more often.

It is not necessary that the important keywords will be found in the title and abstract only. Quite often an important keyword may be found in the main body of the text – hidden away. Reading through the text makes the identification obvious choices, which otherwise may not at all appear to be important at a first glance! I am laying so much emphasis on going through the text, because selection of proper keywords is of paramount importance.

The next vital step requires the use of Internet facility. Feed all the keywords (three of four) with a 'plus' sign between them in 'Google' search engine and press the 'enter' button. A plethora of websites will appear. If there are more than three keywords, it is better to try three keywords at a time and try various combinations. Try the various websites that appear – of different related research papers, symposia, seminar proceedings world over and try to identify authors working in that area, with their address, which are often found together in those papers, either directly in the web or in papers presented in current seminars.

Generally there is more than one author from the same or different institutions. Very often the names will tally with those given in the list of references in the paper in question or the text itself.

Even at this stage the editor is only halfway through, for among multitude of names identified, he is not sure who the main or most important author is. So the next stage is to go through the home pages of the institutes, and departments associated with those names and find out the credentials of those authors. Are they regular professors or students? What is their subject specialisation and stature? These details will all be there. All it requires is a painstaking search, keeping your motive in view. The main aim must not be lost sight of. Identify two / three reviewers with their complete address with pin code. Try to ascertain the age of these experts. Very often it will be found that the best of them will be more than 70 years old with an outstanding CV. But they will not prove to be very useful, for they will most likely be

unapproachable. One should try to identify an expert in the age range of 30-50 years. Below 30 years, they might be having other problems.

Identifying reviewers is doing only half the job. How do you know they will send you comment? The obvious answer is – send a request email and wait for an answer. It looks perfect on the surface – very British. But it suffers from two faults – (i) it is very easy to send a negative reply by email, or no response at all! (ii) How long do you wait and follow it up? Does a busy editor have enough time to follow up and connect between different papers received and different reviewers? The answer to my mind is a big 'No'.

The next question is does the person you want to review your paper know you or your journal? Has he even heard about your institute? Most often the answer is a big 'No'. It is important that the reviewer is made to know about you, your institute, about your journal in details, i.e., you establish your brand equity first. Send a hard copy of a colourful brochure about your institute, so that he comes to know about its multifarious activities and the role it plays in advancement of science, world over. Also send a brochure about your journal, describing its salient features – its editorial board, the coverage it receives by various international abstracting and indexing services, style followed, etc. After several trials and errors, it was found that enclosing two such brochures along with a hard copy of the paper and a nice and brief forwarding letter along with other relevant attachments yields very encouraging results. In about 80% of the cases over a period of three years, comments were received.

Discussion of results and Conclusion

In 50% of the cased the comments were so good that the editor was able to take a definite decision, regarding the suitability of the paper. Either the paper was rejected sighting very valid faults in it or new insight was offered to the authors to revise and supplement the paper giving additional inputs covering related research work done in other parts of the world. Very often the author was grateful and pleased beyond a measure at the comments offered and thought that it led to enormous value addition to it. Since three reviewers were used for each paper, in almost 100% cases atleast one set of very good comments was received, leading to a definite decision on it. The editor has to supplement such comments sometimes, with those from the other well known tried and tested reviewers from the regular list to have a balance.

On the other hand some reviewers thus identified found blatant verbatim lifting of data and text from their own papers and pointed them out! Not so surprisingly the paper in question was not included in the list of references by the author, although other papers of that referee found a place in the list. This was the success of such a method of reviewer selection in checking plagiarism.

The negative aspects of selecting reviewers in the manner as mentioned earlier is that, (i) the reviewer chosen for a paper may not be used again in the near future as such an exact subject match may not take place. Again (ii) this system cannot be automated by any kind of software or computer programming. Despite these shortcomings the method of referee identification has been found to be most innovative and satisfying, both for the authors and the editor and ends up in doing enormous value addition to the papers and in turn to the journal.

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An Analysis of Public Opinion on Science Television Channels

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Abstract

Scientific temperament can play an important role in developing a nation. It can be created by changing the way of public thinking from traditional to scientific. Science communication can play an important role in this direction. There is a limited role for print media to play in the field of science communication as majority of our population resides in villages and their literacy level is still low. But electronic media, especially television, can do wonders in such a scenario as it can communicate science in an interesting and more comprehensive manner. Today when there is mushrooming growth of T.V. channels, there are only a few channels, which are communicating science, and those all are grown from the soil of foreign countries. The present study assesses the popularity of science channels and the prospect of Indian science channels, if commenced in future.

सारांश

वैज्ञानिक सोच का राष्ट्र के विकास में गहन भूमिका है। आम लोगों की सोच को परंपरावादी से विज्ञान आधारित यदि परिवर्तित किया जा सके तो उनमें वैज्ञानिक सोच का सूत्रपात किया जा सकता है। हमारी आबादी का बड़ा हिस्सा अल्प साक्षर है और गांवों में निवास करता है, तो मुद्रित माध्यम की भूमिका सीमित है। लेकिन इलेक्ट्रॉनिकी माध्यम, विशेषतौर पर टेलिविजन इस मामले में कमाल कर सकता है क्योंकि इसके पास विज्ञान को रोचक व समग्र तरीके से संचारित करने का अनूठा तरीका है। आज जबकि टीवी चैनलों की बाढ़ सी आई हुई है, ऐसे गिने चुने ही टीवी चैनल मिलते हैं, जिन पर विज्ञान को प्राथमिकता दी जाती है और ये विदेशों से प्रसारित होते हैं। यह अध्ययन विज्ञान टीवी चैनलों की लोकप्रियता का आकलन करता है और भारतीय मूल के विज्ञान आधारित चैनल की संभावित उपदेयता को आंकता है।

Keywords: Science & Technology communication, Scientific temperament, Electronic media, Science channels

Introduction

The development and prosperity of any nation depends on the advancement of science and technology in that nation. In modern era, a keen competition is going ahead with other countries in scientific innovations and using the latest technologies for attaining higher production in each and every field. Science is continuously bringing comfort and prosperity to human life. It has entered in each and every sphere of life and today even the imagination of life without science appears next to impossible. It has provided the countrymen all those amenities, which were once confined to only a small privileged elite group of people. The impact is so enormous that it has become indispensable and necessity in day today life. It has interwoven and intermingled with the fabric of life and sparing science is next to impossible.

India has a glorious history of scientific advancements in the ancient times but the alien and colonial rulers neglected and weakened the scientific temper of India. At the time of independence India had very weak base of Science & Technology (S & T). In order to bring the country in the mainstream of development, Jawahar Lal Nehru, the first prime minister of India, emphasized on the development of S & T. It is well understood that the dominating feature of contemporary world is the intense cultivation of science on large scale and its application to meet country's requirements[1]. The short cut for the rapid industrialisation was brought by importing experiences from other countries in the form of plants, machineries and highly paid personnels thus draining out capital. It was only to bring the country at par with the global advancements. At that time also, the stress was made on self reliance and major breakthroughs in technologies. Technology Policy Statement, 1983 emphasized that in a country like India self reliance is inescapable and must be at the heart of technology development[2].

The development of technologies requires education in science and training in technical skills. India has enormous manpower and if they participate in the march of science, the country can attain the goal of self reliance and become a strong nation. India adopted variety of strategies for strengthening the scientific infrastructure, input of technologies for development

of country and using maximum resource at minimum cost. As a result, India made great strides in S&T and made its place on the globe in nuclear, space and defence sciences.

Despite the excellent advancements in scientific research, the human sufferings are still enormous, the superstitions and unscientific thinkings are still prevalent in our societies. This is only because of the lack of scientific attitude to common man. At this point it becomes imperative to link the people of nation with Science & Technology, so that they can also get included in the mainstream of development. Koolstra et al (2006) conducted a study that shows that television should be considered as the preferred medium to communicate science besides its some limitations[3]. The communication of science and technology in a very comprehensive and interesting manner, is therefore required.

Objectives

Media can play a significant role in bringing science and technology from the laboratories to common man. Print media has certain limitations because its limited reach in the remote areas and also it requires at least reading ability. As our country is an agricultural country and still most of the people are residing in rural areas with low literacy rate, therefore, the role of print media like newspapers and magazines becomes very limited. On the other hand television, being an audio visual media, can play an amazing role as it can explain science and technology more explicitly because of its inherent visual properties. Also, its reach is higher, about 90 percent in our country.

Today, host of channels are offering variety of programmes to corner the attention of the viewers but only few channels are telecasting Science and Technology and related programmes. The present study aims to assess the popularity of these science channels among the people of Indore city. The following objectives are developed to conduct the study:

1. To assess the popularity of science channels among people.
2. To assess the scientific topics which people like most to watch.
3. To determine whether the people feel lack of Indian Science Channels.
4. To determine the knowledge and interest of common man regarding science and technology.

Methodology

Surveys are being used widely in all areas such as business marketing, politics, and advertising for their everyday decision making. The importance of research survey to the public at large is confirmed by the frequent reporting of survey results in the popular media. To understand the public opinion on any point, survey research can provide a better way to do it. Therefore, research survey has been used in the present study.

A sample of 386 people was taken for the study. The sample was selected in such a manner that all sorts of people may be included in this study. For collecting the data, a well defined questionnaire was framed having closed ended and open ended questions. The questionnaire gives an opportunity to express views regarding the television channels and preferences, etc.

Results and Analysis

The collected data were analysed and the results are shown as follows:

Table 1 shows the percentage of viewers of the science channels. It includes those viewers who watch television regularly. The study reveals that 78% of people see science channels regularly and only 22% people are non viewers of science channels. The same results are drawn in Figure 1. On analysing the reasons behind non viewers of science channels, it is found that either they do not have cable connections or their educational level is low.

Table 1: Percentage of viewers/non-viewers of the science channels

Sample Size (No.)	Viewers of Science Channels (%)	Non-Viewers of Science Channels (%)
386	78	22

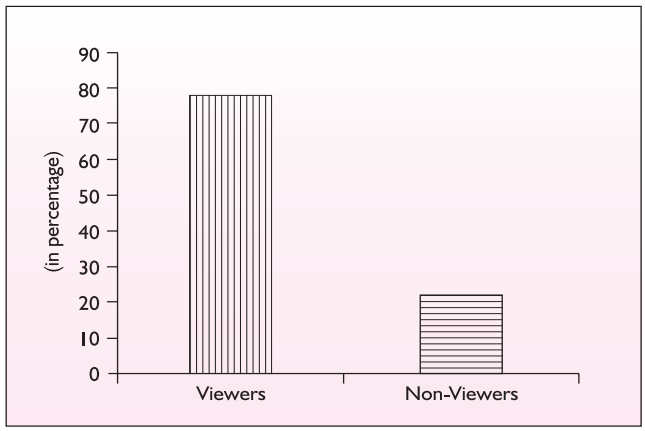

Figure 1: Percentage of viewers/non viewers of the science channels

Table 2 and Figure 2 represent the preferences to channels by the public to get scientific information. It shows that most of the people prefer Discovery channel, the percentage of which is 49% followed by the combination of Discovery and National Geographic, with 25.66%. About 9% of people view all the three channels like Discovery, Animal Planet and National Geographic channels and 6% of the people see only National Geographic channel.

Table 2: Preference of the viewers about T.V. channels

S.No.	Channels	Preference (%)
1.	Discovery	49
2.	National Geography	6
3.	Animal Planet	1.66
4.	Discovery – National Geography	25.66
5.	Discovery – Animal Planet – National Geography	9
6.	Discovery – Animal Planet	6
7.	Animal Planet – National Geography	2
8.	DD-1	0.33

Table 3 and Figure 3 show the science subjects that people prefer to watch on television. It shows that the most popular science subject among viewers is wildlife. Whereas 22% of the people indicated their choice to watch wildlife followed by wildlife and marine life with 15.33% and 13.66% people like to watch wildlife, marine life and medical science. While 11.33% people selected medical science as their favorite subject, 8.33% persons preferred to watch space science. The most preferred subjects are of general interest with only a few technical details such that a layman / non-science people can understand them easily. However, children

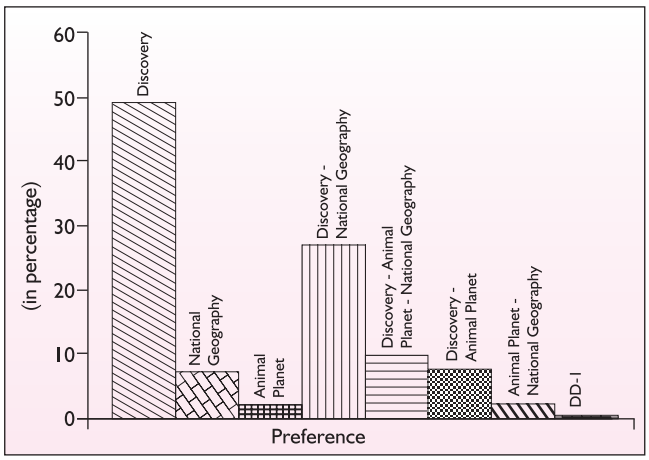

Figure 2: Percentage of viewers about T.V. channels

Table 3: Preference by the viewers regarding their scientific areas of interest

S.No.	Topics	Preference (%)
1.	Medical Science	11.33
2.	Forensic Science	3.66
3.	Wild Life	22
4.	Marine Life	2.66
5.	Space	8.33
6.	Medical Science – Wild Life – Marine Life	13.66
7.	Wild Life – Marine Life	15.33
8.	DD-1	0.33
9.	Wild Life – Marine Life – Space	2
10.	Medical Science – Marine Life	1.33
11.	Wild Life – Space	4.33
12.	Others	9.33

love to watch only those Science programmes which are related to space or new technologies.

Table 4 and Figure 4 give an idea of having an Indian Science Channel, which indicates that 68.13% people really want to have dedicated Indian science channels while 31.86% persons say that it makes no difference. Most of the people express the need of Indian Science Channels and are in favour to start it as soon as possible because Discovery Channel, Animal Planet and National Geographic Channel are telecasting programmes in English or sometimes programmes dubbed in Hindi but as the presenters and the context of the programmes are not Indian, these may distract some of their viewers. The programmes, which

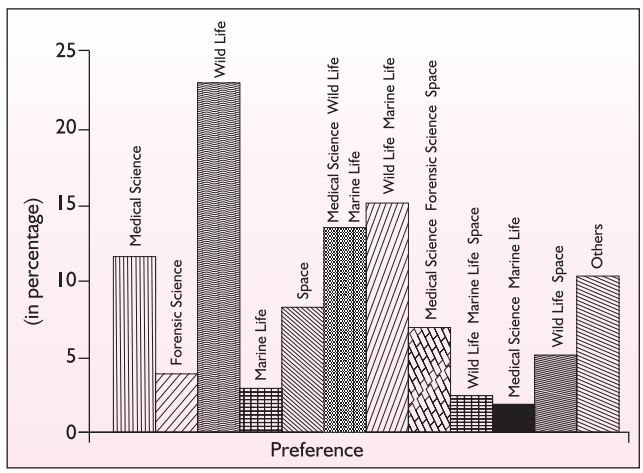

Figure 3: Percentage by the viewers regarding their scientific areas of interest

Table 4 : Need of Indian science channel

Yes	No
68.13%	31.86%

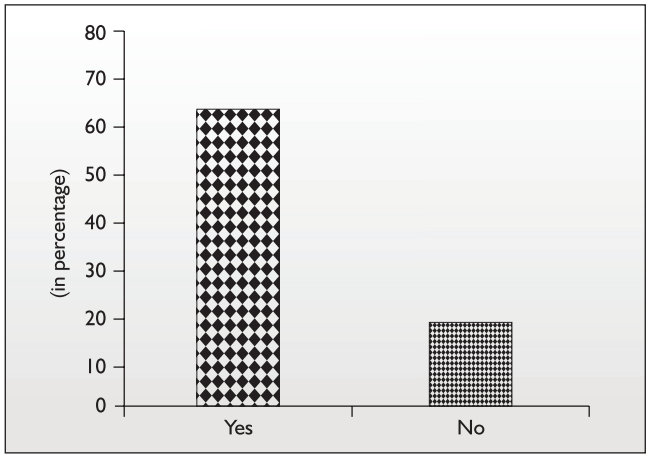

Figure 4: Need of Indian science channel

are developed on Indian soil, with Indian presenter and Indian context, can attract more people because they identify themselves and their problems in those programmes.

Table 5 and Figure 5 represent the percentage of male and female viewers of science channels. The results indicate that males are more inclined towards science channels than the females. The 76.33% males prefer to view science channels while only 23.66% females prefer to see science channels.

Table 5 : Gender wise distribution of viewers for science channels

Male	Female
76.33%	23.66%

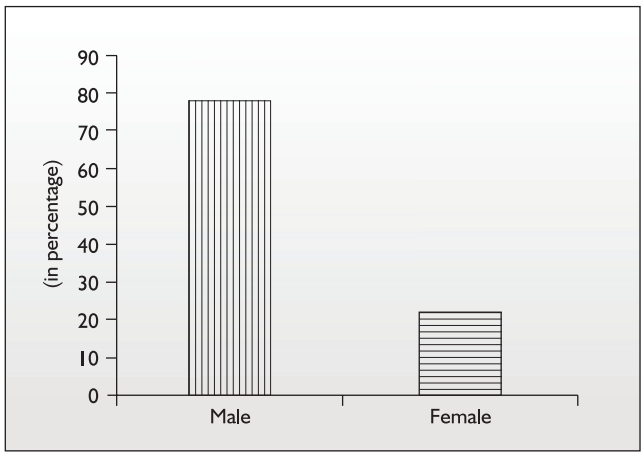

Figure 5: Gender wise distribution of viewers for science channels

Table 6 and Figure 6 show the viewers of science channels on the basis of educational qualifications. It is found that the graduates like to see more science on television than others including postgraduates. Science being exciting and adventurous subject as per the age group of 21-30 with graduation and hence preferred to watch science programmes. This is a good sign as they are the future of the nation.

Table 6 : Education wise distribution of viewers for science channels

S.No.	Education	Liking (%)
1.	Under Graduate	24.66
2.	Graduate	39.33
3.	Post Graduate	29
4.	Others / Professionals	7

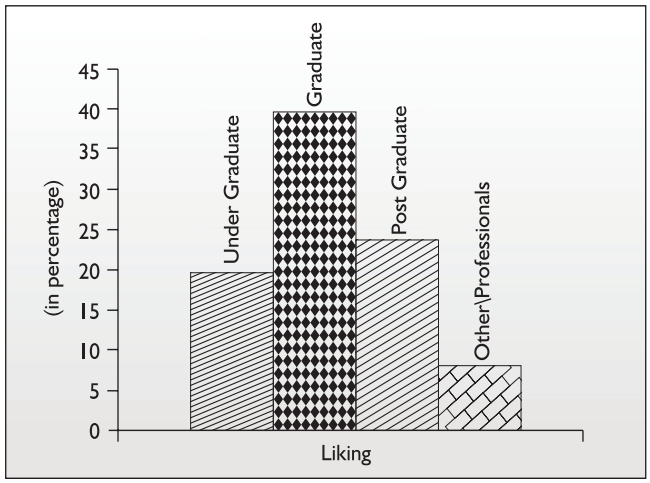

Figure 6: Education wise distribution of viewers for science channels

Table 7 and Figure 7 provide an idea regarding the occupation wise distribution of viewers of science channels. The findings reveal that service class men / women and students are the frequent viewers of science channels rather than persons with other occupations. About 41.33% services class people prefer to view science channels and 23% students

Table 7 : Occupation wise distribution of viewers for science channel

S.No.	Occupation	Liking (%)
1.	Service	41.33
2.	Business	18.33
3.	Student	23
4.	House wife	7
5.	Others / Professionals	10.33

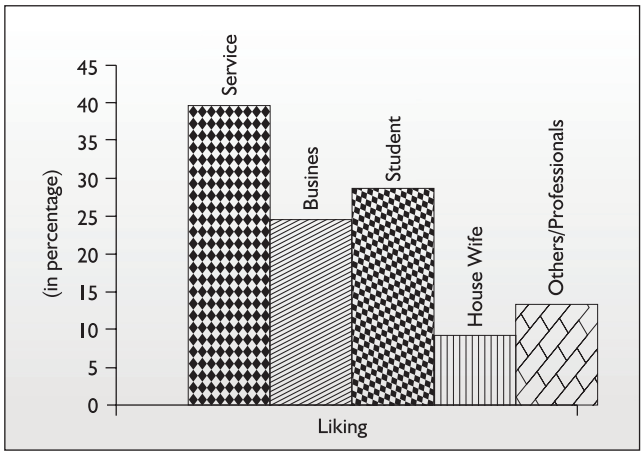

Figure 7: Occupation wise distribution of viewers for science channel

also like to watch science on television, which may be due to the lack of time with the persons of other professions rather than the lack of interest.

Conclusion

The results indicate that most of the persons, including service men and students, like to see science programmes on television. Discovery channel is the most popular channel among the masses and most preferred science subject is wildlife. The reach of science programmes can be increased by starting Indian science channels on wildlife, marine life and health. Language for Indian science channel can be Hindi / English or regional.

Acknowledgements

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Induction of Experimentation on Energy Conservation into Teacher Education Undergraduate Course in Physics

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Abstract

In attempts to improve science education in Brazilian high schools, students of teacher education at undergraduate level are required to design and assemble chosen experiments. In this work we present few examples of experiences, developed by the students of Learning Practices IV course, such as collision, domino effect, yoyo of bottle and water wheel. We argue and we evaluate these works and we point out their potentialities such as for the effectiveness as instruments of learning in the conception of the hands-on science philosophy.

सारांश

माध्यमिक शिक्षा के स्तर पर ब्राजील में विज्ञान शिक्षण की गुणवत्ता को बढ़ाने के उद्देश्य से, शिक्षण के स्नातक पाठ्यक्रम के छात्रों को प्रायोगिक कार्यकलापों की रूपरेखा तैयार करके उनको बनाना होता है। इस पत्र में ऐसे ही कुछ अनुभवों को अंकित किया गया है जिन्हें 'लर्निंग प्रैक्टिस–4' पाठ्यक्रम के अंतर्गत छात्रों ने तैयार किया है, जैसे कि टकराना, 'डोमिनो इफेक्ट', बोतल का 'योयो' और पनचक्की आदि। इन प्रयोगों को आंकने का प्रयास किया गया है और ऐसे प्रयासों के सकारात्मक प्रभाव को 'कर के समझने' के सिद्धान्त के सापेक्ष परखने की चेष्टा की गई है।

Keywords: Education, Energy conservation, Physics

Introduction

The Learning Practices IV course (FIS461), from teacher education undergraduate in Physics programme of the Federal University of Itajubá (UNIFEI), Brazil, requires to work with the concept of energy conservation with an historic approach giving emphasis to their several forms, sources and also with the fundamentals from the point of view of the theories of Physics. To introduce each topic, a conceptual and qualitative argument is made. After that, the students develop new activities such as seminars about the sources of energy. To conclude, they work out and develop experiments on the subjects learned, more exactly energy conservation.

The goal of the students is to design and to assemble chosen experiments in order to promote the experimental Physics and to improve the scientific education at the Brazilian High Schools. Those are user friendly assembled experiment and are built up with recycled material or cheap material. A schedule is developed for each experiment in order to guide the teachers and the students from High School to set up and carry out the activity.

With those experiments we intend to provoke and develop the use of classroom experiments. In this way we expect that the Brazilian High School students are going to 'do' science rather than merely being 'exposed' to it. It is fundamental that the experimental set up must be made by the high school students themselves. The students will be completely familiar with the experimental set up and will carry out better understanding about the experiment itself and about the physical concepts involved.

Teacher education undergraduate course in Physics, of the Federal University of Itajubá, was started in the year of 2001, with the first group entering in the following year. The objectives were; to evolve and train Physics' teachers, who can teach in the High School and continue their studies in programmes of M.Sc and Ph.D; to support collaborations and to make possible new collaborations with diverse research groups in Education and Physics Education, in the institution as with others institutions, through activities like probation and scientific initiation; to promote university training and scientific initiation program; to promote the dissemination of distance education to

train qualified people to work in sciences museums; and to include students in extension activities in order to contribute into processes of social inclusion already in progress.

The Learning Practices IV course has objective to give to the students a conceptual and quantitative vision on energy and its conservation. The broad strategies are : formal lessons, seminars presented by the students and elaboration and assembly of experiments involving conservation of energy.

The following concepts has been included in the formal lessons : history of Energy; diverse forms of energy; sources of energy; renewable energy; and the theories of physics and energy. In the seminars the students generally considered the following energy sources : aeolian, biomass, hydroelectric, nuclear, solar and thermal. Some of the experiments presented by the students on conservation of energy form were : collision, domino effect, yoyo of bottle and water wheel.

Experiments

The experiments developed for the students of the course, aim at the promotion of experimental expertise in Physics in particular and Energy Conservation in general, in order to improve the scientific education in the Brazilian schools. These are developed for easy assembly and composed of recycled materials, or cheap materials, and all of them have a script that guides the teachers and students for proper accomplishment of the activity.

This will promote the complete familiarisation of the experimental apparatus and will provide the domain of all experimental aspects causing a better agreement of the experimental experience itself and also of the concepts embedded in it.

Scripts of the experiences

To follow we present scripts elaborated for the students ahead.

1. Collision

Experience : Forms of Energy

Objective : The objective of this experiment is to show the transformation of the gravitational potential energy in kinetic energy, illustrating the conservation of the concept of energy.

Material used

- plastic cup
- 2 plastic cover from 2000 ml or 600 ml bottle
- 2 rulers of 30 cm each
- adhesive ribbon
- supports (like book, notebook, pencil, etc.)
- a small ball

Experimental procedure

- Cut a rectangle of approximately 3 cm width and 6 cm height next to the edge of the plastic cup;
- Fix the plastic covers with adhesive ribbon in the extremities of one ruler, in such a way that there are lined up;
- Fix the another ruler, horizontally, on the other face of the plastic cover. This junction of the two rulers, separated by the plastic cover, is like a narrow channel (see Fig.1).
- To prevent the small ball to force open the two rulers when rolling in the narrow channel, place an adhesive ribbon in the lower part of the narrow channel, in such way that the rulers cannot be opened.
- Raise the channel's one end using a book as support.
- Place the small ball in the ridge of the ruler, from the upper part of the support.
- Liberate the small ball and observe the cup.
- Repeat the procedure using different supports with different heights.
- Observe the reactions of the cup.

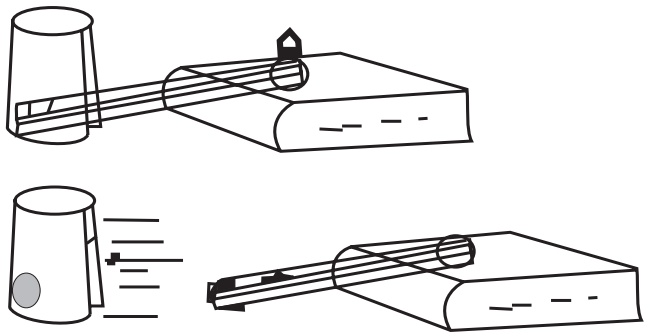

Fig. 1. Illustration of the experiment on the forms of energy

Cost of the experience

- Plastic cup : recycled
- Plastic cover : it can be obtained from 2000 ml or 600 ml bottle

- Rulers : 0.15 euros
- Small ball : 0.15 euros
- Adhesive ribbon: 0.50 euros

Explanation as the energy changes form

The idea of the experiment is to show that higher the gravitational potentia1 energy of the object at the beginning of the fall, greater will be its kinetic energy in the end of the fall.

In this experiment, a small ball in fall on an inclined plane transfers its mechanical energy to a cup. On initiating the movement, the small ball transforms its potential energy into kinetic energy. During the movement occur reduction of the gravitational potential energy and increase of the kinetic energy. In the end, all potential energy transforms into kinetic energy. After that, the small ball enters in contact with the cup and the kinetic energy is transformed into other forms of energy.

On hitting the cup, the energy of the moving ball is spent in the followings: generation of sound; in moving to cup to a distance; in overcoming friction between up and surface; etc. The friction over the cup is practically constant and the cup needs an certain amount of kinetic energy to move to a fixed distance. Therefore, if the cup dislocates more, this means that it received a greater amount of kinetic energy.

What we observe is that the higher is the higher end of the system of rulers where the small ball is released, more potential energy the small ball will have. Therefore the potential energy is function of the height. The small ball acquires more kinetic energy when rolling from the greater inclined plane. This implies more energy transfer to the cup, which covers larger horizontal distance until stopping due to the friction with the surface.

This experiment was developed by: Denis Marcel Gouveia de Souza, Thiago Amaro Vicente and Guillermo Colaneri

2. Domino effect

Experiment: Energy Conservation

Objective: The objective of this experiment is to show the transformation of potential energy in to kinetic energy.

Context: The principle of the conservation of the energy says that "the energy can never be created or destroyed but can be transformed or transferred".

In a determined mechanical system, where we don't have energies related to electromagnetic or thermal phenomena, we can say that the total energy of the system is of mechanical form. Total energy is the sum of amounts of potential energy and kinetic energy. Although the energy is always constant, the amount of each one of its components can vary but the total energy remains constant.

3. Yoyo of Bottle

Experiment: Yoyo of Bottle, Principle of the Energy Conservation

Objectives: To construct a yoyo of bottle and to verify the principle of energy conservation.

Material used

- Small empty powder milk tin (or similar) with cover;
- Small ice cream stick;
- Rubber band (elastic);
- Electric cell (discharged);
- Cutter;
- Hammer;
- Ribbon crepe;
- String.

Experimental procedure

Part A: Costruction of Yoyo of Bottle

Use the ribbon crepe to fix the electric cell in the rubber band. Make two small holes with a cutter, one in the middle of the tin base and another one in the middle of the cover. It is important that it is exactly in these points. To ensure this, trace successive straight lines in diametrical opposing points with a ruler, the intercession of these straight lines will be approximately the center of the tin. It is advisable that the rubber band be of circular shape and that its maximum length be 0.1 cm bigger that the length of the tin, to facilitate placing of the electric cell in the tin. Fix the rubber band inside the tin in this way: fasten a string piece in two symmetrical points of rubber band and pull one of them outside of tin from the hole made in the base, fixing it in a ice cream stick (the rubber band must be strained inside the tin); straining the rubber

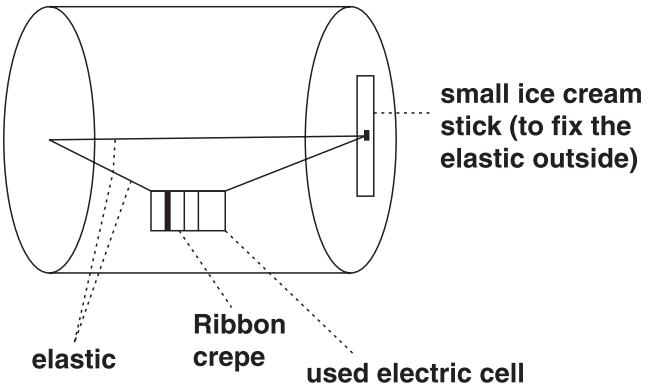

Figure 2: Yoyo of bottle

band, make the same arrangement on the opposing side to fix it in the hole of the cover. Close the cover and the assembly is ready (see Fig. 2). With the tin closed and lying on the round surface, two branches of rubber band are formed, the lower branch, that has the weight in the middle, forms a well open V (and the other remains horizontal).

Observations: It is important that the stick stay fixed to the tin (does not have to slide when it rolls) and that the suspended weight does not touch the tin when it is lying. If this happens, reduce the length of the rubber band (it is enough to give one or more knots towards the tips) or substitutes it for a smaller one, therefore the device will move only when the weight remains suspended.

Part B: Functioning

Place the lying tin in a horizontal oor. It is important that the table or the horizontal place be well polished and levelled to not help create undesirable accelerations. Mark the initial position. Give a moderate impulse to it, making it roll in front, without sliding.

Theoretical input

The total energy is always conserved. In this experiment the total energy is conserved; it changes itself into various types. It is an important physical law in physics.

When dissipative forces, such as frictional force, are not considered in the system, we have the conservation of a special type of energy, called mechanical energy; in case that these dissipative forces exist, this kind of energy do not conserve, being itself part of the total energy transformed; thermal energy, luminous energy, etc.

The total energy is composed of potential energies (elastic, gravitational) due to the rubber band strength or the body position, respectively, and kinetic energy, due to the body or system movement.

The system never creates energy, but transforms the available energy into other possible kind, some times this transformation being simple or other times being complex, but in the end, it will have exactly the same total value.

Interpretation of the results

- Give an impulse in the tin. It comes back to the same location where it left?
- Are there dissipative forces acting on the system? If they exist, what will be its role in the return of the tin?
- What is the importance of the test table or place to be levelled?
- Describe what happens with the rubber band and the electric cell after the impulse given to the tin.
- Why the tin stops for an instant and later it returns in opposed direction, not stopping at the starting point?

Reference

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Cost

This experiment may cost approximately 0.20 euros.

Team: Andres Ribeiro de Souza, Jonas Peter Pereira and Thieny de Cássio Helms

Analysis and discussion

The objective of the practical element in the course is to develop the practice of use of experimental experiences in the classroom, with the purpose of enabling the Brazilian High School students 'make' science instead of to be 'exposed' to it. For this to happen, it is fundamental that the compilation of the experiences is made by the High School students. In this way it will provide the complete familiarisation of the experimental apparatus and will provide a full domain of all its aspects causing a better agreement of the experimental experiences and also of the broad theoretical concepts.

The proposals expose the students to the experimental competency with the concept of hands-on science. The experiments are of low cost, they

have an experimental concept and are project driven technological experiments. Therefore we believe in the potential effectiveness of these experiences as instruments of learning in the conception of the philosophy hand-on science.

Conclusion

The course discipline FIS 461, Practical of Education IV, from teacher education undergraduate course in Physics of the Federal University of *Itajubá* (UNIFEI) presents forms of incorporating the energy concept in High School education. First of all it intends to give to the students a conceptual and practical vision on energy, stimulating the student to present issues related with the concepts as well to elaborate and to work on experiments involving the concepts of energy learning.

We believe that the contact of the student of the teacher education undergraduate course in Physics with this course provides a significant improvement in their academic formation. Therefore, in the lessons, besides others things, that is the produced materials, seminars and the scripts, we must have in mind the importance of clarity of the concept discussed, and also the clarity in the exposition of the concepts.

This improvement in the formation of the teacher education undergraduate course in Physics, must cause a better learning of the concepts of average education that the futures teachers will work ahead. It will cause an improvement in the quality of average education with reference to Physics.

We therefore believe reasonably on the potential effectiveness of these experiences as instruments of learning on the principles of hands-on science.

Acknowledgements

The author thanks Prof. Dr. Helena Libardi, of the University of Caxias of the South (UCS), for the motivation, contribution and revision of the text of this paper.

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Short Communication

Science Communication in Regional Media in the Changed Scenario

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During the former half of the century science communication was confined to text books and articles and write-ups that appeared in journals. But after India became a Republic, a sea change took place. In this direction, Akashvani allotted considerable slots for science talks and features. Not only that, the Government made use of satellites and started educational broadcasts for primary and high school students. This is still being continued. Children in six states including Andhra Pradesh were benefited, which is now covering the entire country.

But after the advent of T.V., the scenario radically changed. The government started UGC programmes for college students. As T.V. is a visual medium, it became extremely popular in no time. The quality of UGC programmes is so high that they have attracted 'even non students. Sponsored programmes like Turning Point' were extremely popular. Thus science communication become easier through the medium of T.V.

With the emergence of computer and internet, the earlier media lost their importance significantly, though they did not become obsolete. One may ask — when computers are only for the af uent classes, what effect they could bring on society in general. On the face of it, this observation appears rational. But if we go deep into realities, they present an optimistic picture.

It was just one person – Graham Bell, who invented telephone. But the fruits are enjoyed by one and all. As the present topic is confined to S&T communication and popularisation, it I shall tried to project computers in this context and also that now computers could bring revolution.

Now a days, in schools; especially in English medium schools, computers has entered the school curriculum. In many places even government school are following suit. The situation in cities is quite encouraging. But what about rural front? It is a fact that in majority of villages, many schools suffer with lack of even basic amenities. Then what about computers? The main problem in villages is something more than lack of computers. Computer operation is mainly through English. In villages, most of the schools teach in regional language. Thus for the students of these schools, computer learning is like learning Greek and Latin.

Now softwares for many Indian languages has been developed. As rural schools are mostly run by government, it should take steps to prepare educational programmes in regional languages. They can devise programmes based on information available on internet. They can take out printouts of useful information, get it translated, take number of copies and distribute among themselves. For this purpose, a computer could be installed at the community centre and a trained operator could be appointed. These programmes could supplement educational programmes transmitted on T.V. and radio.

Inspite of all this (which is not so practical in reality), it is the medium of press that plays the pivotal role. As newspapers reach every nook and corner of the region and are widely read, the dailies, especially in regional languages could play wonderful role. They should allocate more space for Science & Technology. In this connection, *Eenaadu* Telugu daily is playing a leading role. It is publishing a daily science column 'Jnana Netram'. Though the matter given is small; yet it is informative and readable. Other papers also should emulate this example.

A band of good science writers both established and novices are to be given a refresher course in writing science articles in revised format that suits the

present day requirements. Now a days, developments in science & technology are taking place so fast, that there is enough material for writing a number of good articles. The criterion is that they should be written in simple, readable, understandable and impressive manner. In this regard, the regional bodies like A.P. Akademi of Sciences and national bodies like Vigyan Prasar, can play a monumental role. They have to conduct workshops / seminars frequently at regional and national levels. New writers can be trained and experienced writers can be refreshed at these meetings, to produce such write-ups that suit modern requirements.

At national level writers of different languages can interact among themselves and appraise themselves with the modern trends that are taking place in other regional languages. Vigyan Prasar can coordinate these programmes. Regional bodies like A.P. Akademi of Sciences and national bodies like Vigyan Prasar can start journals or bulletins in which the deliberations of the workshops and seminars could be given besides thought provoking articles which can be adopted by regional language writers. At every workshop, feed-back of the earlier workshops, is to be taken by which a correct estimate of the outcome of the workshops could be worked out. ■

K R K Mohan: Versatile and Prolific

Obituary

Though he worked in postal service and retired as Head Postmaster, he began his science writing pursuits by being very much interested in Science, Astronomy in particular and thereby in exploring up of ancient Hindu scriptures, mythologies and epics with scientific reason and astronomical aspects. Some of the stories written by him are astonishing as he could guess in 1959 itself in his book that "man can land on moon", which came true after a few years. Hence his inferences of brain transplantation and survival of creatures on other planets, etc., may also come true in future. He always used to say that there is tremendous requirement for serious research on ancient Indian sciences such as done by great Late Kota Venkatachalam.

He was epitome of patience and understanding who would never see a wrong in anybody.

His writings exceed 5000. He contributed as a writer, artist, poet and as a columnist. He was recipient of many awards and honours for various writings at regional, national and international levels such as NCSTC award in 1994 for popularisation of science & technology through mass media, which he shared alongwith Dr. J. J. Rawal, who is an internationally famous Astronomer and then the Director, Nehru Planetarium, Bombay. He was awarded Doctorate by Indian Society for Alternative Medicine of Kolkata in 1996.

His recognition also includes Sahitya Sri Award by All India Literature Council, Bhopal. The list would go on for him, who remained creatively active till the very last.

K. Rama Devi

Impact Study of Contact Programmes for Talented School Children

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Introduction

Scientific literacy has become a necessity for everyone in a world filled with the products of scientific inquiry. Scientific information is needed by everyone in order to make choices that arise every day. Everyone wishes to be able to engage intelligently in public discourse and debate about important issues that involve science and technology.

In the work place too, scientific literacy is of increasing importance. More and more jobs demand advanced skills, requiring that people be able to learn, reason, think creatively, make decisions and solve problems. An understanding of science contributes in an essential way to these skills.

Imparting of science education in India should have grown with the phenomenal growth in the number of universities and colleges. However, this has not happened and there has been a consistent decline in the percentage of school students opting for science after passing their high school / higher secondary examinations. It has gone down from 32 per cent in 1950 to 15 percent now.* There has also been a marked change in the profile of students taking up science stream. Today, high school / higher secondary students opting for science are often those with relatively low scores unlike in the past. Even the majority of the meritorious 150 students selected for the mathematics, physics, chemistry and biology olympiads do not opt for careers in the sciences.

Science is an endless frontier, a unique human activity without limits. The declining popularity of science and the unwillingness among the youth to take up science as a career will jeopardise India's future. Human resource development in science and technology has become an area of concern for the Government of India today. The Government of India has, therefore, decided that during the Tenth Plan, massive support would be provided to basic research, especially in universities so that India can contribute significantly towards advancing that frontier. In this direction, efforts will be to undertake imaginative and innovative programmes to attract the students to science and technology and enhance the number of young scientists.

Contact Programme for Talented School Children

The objectives

Under the scheme, eminent scientists have been interacting with brilliant students with the objective of transmitting some of the excitement of pursuing a career in basic sciences – in terms of teaching and/or research. Even one meaningful interaction may motivate bright students to consider the option of pursuing careers in basic sciences, hence this scheme has been implemented across the country.

In brief the 'Contact Programme for Talented School Children' is planned and formulated by the National Council for Science and Technology Communication (NCSTC) to attract, encourage and create interest among bright students to select research and teaching as careers in science and technology. Under this, selected science stream students of class XI or equivalent can closely interact with an eminent scientist, generally a fellow of one or more science academies, in a national research laboratory or in the science department of a leading university. This opportunity is provided for about 7 days for a batch of 25-30 students drawn from within or adjacent districts.

The programme structure

A well publicised announcement is made inviting brilliant students to apply and/or principals of all senior secondary schools are contacted to nominate

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Based on project report – 'Impact study of contact programmes for talented school children' by Prof. Y. L. Nangia, Director, Manpower Management Centre, New Delhi.

*Source : Tenth Five-Year Plan, Volume II, PP 1084

the students. A committee selects the final participants. The students, besides sharing long hours exclusively with the Contact Scientist in informal and unstructured discussions also get an exposure to research methodology. They are encouraged to perform advanced science experiments, have close interaction with some other scientists and intensive interaction among themselves. The major means of interaction which are applied during the contact programme are as follows:

- Lecturers/demonstrations by one or two experts followed by discussions;
- Demonstration of scientific experiments by experts with involvement/participation of students;
- Discussion on critical career choices;
- Excitement and frustrations in research, prospects and other aspects of the life of Scientist in both formal and informal sessions on all days;
- Screening of films on developments in science and achievements of scientists;
- Exposure to functioning of analytical instruments, computers, sophisticated equipment, etc.;
- Creativity encouragement, improving communication skills by debate/public speaking/essay writing competitions on selected scientific topics;
- Library work and exposure to science literature;
- Visit to industrial/scientific institutions/biosphere reserves in and around the area;
- Extra curricular creative activities like games, skits, etc., to foster team spirit.

To conclude the programme, a valedictory function is organised, where the participants present their experiences which help them to develop and improve communication skills. Certificates of participation and token mementos are presented.

Organising the programme

Eminent scientists/teachers from a national laboratory/university science department willingly agree to commit their time and efforts for this objective and to serve as a model 'Contact Scientist'. He/she in consultation with other colleagues/faculty members of other units/departments draws up a detailed programme and applies for support to NCSTC. Infrastructure arrangements for modest but comfortable stay of the participating students and guests, their easy movement to selected laboratories, space for activities, etc., are tied up, well in advance. The programmes are fully residential allowing post dinner discussion, pre dawn nature walks, group activities by students, etc.

The programme is vetted by the NCSTC and wherever necessary it provides technical inputs. It also provides support in the form of travel for the participants and the invited experts, reasonable boarding and lodging, a token amount of honorarium to the experts, contingencies and consumables, etc.

Selection of participants

Participants are selected on the basis of Class 'X' Board result. Principals of both government and private schools in the district are requested to send names of first three toppers in the Board examination who have selected science stream in Class 'XI'. During the finalisation of this list care in taken to give equal representation to students from rural and urban areas and as far as possible equal number of girls are also included in the programme.

Objectives of Impact Study

The proposed study was required to make an assessment of the benefits derived out of 50 Contact Programmes for Talented School Children so far conducted in 15 states and to look into the deficiencies, etc., in order to bring in improvement, if any, needed. In addition to this there were many other important factors to be researched into, as brie y stated hereunder:

Concerning participants

- What is the present status of the participants, i.e., he/she is pursuing further a course in basic sciences or has dropped out of it;
- Whether the programme was able to inculcate positive thinking, curiosity, creativity in the participants towards continuing with science courses for building up their career in teaching and/or research;
- Whether the programme fulfilled the objective of exposing participants to research methodology, advanced science experiments, functioning of analytical instruments, computers and sophisticated equipments, etc.;
- What impact the interaction with the scientists/teachers had on participant's communication skills;
- Whether the participants were fully satisfied with the contents, methodology and vis-à-vis the boarding,

lodging and other infrastructural facilities and/or whether they wish to give any suggestions in this regard;

- Whether the participants had any difficulty in preparing their reports at the end of the programme;
- To obtain free and frank opinion from participants on any other aspect of the programme, not covered through the above mentioned objectives.

Concerning scientists/teachers

- To find out from scientists/teachers as to whether their programme really helped in encouraging scientific temper and research aptitude in students as well as created excitement and stimulated them towards a science and technology career;
- To find out from scientists/teachers who organised and conducted these programmes to know whether they have been in touch with students who participated and as to how many of them, to their best of knowledge, are continuing their studies in science courses or dropped out;
- Whether they have any information about any significant achievement of any of their participants relating to science and technology;
- To know whether these scientists/teachers faced any difficulty (ies) in organising and conducting these programmes;
- Finally, to have a view from scientists/teachers, based on their practical experience of organising and conducting the programmes, as to whether NCSTC's scheme of 'Contact Programme for Talented School Children' needs changes/modifications.

Methodology

Strategy for data collection

In all 1129 participants and 37 scientists/teachers took part in 50 Contact Programmes organised in 15 States. For collecting data from participants and contact scientists/teachers the following strategy was adopted :

Collection of names and addresses : Names & addresses of participants and contact scientists/teachers were collected from the records as given by them to NCSTC at the time of submission/approval of Contact Programme proposal.

The questionnaires : Two separate questionnaires were structured based on the objectives of the study for obtaining response from participants and contact scientists/teachers. These questionnaires were meant to seek information about personal data covering education, family background, feedback on contact programmes and an overview from participants and scientists/teachers. These questionnaires were pre-tested by getting these filled up from a few local students and scientists. The comments and suggestions of a few experts and NCSTC were also invited and incorporated in the questionnaires (Annexure I & II). The two questionnaires along with self addressed and stamped envelopes were then mailed to addresses of participants and contact scientists/teachers for completion and return.

Responses to questionnaires : Out of 1129 questionnaires mailed to participants, response from 482 (43 per cent) was received. The second questionnaire was sent to 37 Contact Scientists / Teachers, out of which 26 (70 per cent) responded.

Data storage and analysis : A software was designed and developed for entering the data received through the questionnaires. Comments and suggestions received through replies to the open ended questions were stored on the MS Word. Data was analysed and then compiled in the form of Tables and Graphs on the computer so as to derive inferences for report writing.

Impact Analysis

State-wise response distribution of participants

The questionnaire was mailed to 1129 participants of the "Contact Programme for Talented School Children" organised and conducted in 15 states. Only 482 (43 per cent) of them returned the questionnaires duly completed as shown in the Table 1.

Programme's impact on participants

As may be seen from Table 2, 472 (98 per cent) respondents have stated that the programme was very effective in maintaining their interest in science subjects. It has thus created a positive impact on them. Only 10 (2 per cent) indicate that they were not in uenced much by the Contact Programme (also see Fig.1).

Rationality of impact

The rationality of impact is revealed from the fact that Contact Programme did bring in positive change in the thinking of participants as majority of them have continued with their studies in science subjects

Table 1 : State-wise response distribution of participants

S.No.	State	Participated	Responded
1.	Andhra Pradesh	23	11
2.	Assam*	187	69
3.	Bihar	35	15
4.	Chattisgarh	48	21
5.	Karnataka	162	102
6.	Kerala	25	10
7.	Madhya Pradesh	62	5
8.	Orissa**	**	**
9.	Punjab	41	22
10.	Rajasthan	30	12
11.	Sikkim	13	10
12.	Tamil Nadu	206	111
13.	Uttaranchal	172	62
14.	Uttar Pradesh	27	8
15.	West Bengal	98	24
	Total	**1129**	**482**

* Including Manipur & Meghalaya
** Information / Data Not Available

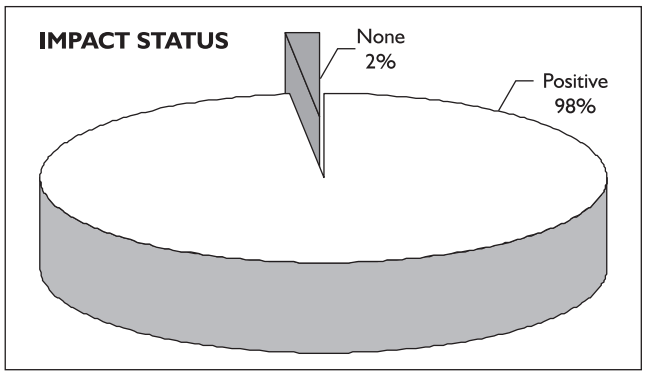


Figure 1

Table 2 : Impact status

S.No.	Impact	No. of participants	%age
1.	Positive	472	98
2.	None	10*	2
	Total	**482**	**100**

* Inclusive of 2 dropouts

(see Table 3). However, 8 (exclusive of 2 drop-outs) participants changed their studies from Science to Arts and Commerce.

Future career plans

The future plans in terms of career, as stated by the participants, are as indicated in the Table 4 ahead (also see Fig. 2).

Based on the figures, as in the above Table about career plan, as indicated by the Participants, the Contract Programme has successfully served its purpose to a large extent in encouraging and creating interest in students to plan their careers in science and technology.

Programme exposure

The Participants were asked whether in their view the Contact Programme was successful in exposing them to research methodology and other related aspects. The position stated by them in this respect is compiled in Table 5.

Impact on communication skills

The impact on participants as regard to improvement of their communication skills as a result of their interaction

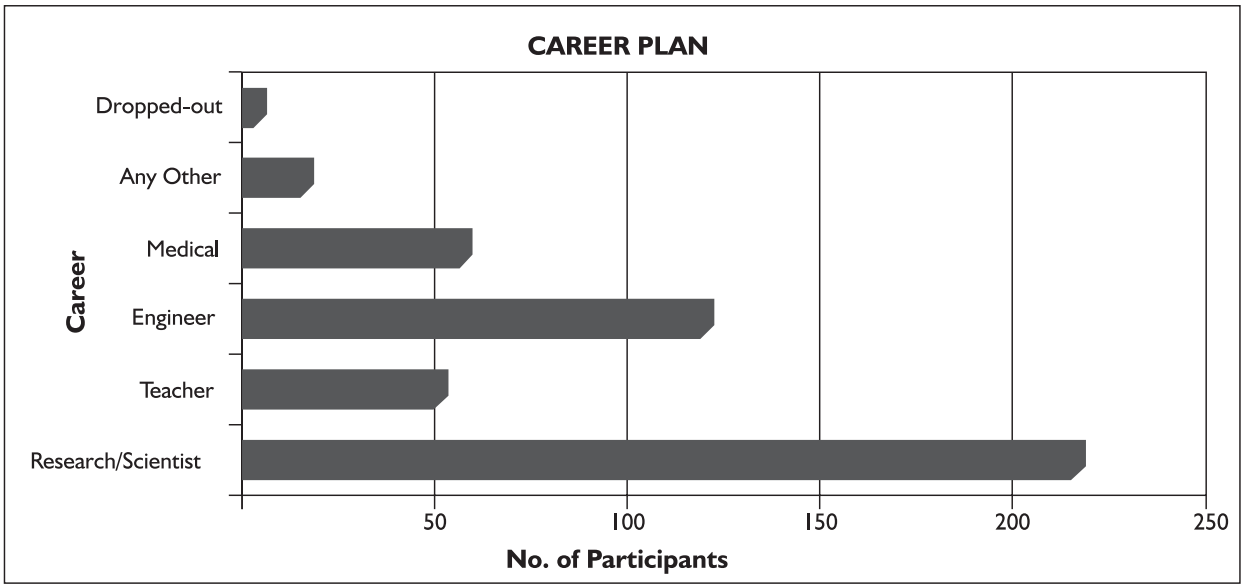


Figure 2

Table 3: Changed study status*

S.No.	State	No. of Participants	Subject
1.	Assam	2	1 B.A. + 1 B. Com
2.	Punjab	1	B.A.
3.	Karnataka	1	B.Com
4.	Tamil Nadu	1	B.A.
5.	Uttaranchal	2	B.A.
6.	West Bengal	1	B.A.
	Total	**8**	**6 B.A. + 2 B.Com**

*Inclusive of 2 dropouts

Table 4: Career plan

S.No.	Career Plan	No. of Participants
1.	Research/Scientist	227
2.	Teacher	52
3.	Engineer	125
4.	Medical	63
5.	Other: IAS, Defence Services, Management etc.	13
6.	Dropped-out	2
	Total	**482**

Table 5: Programme exposure

Exposure	Yes	No	Total
Research methodology	419	63	482
Advance science experiments	426	56	482
Functioning of analytical instruments	372	110	482
Computers	312	170	482
Sophisticated equipments	354	128	482

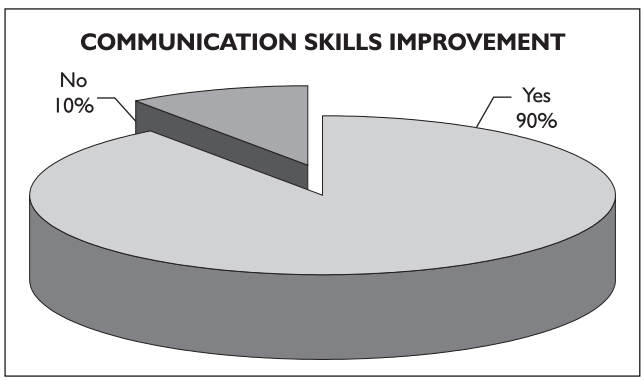


Figure 3

with the scientists/teachers of the programme, is shown in the Table 6 and Fig. 3.

The 47 participants who have stated that interaction did not bring in any improvement in their communication skills, belong to schools in rural areas of Assam, Tamil Nadu, Uttaranchal and West Bengal, where the medium of instruction is their regional language such as Assamese, Tamil, Hindi and Bengali.

Table 6: Communication skills improvement

S.No.	Improvement	No. of participants	%age
1.	Yes	435	90
2.	No	47	10
	Total	**482**	**100**

The summary of answers given by the participants as to how the improvement in communication skills has helped them in their current studies or in any sphere, is as follows:

- It has removed shyness.
- It has created confidence.
- It has helped in clearing the concepts.
- No hesitation now – can interact easily.
- Motivated to speak/discuss more openly.
- It widened view and thought.
- Helped to qualify competition tests.
- It created inspiration.
- Sharpened vision and attitude.
- Removed inferiority complex.
- Evoked enthusiasm, brought change in behaviour.
- Encouraged participation in group discussions and seminars.

Based on these replies, the rating on advantages of improvement in communication skills due to interaction with scientists/teachers of the Contact Programme has been assessed as shown in Table 7.

Table 7: Communication skills rating

S.No.	Rating	No. of Participants	%age
1.	Excellent	75	16
2.	Very Good	107	22
3.	Good	165	34
4.	Fair	88	18
5.	None	47*	10
		482	**100**

*These 47 students belong to rural areas where the medium of instruction in their school has been their regional language.

Programme design and execution

To know about the satisfaction of participants, they were asked to give their response relating to designing of syllabus, i.e., contents and its execution such as teaching methodology and stay arrangements, etc. Their response is shown in the Table 8.

Table 8 : Satisfaction from design and execution

Aspects	Satisfied	Needs improvement	Total
Contents	426	56	482
Methodology	422	60	482
Boarding	414	68	482
Lodging	419	63	482
Infrastructural facilities	424	58	482
Any other (Misc.)	356	126	482

The important comments given by the participants with regard to their dissatisfaction and asking for improvement on the above aspects are summarised belows :

- Course contents were complicated and contained high level concepts.
- Course contents had more emphasis on a particular subject, say biology or mathematics, related to the specialisation of the scientists teachers / professor.
- There is a need to expose students to all subjects of science, i.e., physics, chemistry, mathematics, electronics, medicine, computer, biology, zoology, astrophysics, nuclear physics, etc., and hence course contents be formulated giving weightage to all the subjects.
- Besides giving theoretical knowledge of science subjects, students should be allowed to experiment under the guidance of scientists / teachers.
- Not much time was available for interaction with each scientist / teacher / professor, as the daily schedule was very heavy / hectic.
- Medium of instruction was a problem for students belonging to rural areas.
- Analytical instruments and sophisticated equipments were just shown. It would be good to explain and give their demonstration.
- Access to libraries, computer labs was not allowed.
- Boarding & lodging arrangements should be good and very near to the campus / training center.
- Transport facility was very poor.
- Cultural activities were missing.

Preparation of report

Each participant is required to prepare a Report at the end of the programme. However, only 323 (67 per cent) participants prepared the Report, whereas 159 (33 per cent) did not do so. This shows that nearly one-third of the participants managed to shirk away from this important feedback activity of the programme. The data on this is shown in the following Table 9 and Figure 4.

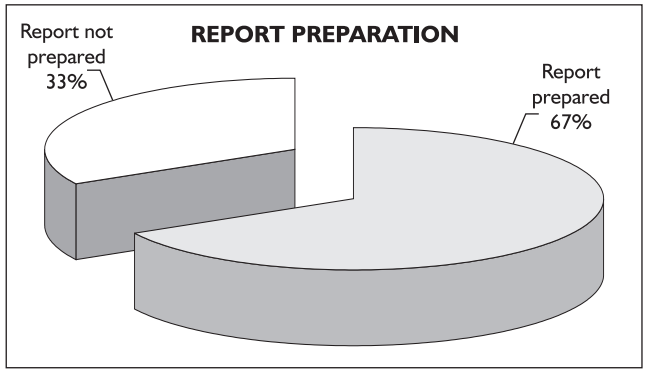


Figure 4

Table 9 : Communication skills rating

S.No.	Status	No. of Participants	%age
1.	Yes	323	67
2.	No	159	33
	Total	**482**	**100**

Difficulties in report preparation

The summary of difficulties faced by participants in preparation of their report is as under :

- Due to poor knowledge of English, especially by those who belonged to rural areas of Assam, Tamil Nadu, Uttaranchal and West Bengal, etc.
- Lack of a structured format for report. Were not aware of what is explicitly needed in a report.
- Faced difficulties in understanding and recalling scientific terms for report writing.
- Could not digest what all was taught and hence faced difficulties in report writing.
- Found it difficult to remember the names of analytical instruments and sophisticated equipments as no notes or literature were provided about these.

- The contents and data taught by the scientists/teachers was beyond the level of class XIth students, especially when a mathematics student is asked to prepare a report on subject of biology and that too without the help of library books.

Programme duration

Out of 482 participants only 248 (52 per cent) have said that the duration of 5-7 days is adequate for the programme, as is shown in the following Table 10 and Figure 5.

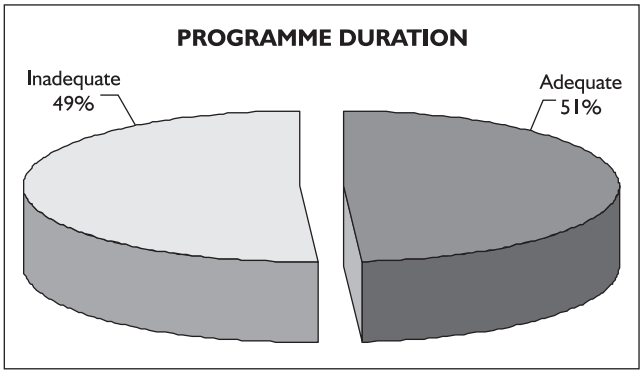


Figure 5

Table 10: Programme duration

S.No.	Duration	No. of Participants	%age
1.	Adequate	248	52
2.	Inadequate	234	48
	Total	**482**	**100**

Those who have termed the duration as inadequate have stated that the planned schedule of contents is very heavy and therefore the students are kept occupied for almost 10 hours daily. Students do not get much time for interaction amongst themselves and with the scientists/teachers. Experiments, practical, demonstration of analytical instruments and sophisticated equipments, computer labs and library reading are either given very little time or totally avoided. They have desired that the programme duration should at least be of 10-15 days.

Adequacy of participation

Whether the number of students who participated in the programme were adequate or inadequate, the position has emerged as in the following Table 11 (also Fig. 6).

A large number of participants, i.e., 408 (85 per cent) have stated that the present status of participation of 25-30 students in a group is adequate. Only 74 (15 per cent) desire that groups should be much larger (35 to 40) for better interaction amongst themselves and that this will also help more students to avail the benefits of this programme.

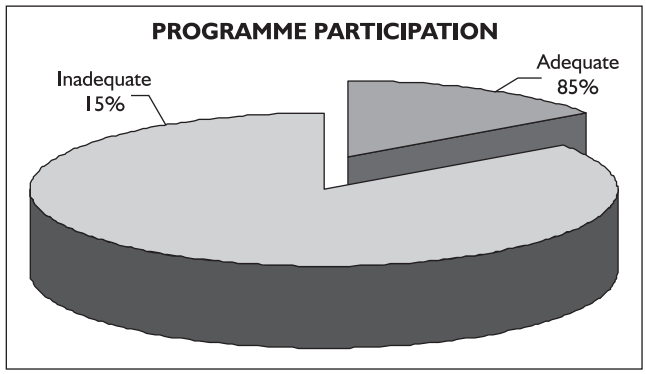


Figure 6

Table 11: Programme Participation

S.No.	Participation	No. of Participants	%age
1.	Adequate	408	85
2.	Inadequate	74	15
	Total	**482**	**100**

An overview by participants

Contact Programme for Talented School Children has been appreciated by almost all the participants. The overview comments on the scheme and suggestions from them are summarised below:

1. Such programmes should be organised and conducted throughout the country so that more and more students are benefited by it.
2. Programme has its motivational effect; it encourages and creates interest in students to select research and teaching as career in science and technology. These programmes should continue.
3. Interaction with eminent scientists creates confidence, communication skills, knowledge and awareness as to what is happening in the field of science, analytical instruments, sophisticated equipment, etc.
4. The programme triggers thinking for a career in science. It is an exceptional and beneficial programme.
5. A 5 day programme held once for class XIth may not be sufficient to change one's attitude and interest. There is a need to have another programme for the same students during class XIIth.

6. The programme is very crucial and beneficial to students of rural areas as they get exposure to wider aspects of science and technology, which they may not otherwise get in their schools.
7. Such programmes should also be held for IXth & Xth class students so that they can be moulded at this stage to enter into science stream.
8. The programme with current contents is suitable only for Class XIIth students, as they are in a better position to understand and comprehend.
9. The Programme took us out from the bookish studies and gave us practical and experimental knowledge.
10. The programme should be organised during summer and winter vacations to avoid disturbance in regular studies.
11. To maintain the interest of students in science and technology, it would be better if such programmes are also conducted at under graduate level.
12. There is a need to explain complete usage of analytical instruments and equipments and get some experiments done by participants.
13. The duration of the programme should be increased so as to reduce the daily load of studies.
14. Showing/visiting research centres, institutions and laboratories is not enough. The work done in these organisations should be explained. Interaction with the heads of these organisations may be scheduled during the visit.
15. It would be better if students are asked to do small science research projects singly or in groups during the programme for a day or two soon after the lectures on research methodology are over.
16. More practical classes be added in the course content without which value of theoretical knowledge diminishes.
17. While preparing the groups for a programme a proper ratio be maintained, i.e., students from all the science subjects be included in it. Say, if there are more students of biology and less of other science subjects, the participation will not be conducive.
18. Computer theory lectures will serve the purpose only if students are explained and allowed to operate computers. Facility of computer practical be added up.
19. Lectures on recent developments in space, defence equipments, biotech, atomic energy and so on be added up.
20. The medium of instruction in some schools being regional language, a local teacher be asked to explain difficult terms used by scientists/professors in their lectures.
21. Each student be asked to prepare a short report of the study done at the end of day.
22. Entertainment and cultural activities be added up in the programme.
23. Notes on latest developments in science be given to each participant.

Scientists' feedback

State-wise response distribution

Contact Scientists/Teachers, in all 37, who organised and conducted contact programmes in 15 states were also asked to fill up a questionnaire. Twenty six (70 per cent) of them returned the questionnaire duly completed. Their distribution is indicated in the Table 12.

Table 12: State-wise response distribution of contact scientists/teachers

S.No.	Name of State	Male	Female	Total
1.	Andhra Pradesh	1	0	1
2.	Assam	2	0	2
3.	Bihar	0	1	1
4.	Chattisgarh	2	0	2
5.	Karnataka	2	1	3
6.	Kerala	1	0	1
7.	Punjab	2	1	3
8.	Rajasthan	2	0	2
9.	Sikkim	1	0	1
10.	Uttaranchal	3	0	3
11.	Uttar Pradesh	4	0	4
12.	West Bengal	2	1	3
	Total	**22**	**4**	**26**

The feedback

The feedback given by 26 scientists/teachers on the programme and participants is summarised belows:

(i) All the 26 (100 per cent) scientists/teachers have stated that the programme has really helped in encouraging students' scientific temper and research aptitude as well as created excitement and stimulated

students towards a science and technology based career. In their view, it is a very well planned programme and all the participants were benefited in terms of exposure both theoretically and practically to science and technology.

(ii) With regard to deficiency, if any, observed by them in the programme they termed it as a very good programme but in order to avoid drop-out of students from science courses in future, their general comments/suggestions are:

(a) Selection of students be based on excitement and aptitude for science and not on marks secured at board examination.

(b) It is the societal pressure and the perception that only a professional degree leads to a better job/career and hence takes them away from science.

(c) Scientists have heavy engagements and therefore they are not in a position to give much time in formulation of the programme. To avoid deficiencies in the programme, NCSTC should specifically ask the coordinators to plan the schedule of lectures, etc., most appropriately.

(iii) 17 scientists out of 26 have remained in touch with participants after the programme.

(iv) On the question of participants making any significant achievement(s) relating to science and technology after completion of programme; scientists have stated that the only achievement in their view has been that participants are continuing with their science studies and therefore the programme has served its basic purpose.

(v) The difficulties faced by scientists/teachers in organising and conducting contact programmes are brie y as under:

(a) Some of the school authorities did not respond to request of sending students for the programme.

(b) It would enhance impact if eminent scientists, more in number participated in this programme.

(c) Science students are generally found too busy in attending tuitions/coaching and therefore avoid joining this useful programme.

(Contd. on page 33)

SCIENTOON

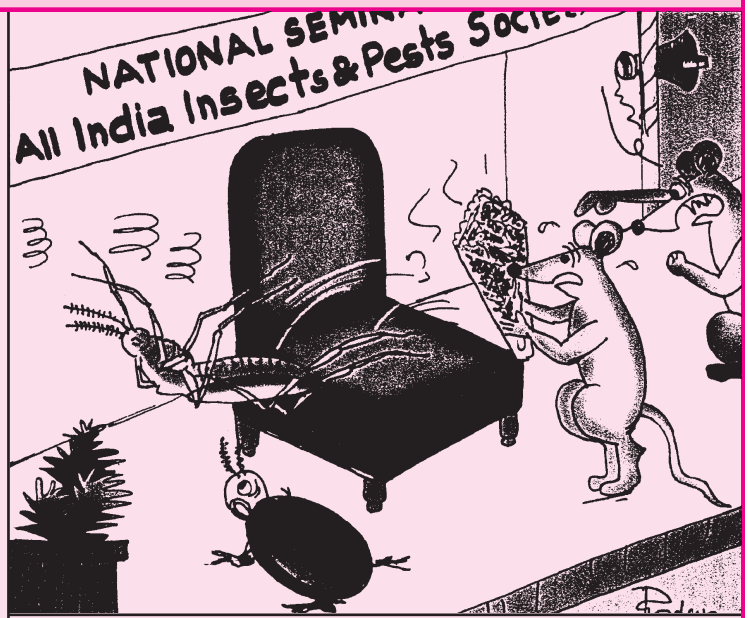
PYRETHRUM

HOUSE HOLD INSECTICIDE

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

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

Cost of extracted pyrethrum owers 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 owers on pilot plant scale at 40 Kg per batch.



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

अनुवाद सहायता सॉफ्टवेयर

सूचना प्रौद्योगिकी के क्षेत्र में तेजी से परिवर्तन हो रहे हैं। कम्प्यूटरीकरण के इस दौर में भाषा भी पीछे नहीं रह सकती। हिन्दी भाषा ने भी कम्प्यूटरीकरण के क्षेत्र में अपना स्थान प्राप्त करना शुरू कर दिया है। आज हिन्दी में कार्य करने के लिए अनेक सॉफ्टवेयर बाजार में उपलब्ध है। मशीनी अनुवाद क्षेत्र में अनेक शास्त्रज्ञ तथा भाषा विद्वान अनेक सालों से अनुसंधान कर रहे थे। अब भारतीय कम्प्यूटर सॉफ्टवेयर विज्ञों ने अंग्रेजी से हिन्दी अनुवाद करने वाला तंत्र ढूंढ़ निकाला है।

राजभाषा नियमानुसार हर सरकारी कार्यालय को धारा 3(3) के अंतर्गत जारी कागजात जैसे संकल्प, साधारण आदेश, अधिसूचनाएं, प्रेस विज्ञप्ति, निविदा प्रारूप आदि द्विभाषी तौर पर जारी करना अनिवार्य है। संसदीय राजभाषा निरीक्षण समिति द्वारा इन कागजातों का कड़ाई से निरीक्षण किया जाता है। लेकिन आमतौर पर हर कार्यालय से ऐसे सभी कागजात सिर्फ अंग्रेजी में जारी किए जाते है। अंग्रेजी में जारी आदेश पर लिखा होता है- Hindi version will follow! दुर्भाग्य है कि ऐसे आदेश बहुत कम हिन्दी में जारी किए जाते है। हर कार्यालय की अपनी मजबूरी रहती है जैसे हिन्दी अधिकारी या हिन्दी अनुवादक पदों का न रहना, सरकारी कामकाज में हिन्दी का अपर्याप्त ज्ञान, हिन्दी टाइपिंग का अभाव, आदि।

सी डैक नोएडा के नैचुरल लैंग्वज प्रोसेसिंग विभाग ने अनुवाद सहायता तंत्र (ट्रांसलेशन सपोर्ट सिस्टम) का सफल विकास किया है। ज्ञान भण्डार अंग्रेजी भाषा में कैदा रहेगा तो आम हिन्दी जानने वाला आदमी प्रतियोगिता में पिछड़ जाएगा। हिन्दी अनुवाद की जटिल कार्यप्रणाली और टंकलेखन से अब आपको राहत मिल सकती है। समय मूल्यवान है। कम समय में महत्वपूर्ण सूचनाएं अनुवाद करने के बाद भेजना भी जरूरी रहता है।

सरकारी कार्यालयों में राजभाषा हिन्दी का पत्राचार बढ़ाना जरूरी है इसलिए समय बचाने के लिए मशीनी अनुवाद सुविधा का लाभ उठाना चाहिए।

इसी उद्देश्य से सी-डैक नोएडा ने टी.एस.एस (Translation Support) System) सॉफ्टवेयर विकसित किया है। इसके लिए कम्प्यूटर मशीन की आवश्यकताएं इस प्रकार हैं- विण्डो एक्स पी या विण्डो 2000 जी यू आई सहायता, कम से कम 64 एम बी रैम, 60 एम बी की जगह तथा पेंटियम आधारित प्रोसेसर।

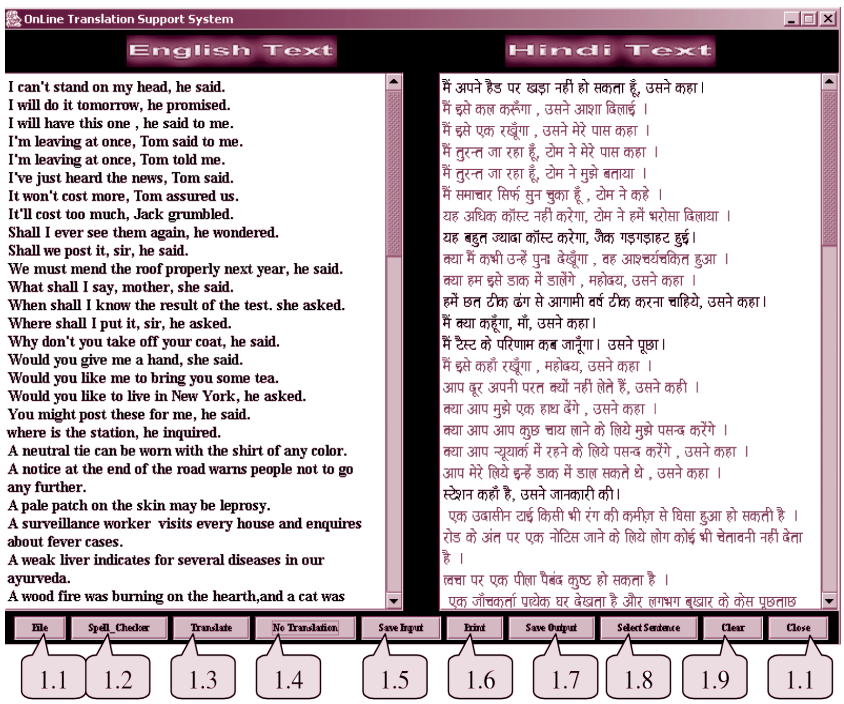
अनुवाद सहायी प्रणाली और विशेषताएं

टी.एस.एस. मेनू के ट्रांसलेशन पर क्लिक करने पर आप दो विण्डो पैनल देख पाएंगे इसमें प्रयोक्ता के सामने अंग्रेजी और हिन्दी के लिए दो अलग पैनल दिखाई देंगे। बाईं ओर अंग्रेजी पैनल में फाईल, स्पेल चेक, ट्रांसलेट तथा नौ ट्रांसलेशन बटन होंगे। आप अंग्रेजी पाठ टाईप कर सकते है या आपके किसी फोल्डर से चुनकर रख सकते हैं। इस अंग्रेजी पाठ को आप दाईं ओर के पैनल में हिन्दी में अनुवाद के रूप में प्राप्त कर सकते है। हिन्दी अनुवाद आप किसी भी फाईल में सेव आऊट पुट बटन के द्वारा संग्रहित कर पाएंगे।

हिन्दी में अनुदित पाठ में कुछ नीले रंग का पाठ यह दर्शाता है कि इस पाठ में अनुवाद के कई विकल्प उपलब्ध है। इसमें सही अनुवाद को चुनना हैं। इसमें 9 बटन उपलब्ध हैं। कुछ का वर्णन नीचे दिया गया है।

1. **फाईल :** इस बटन की सहायता से आपके कम्प्यूटर स्थित किसी फाईल को अनुवाद हेतु लिया जा सकता है।
2. **वर्तनी जांचक (Spell Checker):** बाईं ओर के विंडो पैनल में अंग्रेजी पाठ की वर्तनी जांच की जा सकती है। अगर कोई शब्द उलब्ध नहीं हो रहा है तो यह विशेषता संबंधित शब्द की प्रविष्टि कर सकती है। सजेस्ट, चेंज तथा इग्नोर बटन द्वारा क्रमश: अनेक सुझाव, परिवर्तन तथा यथास्थिति बनाए रखने का विकल्प उपलब्ध है।
3. **अनुवाद :** इस बटन पर क्लिक करते ही दाईं ओर के विंडो पैनल में हिन्दी अनुवाद मिलना शुरू हो जाएगा। अनुवाद कार्य सम्पन्न होते समय पर्दे पर प्रोग्रेस बार दिखाई देगा।
4. **नो ट्रांसलेशन :** अगर आप किसी अंग्रेजी पाठ का अनुवाद नहीं करना चाहते हों तो इस बटन द्वारा संबंधित पाठ को प्रकाशित (हाइलाइट) करके यथास्थिति अंग्रेजी रख सकते हैं।
5. **सेव इन पुट :** इस बटन द्वारा अंग्रेजी पाठ को वांछित स्थान पर सेव एज के तहत पर रख सकते हैं।
6. **सेव आऊट पुट :** इस बटन की सहायता से हिन्दी में प्राप्त अनुवाद को आप किसी वांछित फाईल में किसी भी जगह सेव एज करके रख सकते हैं।
7. **सिलेक्ट सेन्टेंस :** बहु विकल्प सुविधा के द्वारा आप किसी उचित वाक्य को चुन सकते है। इस बटन पर क्लिक करने पर एक विंडो में अनेक वाक्यों में विकल्प आपको प्राप्त हो जाएंगे। इसमें उचित वाक्य को हाइलाइट करके एडिटर में स्थानांतरित कर सकते है। इस मेनू में अन्य छ: बटन उलब्ध है। जिसमें नेक्स्ट बटन, प्रीवियस बटन, वर्ड बटन, एक्सेप्ट बटन, एक्सेप्ट सेंन्टेस तथा क्विट बटन उपलब्ध हैं।

चित्र 1 : अनुवाद सहायता सॉफ्टवेयर का मुख्य पटल



चित्र 2 : ट्रांसलेशन सपोर्ट सिस्टम सॉफ्टवेयर का विंडो पैनल

हिन्दी एडिटर के द्वारा स्वीकृत वाक्य की रचना को कुछ जगह पर ठीक संपादित किया जा सकता है। इस एडिटर में सुशा फांट में टाईप किया जा सकता है। स्क्रीन पर सुशा की-बोर्ड ले-आऊट मार्गदर्शक चित्र पटल ऑनलाईन उपलब्ध है। इस सॉफ्टवेयर में उपलब्ध शब्दकोश में प्रयोगत: अपनी ओर से कुछ विशेष शब्द उपयोगकर्ता दर्ज कर सकता है। मशीन आधारित अनुवाद की इस सुविधा से राजभाषा वार्षिक कार्यक्रम के लक्ष्य के अनुसार हिन्दी पत्राचार बढ़ाया जा सकता है।

अधिक जानकारी के लिए– नैचुरल लैंग्वेज प्रोसेसिंग डिवीजन, सी-डैक नोएडा, सी-56/1, सेक्टर-62, नोएडा-201307 पर सम्पर्क कर सकते हैं। ई-मेल पता vnshukla@cadacnoida.com

विजय प्रभाकर कांबले
सहायक निदेशक (राजभाषा)
महाप्रबंधक दूरसंचार का कार्यालय
अहमदनगर-414001 (महाराष्ट्र)

(Contd. from page 30)

(vi) Except two scientists, the remaining 24 have indicated their willingness to continue with this activity. The unwillingness of two scientists from Jorhat and Chandigarh is due to the reasons that:

(a) the Regional Research Laboratory at Jorhat does not have resource for such a programme;

(b) there are no funds for such activities with Chandigarh administration.

(vii) 21 scientists/teachers have considered the duration of 7 days as sufficient for the programme, whereas 5 of them have recommended a duration of 10 to 15 days. In their view, the schedule of programme management becomes too hectic and giving sufficient time to participants for interaction and practical knowledge becomes difficult. As regards number of participants, their view is that a group of 25-30 students is quite manageable but in any case it should not be increased beyond 40.

(viii) Suggestions given by a few scientists/teachers with regard to changes/modifications required in the programme are brie y stated below:

(a) Budget for the programme may be increased.

(b) NCSTC should send one or two scientists for special/popular lectures on science.

(c) One day orientation programme for parents of participants on the last day might help in clearing misconceptions.

(d) Some practical activities are required and workshops also needed.

(e) Transport arrangements for participants be provided from camp to the training centre and back.

(ix) NCSTC should maintain a total database of participants.

Findings and recommendations

Findings of the study based on the data analysis have been assessed and discussed in earlier chapters and accordingly related suggestions and recommendations have been made there itself. The study reveals that NCSTC's 'Contact Programme for Talented School Children' has been very much appreciated and found beneficial both by students and contact scientists/teachers. To a great extent, it has served and will surely continue to serve its purpose of attracting, encouraging and creating interest among bright students to select research and teaching as careers in science and technology. Nonetheless, to strengthen the programme further, the recommendations are made in the following paras.

Recommendations

1. The programme should be widely publicised well in advance through national and local newspapers, magazines, radio and T.V. channels and by sending communications to school principals so that students in far ung areas can avail this opportunity. In fact, the school principals can be requested to make it a regular practice to recommend the names of the bright science students of Class XIth every year to NCSTC, who in turn can coordinate and finalise a programme with the scientists/teachers.
2. NCSTC can form a permanent pool of willing scientists/teachers on all India basis by maintaining their database. There is a need to have more than one scientist/teacher for each programme with different specialisation in science subjects. This pool can serve a very useful purpose.
3. The scientists/teachers and NCSTC should remain in contact with participants to keep intact their interest in science and technology and to see whether they have taken up a career in S&T or not.
4. The best graded 2 or 3 participants of each programme be called from all states collectively in a national level programme at Delhi or any other location by NCSTC so that they have a better interaction and exchange of views on science subjects with policy makers.
5. Once in two years, all the organisations/schools, etc., conducting this programme should meet and discuss the problems and suggestions and formulate a Programme Module.
6. A committee of minimum 3 persons, consisting of one representative each from NCSTC, contact scientist/teachers pool and the organisation coordinating should be given the responsibility of preparing the course content suitable for science students of class XIth.
7. NCSTC may consider awarding scholarships to the participants who may attain first 10 ranks in the class XIIth board examination and show a proof

of registration for admission to a science course at under graduate level in a recognised college/ university. The scholarship amount can be released in three equal installments in each year for the degree course after a certificate of good standing is produced by the student from the college principal or university registrar.

8. Coordinators should, while planning the schedule of lectures, etc., include time for group activities from day one to encourage interaction.

Epilogue

1. Students must actively participate in scientific investigations and they must actually use the cognitive and manipulative skills associated with the formulation of scientific explanations in order to develop the abilities that characterise science as inquiry.

2. As individuals and as a society, we all have a stake in scientific literacy. An understanding of science makes it possible for everyone to share in the richness and excitement of comprehending the natural world. Scientific literacy enables people to use scientific principles and processes in making personal decisions and to participate in discussions of scientific issues that affect society. A sound grounding in science strengthens many of the skills that people use everyday, like solving problems creatively, thinking critically, working cooperatively in teams, using technology effectively and valuing life long learning. We may always remember that economic productivity of our society is tightly linked to the scientific and technological skills of our manpower.

3. Finally, the responsibility for improving scientific literacy extends beyond those in classrooms to the entire educational system. Scientists, science teachers, educators, state departments of education, local school managements, business and industry, governmental and non governmental agencies, school administrators, parent and students; all have a role to play. ■

Science Reporting Basics

As a scientist doing general audience science writing, you have the chance to explain the science behind a hot topic—or an obscure but important topic. Or perhaps you've found an interesting character in the world of science that you want to highlight. Either way, what you are really doing is telling the reader about the world around them using a scientific lens. The point is to relate the science and its practitioners to the greater world by perhaps tying the work to the environment, health, money, or politics. And it's your job to make a clear, accurate and compelling story for a reader who may not be familiar with science.

This writeup is a scanty, bare-bones guide on how to report, interview scientists and write about what you found out.

Reporting

The sooner you start, the better. For a magazine feature, give yourself at least a month to report and write. Even if you have a free moment to report, your sources may be really busy with teaching, speaking at conferences internationally, or trying to find funding. Start with background reading, and then move onto to talking with the scientists involved.

If you already know people who are researching a certain topic you're interested in, like breast cancer markers, look for articles about the topic or the scientist in the mainstream press (magazines, newspapers). This will explain the research in plain English. Next, search Lexis-Nexis, the Cal library website databases to read pertinent scientific papers by your specific author. That way, you won't go in cold. While you're reading about their work, write down questions you have, and keep them in mind for when you interview people.

Finding the researchers

If you've got scientific papers and are looking to talk to the authors, contact info is generally listed along with their academic or corporate affiliations (you'll want to talk with the first and last authors, most likely). For university researchers, you can often find their phone number and / or email address on the web using peoplefinder. For private companies, try asking for a public relations person, or public information officer.

In both cases, call and identify both yourself and the publication you are writing for (you can say freelance if you do not have an official news organisation). You can choose to explain it's a campus publication if that will help you get information out of them. Sometimes the best thing to do is tactfully ask to make an appointment to see them in person, so you can have a whiteboard handy for schematic drawings or equations.

Always try to get an identity on who you're talking to—that way if the person is not there, when you call back, you at least have a name to use.

Interviewing scientists

The best thing to do is go to the lab in person, if you have the luxury. You will get the best information, meet the most people. Dress nice to show respect to them, and to show you're serious. Also, take good notes. Most reporters use long thin notepads, befittingly called reporters notepads. With a fast talker, you're going to need a mini-tape recorder. However, transcribing will take two to three times the length of your interview. But sometimes it's worth it: a misquote can get you sued or piss off a source. To make a source more comfortable with a tape recorder, you might explain that your purpose is to be able to get the quotes right, to listen to the interview later again for clarity. That said, be prepared to call this person back later while writing the piece to check a quote, ask more questions. You're not being a nuisance, you're doing your job, which is getting it right.

While reporting, try to be present for a physical act that illustrates the science in the story. A scene can explain the science in an active, engaging way. If you can tag along and interview the scientist while he or she is rotating the telescope and squinting with the right eye while finding the outer edge of the universe, that's more interesting than just regurgitating the details of their research gleaned from an academic paper. For magazine articles or newspaper features, pay attention to physical details: what does the lab look like? How

does it smell? Paint a picture to bring the reader to the action.

Now even if you are writing for a magazine, the common newspaper rhetoric of who, what, where, when, and why still applies. Even if you think you know the basic tenets or importance of the research, ask the scientist anyway. You are not the expert, otherwise someone would be interviewing you. And ask them to explain it like they would to a child or a dog—you'll get a more easily digestible answer. If you can't get a simplified explanation of the research from a scientist, make sure you understand the science so you can find a simple explanation while writing later. If you run into an inarticulate interviewee, a good way to get a comprehensible explanation is to ask a graduate research assistant working on the project, or even a professor in a related field who can explain the concept to you, though you may not quote that person in the piece.

Questions to keep in mind : What are the discoveries they've made already? Why are they doing the research in the first place (finding a cure, making semi-conductors cheaper, etc.)? How does it work? How long have they been investigating this area? Who else is working on a similar thing or who do they collaborate with? Where do they get funding from? The last question will not be so important for this journal unless there is an interesting con ict of interest or the story is about funding.

Embargos

Sometimes, a lab hasn't published results yet, though they have good preliminary data. Scientists may tell you things with the agreement that you don't publish it until it's been in a journal.

Profiles

Profiles are not really just about the work someone does; it's about who they are as a person, and how that relates to what they do. For reporting, that means you might talk to friends, students, secretaries, colleagues, family even. Don't be shy, but prepare for some raised eyebrows. Also, always include a physical description of the person somewhere; it helps define the person in the reader's mind. Imagine there were no photos of Einstein, only articles. Wouldn't you want to know about his crazy hair and mustache, his kind, gentle eyes? Note what sticks out, both in their appearance and their office or lab.

For profiles, you'll want to have at least three interviews with your subjects. Try to see them in several environments : at work, out with friends, whatever. But keep relating their other activities to the core of who they are and what they do. People are best described by what they say, what they do, and what other people say and do to / with them.

Writing

These are not steadfast rules, and some are even broken in this handout.

Structure

So you have all this information and need to write. To do this, you'll need a structure, an order to put things in. Articles go something like this : Lede, nutgraff, then the body. Sometimes, the end will link back to the lede, giving the story a sense of completion, but this is not necessary in any way. The following is mostly about ledes and nutgraffs since organising the body of a piece largely depends on the reporting.

Ledes

There are a few types of ledes, which are just the beginning of a story, maybe the first 2-5 paragraphs (in newspapers, they're about 1 or 2, and in magazines longer). All are meant to draw the reader in with vivid description, detail, mystery, cleverness and / or somewhat of a gee whiz factor. Following are some of the most common ones.

- Anecdotal / narrative: Describes a scene or event, with concrete, physical details. Here's a fictional one :

"Twenty days ago, Jim Lissard's mouse grew a third tail. It slowly emerged from under the white hair to form a lump, and finally, a wiggling pink strand scantily covered with fur.

The mouse, named Pinky, is the first to have the 3tail gene, which can not only spur the growth of a third tail, but prevent cancer." [this last part is actually a nut graff–see below.]

- Straight lede : Subject, verb. "Fourteen years ago, Jim Lissard created the first three-tailed mouse, the current model for cancer research."
- Absurd-question-followed-by-answer lede : "Who would have thought fifty years ago there would be a three-tailed mouse?" Try to avoid this construction. After all, humans can pretty much imagine anything. Use a declarative sentence to make this same point, if you can. Questions in stories, if overused, can be annoying or a sign of a writer's laziness.

Nutgraf(F)

This paragraph, or group of small paragraphs, tells the reader why anyone should even care to read the article. It ties the science to an important outside issue (money, health, the environment, etc). Sometimes the nutgraff will tell the reader why they should read the story but do it by posing a question (not literally, necessarily) that will be answered by the body of the article. Will the research lead to a new drug? Make computer chips smaller, enabling handheld instruments to have more power? In other words, what will this research do for readers' lives? How is this researcher changing the world that the reader lives in?

Tension: The nutgraff may also voice a tension or crystallise a con ict set up by the lede. In turn, the tension if maintained can carry the reader through the story and compels the reader to keep turning pages. There are some types of tensions / con icts that are particularly pertinent to science:

- **The race to find the cure / solution:** Many labs compete with each other to figure out a larger problem. For example, in The Double Helix by Jim Watson, he pits Linus Pauling against Watson and Crick in the race to find the structure for DNA. This type of drama was also a huge part of the race to sequence the human genome. Sometimes this drama is unjustly used to give life to an otherwise boring story, so be careful. The question here would be, who will get there first?
- **The underdog / naysayer:** Often there is one scientist who doesn't really travel with the pack. Example: Peter Duesburg (a professor at Cal) who argues that HIV does not cause AIDS. This type of story often lends itself to a profile, and is usually complicated by politics, scientific infighting, funding issues and general intrigue. In other words, really juicy stuff. The challenge is to find out why the naysayer is really being discredited, and if that they're science really holds up.
- **The "it'll change the way we think about xyz" story:** Sometimes new research comes along and overturns the way the world thinks about a commonly held concept, like the evolution of human life, or the cause of a disease. For instance, the news about the T-rex wasn't really relevant to daily life (i.e., doesn't change the cost of healthcare), but it changed the idea of the T-rex from a speedy, ravenous, meat-eating monster towards something more like a loping, omnivorous dinosaur. Another example is Prusiner's model of prion diseases: he changed the way we view a group of diseases that is destroying the European livestock supply. (But he used to be in the naysayer category for pushing the idea of misfolded proteins being the spreading agent for an infectious disease.)

Quotes

Interesting quotes or explanations are important for science writing because the material can seem dry or unwieldy otherwise. People often say more interesting things than books, especially textbooks. Also, quotes can break up a dense section of explanatory stuff, or provide colour for a story. You need to attribute quotes to a person, generally. In newspapers, you only use "said" after a quote. As in, "'I hate kids," said Mr. Rogers, retired children's television guru.'" Other acceptable terms: "noted" or "added." These are all considered neutral. By strict journalistic standards, you cannot use other synonyms for "said" like "chirped" or "explained." Even "commented" and "agreed" are looked down upon. But in magazine, it's a little more loose.

If you've found an explanation for a concept like DNA replication in a book or paper, it's best to paraphrase it (generally, no attribution needed for magazine since they allow you to assume some air of authority). If you need to use direct quotes or data from a book or paper, attribute it (like if the quotes / data are from the interviewee's work). If you're at a newspaper you'll need to get the scientist to explain the concept and you can then paraphrase them. Common knowledge does not need to be attributed, but your editor will decide what that means.

Things to think about while writing

Voice, point of view: Magazines tend to allow more voice, which can be conveyed through word choice, choice of metaphor and imagery. Magazines are not newspapers because they openly express a point of view, but if the voice you choose is condemning or harsh, the reporting should validate that point of view. Generally, avoid second person (a rule not followed in this handout).

Tone and style: lighthearted, dramatic, funny, self-righteous. Sometimes these tones are better left to essays and editorials, though drama and humor can really illustrate a story well. But the drama and humor should come from the reporting: did someone get fired because of their work? During the course of the

research will the mice go blind? Does a blind mouse regain vision because of treatment? Just stating the facts sometimes is fascinating enough. A good scene can be ruined by owery overwriting.

Metaphors: Many science concepts already have a tried and true metaphor. DNA has several, based on the purpose. For example, "DNA, the building blocks of life" is for a quick throwaway explanation, whereas "DNA, the zipper" is for explaining DNA replication. Then there's "DNA, the book of life" for explaining the genome. Some of these stock metaphors are good, and some are totally misleading and inaccurate. Be creative and come up with your own. Just be wary of not using so many different metaphors that they con ict over the course of a piece.

Sentence structure: Unwieldy sentences (generally caused by multiple clauses, lots of prepositions, dashes, parentheticals and too many words) make it difficult and sometimes boring to read piece. Employ vivid nouns and verbs. They paint a picture best and most succinctly.

Jargon: Every field has its lingo (language). But that doesn't mean you should adopt the lingo. Why? Because physicists may not know anything about plant physiology, and biologists may not understand fractal theory--but they might be reading the same publication. Meaning, if you use a phrase like "astronomical unit," tell the reader that it's equivalent to 93 million miles. To test out story clarity, sometimes it's nice to have a non science person read through a piece.

Fact checking

Check quotes, the spelling of names, figures and explanations by calling your sources again and looking up numbers in textbooks. A month after an interview with an illegible notepad demands diligent fact checking.

Resources

Some of these will be useful for science writing in general even after you are done writing for the Review.

A Field Guide for Science Writers, edited by Deborah Blum and Mary Knudson, Oxford University Press, 1997 is a good guide on how to approach science for the public, whether in newspapers or magazine. It is also the official guide of the American Association for the Advancement of Science.

Some classics:

The Double Helix, James Watson; Gossipy, trashy, and utterly fascinating; How science works behind the scenes, by one of science's true eccentric geniuses.

Cosmos, Carl Sagan, A great primer on the universe.

Silent Spring, Rachael Carson; One of the first and best environmentalism books that started a whole movement; A hard look at pesticides.

Song of the Dodo, David Quammen; A book about the history of evolutionary thought, within the framework of extinction on islands.

The Coming Plague, Laurie Garrett; A great (and long) book on antibiotic resistance as a public health threat by one of the greatest Pulitzer Prize-winning investigative science writers.

Genius: The Life and Science of Richard Feynman, James Gleick; A fascinating portrait of a physicist, and a look at what separates a genius from a really smart person; Also a history of the Bomb, from a scientist's point of view.

Woman: An Intimate Geography, Natalie Angier; A controversial National Book Award finalist about the very meaning of femaleness; By one of the first practitioners of narrative science writing.

Best Science and Nature Writing 2001, edited by E.O. Wilson; A good survey.

The Future of Life, E.O. Wilson; When he writes about biodiversity, it's heaven.

(Source: Berkeley Science Review)

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'*.

News

New Book: Effective Science Communication in an Era of Globalization

As its name indicates, the Chinese language book Effective Science Communication in an Era of Globalization aims to combine inernational resources to promote science communication, especially through the means of science journalism. It is primarily based on a SciDev.Net workshop of the same name, which was held in Beijing from 13 to 17, March 2006. The workshop, mainly funded by the United Nations Educational Scientific and Cultural Organization (UNESCO), gathered journalists and science communicators from China, Mongolia, U.K., the United States, and Democratic People's Republic of Korea. Lectures, discussions and journalism practice assignments after the workshop have been collected in a unified form, which is strengthened by the material from SciDev.Net's e-Guide to Science Communication. The book has been published by the Science Popular Press

With the publishing funding from the British Council, the book has hit the shelves. It has been designed both as a guiding book for promising science journalists to grasp the know-how and background information needed for good science reporting, and as a platform to exchange experiences and lessons that are useful to promote the works of science communication. It also absorbs some of the theoretical papers by working science journalists. As expected, the book could be a leverage point to further improve professionalism among Chinese science journalists.

The book is co-edited by Jia Hepeng, SciDev.Net regional coordinator for China, and Dr. Mo Yang, associate professor of science communication at the Graduate University of the Chinese Academy of Sciences. Besides the sponsorship from UNESCO and British Council, the publication of the book also receives financial, material and organizational supports from China Association for Science and Technology, the Chinese Society of Science and Technology Journalism, and the British Embassy Beijing.

(www.scidev.net)

New journal for astronomy communicators goes live

In response to an increasing need among the growing community of astronomy communicators, the International Astronomical Union has announced launch of a new journal called *'Communicating Astronomy with the Public Journal'*. Subscriptions to print and online versions are free of charge to communicators.

A peer-reviewed journal, this will provide astronomy communicators with important tools and innovative resources to communicate more effectively the workings of the Universe to the public.

"We are pleased to announce the first issue of the Communicating Astronomy with the Public Journal. The IAU is strongly dedicated to improving the global level of astronomy education and outreach." Said IAU President Catherine Cesarsky.

The journal provides astronomy communicators with a mix of resources, opinion and information on how to communicate more effectively to the general public the workings of the Universe. As Pedro Russo, Editor-In-Chief of the journal, explains, the CAP journal has an important aim: "As the astronomy education and public outreach community expands globally, it becomes increasingly important to establish a community of science communication experts."

President of IAU Commission 55 Communicating Astronomy with the Public, Ian Robson: "Astronomy has an innate appeal to people of all ages, partly because it concerns the fascinating great questions 'of life, the Universe and everything' and partly because many of the data obtained with telescopes can be presented as objects of stunning beauty. Astronomy is a great example of how fascinating physics can be."

Science communicators are encouraged to submit their own articles for publication explains Russo. "Public communication of astronomy is a burgeoning field of science communication. We would like to see the

astronomy outreach community deeply involved in this journal's evolution and production."

The journal will be published quarterly for free in print and online. It will act as a repository of ideas for astronomy communicators; for example in use with activities as part of the International Year of Astronomy 2009 which will be a global celebration of astronomy and its contributions to society and culture. Pedro Russo, also IAU Coordinator for the International Year of Astronomy 2009, explains "The next few years will be extremely important for astromony communication and education. The International Year of Astronomy 2009 will serve as a unique platform to inform the public about the latest discoveries in astronomy."

The first two issues are sponsored by the European Space Agency, the International Astronomical Union, Instituto de Astrofisica de Canarias (Spain) and ESO.

Free subscription forms and the online version of the journal can be found at www.capjournal.org

(www.iau.org)