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Year of Scientific Awareness

# Indian Journal of Science Communication

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## Communication Mantra

*The root cause of most of the miseries of our people is communication gap in various spheres of life, be it interpersonal communication or mass communication. This gap has to be bridged and bilateral as well as multilateral and multidimensional communication has to be established for well being of individuals, societies, nations and in fact the world as a whole. It is exactly in this context that science communication can also be for the purpose of our contemplation here. There exist much talked about gaps in the sciences and their understanding by masses, even up to the extent of general perception of scientific issues. Science communication can promote science awareness amongst masses and inculcate scientific temper. Children can form a substantial part of the target audience, as they hold the key to the future.*

*Just ponder over this. A well-informed and aware farmer not only can save his fields from hazardous chemical effluents from industries, but also help save enough resources on subsequent medical expenses of the consumers, who cannot dissociate themselves from harmful effects of such consumptions. The livestock taking the residual fodder from the crop can also fall prey to harmful effects. Now if we calculate the quantum of the overall resources required for tackling the situation and treating patients, including cost of man hours and the losses caused by unproductive time of illness, it will be far beyond than that required for treatment of the chemical effluents. An aware society can understand this entire gamut well enough and take corrective measures for certain. It is hoped that the future leaders, our children, should be able to grow with such clarity so that they are able to minimize such risks and conflicts between mankind and development; this balancing act between mankind and development would pave the way for sustained development.*

*Here is an example as how the local level science reporting can help! A group of upcoming science and environment journalists visited Kosi river near Rampur (U.P.) to write an on the spot report on the situation of pollution in the river as part of a training programme on science journalism. In the process, the participants found that the colour of water in the river was dark, the grasses along the river were decayed and damaged; and animals died due to pollution caused by untreated chemical effluents from nearby industries. It was learnt that the ingress of polluted water has entered the ground water and left it un-potable. Almost 60 villages of the locality were at risk as they relied on wells and hand pumps for their potable water. Towards verification, this team visited a village and came across many people suffering from a variety of water borne diseases ranging from skin diseases to throat ailments. The samples were collected and analysed; which confirmed the findings and reports appeared in regional and national media, then the authorities were alarmed and the situation was tackled by installation of treatment plants in the industries. Such was the impact of communication and local level science reporting.*

*India lives in various layers, such as social, cultural, political, religious, scientific, economical and natural. The bilateral and multilateral sharing, exchange, interaction and communication between these layers can mark a turning point of the process of overall development. The idea has come to the fore at a recently concluded seminar on 'Scientific Temper : Role of Mass Communication' held at University of Rajasthan, Jaipur. Generally, it was observed, all these layers are working in isolation and there is hardly any interaction between them. Some common thread amongst them has to be discovered to make them interactive and communicative to each other so that they also have a sense of togetherness. The communication between these layers would make them more responsive to each other as well as paving the way to develop better understanding and cooperation that is vital to nation building and sustainable development. ■*

**Manoj Patariya**

# ग्रामीण विकास में विज्ञान संचार और संचार माध्यमों की भूमिका

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## Abstract

The penetration of mass media in rural India is satisfactorily significant. This study was carried out in the rural areas of Dhanbad for ratifying this observation. A questionnaire was evolved for carrying out interviews. These answers were analysed and results have been presented in this paper. Sociological and geographical factors affecting rural areas have also been included in this study.

## सारांश

संचार माध्यमों की ग्रामीण क्षेत्रों में अच्छी खासी पैठ बन चुकी है। इसी को आंकने के उद्देश्य से यह अध्ययन धनबाद जिले के ग्रामीण इलाकों में किया गया। पूर्व निर्धारित प्रश्नों पर आधारित इस अध्ययन में ग्रामीण लोगों से साक्षात्कार लिया गया। उनके जवाबों का विश्लेषण करने के फलस्वरूप प्राप्त निष्कर्षों को इस पत्र में प्रस्तुत किया गया है। ग्रामीण क्षेत्रों को प्रभावित करने वाले सामाजिक व भौगोलिक कारकों को भी इस अध्ययन में स्थान दिया गया है।

**Key Words :** Area survey, Random method sampling, Questionnaire, Rural development.

## अध्ययन की प्रकृति

गांवों में रेडियो की पहुंच तो बहुत पहले, सत्तर के दशक में ही हो चुकी है। किन्तु इधर के वर्षों में एक ओर यहां के कच्चे-पक्के घरों के ऊपर अक्सर टीवी-एंटीना आम हो चला है, तो दूसरी ओर दालानों-चौपालों में सुबह-शाम बैठने वाले लोगों के हाथों में यदा-कदा पुस्तकें व विभिन्न प्रकार की पत्र-पत्रिकाएं भी दिखाई दे जाती हैं।

संचार माध्यमों के प्रकाशनों-प्रसारणों का अध्ययन करने से इनमें यदा-कदा गांवों से संबंधित कार्यक्रमों, समाचारों, आलेखों आदि की झलक मिलती रहती है। ग्रामीण लोगों के बीच न केवल अपने गांवों या कृषि-कार्य से संबंधित समस्याओं पर चर्चा होती है बल्कि देश-विदेश की राजनीति एवं अन्य सम-सामयिक विषयों पर भी बहस होते सुना जा सकता है। निश्चित ही उनकी इन बहसों-चर्चाओं का संदर्भ स्रोत संचार माध्यम ही हो सकते हैं।

लेकिन क्या संचार माध्यम गांव के विकास को भी प्रभावित करते हैं। अगर प्रभावित करते हैं तो किस हद तक या किस रूप में? क्या गांवों के विकास में इनसे कुछ मदद मिल पाती है? गांव के लोग संचार माध्यमों को किस रूप में लेते हैं? गांवों के विकास में संचार माध्यमों का अधिकाधिक उपयोग कैसे संभव हो सकता है? ग्रामीण लोगों की इन माध्यमों से क्या अपेक्षाएं हैं?

पूर्व निर्धारित कुछ प्रश्नों (देखें परिशिष्ट-क) के आधार पर ग्रामीण लोगों से साक्षात्कार लेकर यहां उक्त प्रश्नों के उत्तर तलाशने की कोशिश की गई है। अध्ययन के दौरान ग्रामीण क्षेत्रों में विकास की स्थिति की विवेचना भी की गई है।

इस अध्ययन के लिए धनबाद जिले के ग्रामीण क्षेत्रों को चुना गया है। अतएव प्रभावित करने वाले अन्य कारकों यथा-यहां के ऐतिहासिक परिदृश्य, भौगोलिक दशा, व्यापारिक एवं वाणिज्यिक स्थिति आदि के साथ जनसांख्यिकीय आंकड़ों का अध्ययन भी किया गया है। इस पत्र में हालांकि विश्लेषणों एवं निष्कर्षों को ही प्राथमिकता दी गई है, पर उक्त आंकड़े पूर्णतः परिशिष्ट-ख में दिए गये हैं।

## ग्रामीण विकास में संचार माध्यमों की भूमिका

ग्रामीण विकास में संचार माध्यम अति-महत्वपूर्ण भूमिका निभा सकते हैं। यह सरकारी या गैर-सरकारी विकास एजेंसियों की विभिन्न विकास योजनाओं की सही एवं विस्तृत जानकारी गांव के जनसामान्य तक तत्काल पहुंचाने में समक्ष है। जनसामान्य को इनकी जानकारी होने से न केवल योजनाकारों को योजनाओं के क्रियान्वयन में सहूलियत होती है बल्कि संचार माध्यम के द्वारा योजनाओं के सकारात्मक पक्षों को सामने रखने से इसकी स्वीकार्यता भी बढ़ती है।

गांवों की विभिन्न प्रकार की सामयिक समस्याओं को उजागर (कवरेज) कर संचार माध्यम विकास एजेंसियों को क्रियान्वित की जा रही योजनाओं की आवश्यकता एवं उपयोगिता पर पुनर्विचार करने में मदद के साथ ही नई योजनाओं के निर्माण में मार्गदर्शन भी कर सकते हैं।

संचार माध्यम ग्रामीण जनता के बीच योजनाओं के प्रति सकारात्मक जनमत निर्माण कर उनकी सहभागिता को सुनिश्चित करने के साथ जनता की प्रतिक्रियाओं और योजनाओं के प्रतिफल (फीड बैक) को भी सामने लाते हैं।



दूसरी ओर देश विदेश की तात्कालिक खबरों, नए आविष्कारों आदि से ग्रामीण समुदाय को बा-खबर रख संचार माध्यम उनके ज्ञान के अभिवर्द्धन के साथ ही अनुपयुक्त एवं हानिप्रद तौर-तरीकों, अंधविश्वासों, कुरीतियों, आदि, को त्यागने और उपयुक्त एवं लाभप्रद तौर-तरीकों को अपनाने के लिए अभिप्रेरित भी करते हैं।

इस प्रकार संचार माध्यम गांवों के विकास में न केवल एक महती भूमिका का निर्वहन करता है बल्कि आज के संचार क्रांति के युग में इसे निर्णायक माना जा सकता है, खासकर तब, जब अधिकांश योजनाएं सरकार के द्वारा बड़े (प्रायः राष्ट्र या राज्य) स्तर पर क्रियान्वित होती हैं।

### अनुसंधान का स्वरूप

इस पत्र में क्षेत्र-सर्वेक्षण विधि को अपनाकर संचार माध्यम के प्रति ग्रामीणों की प्रतिक्रियाओं, आकांक्षाओं एवं अपेक्षाओं का अध्ययन करने की कोशिश की गई है। ताकि ग्रामीण विकास में इनकी भूमिका की सैद्धांतिक (अपेक्षित) मतों के रू-ब-रू तुलना की जा सके।

वर्तमान अध्ययन का क्षेत्र धनबाद जिला होने के कारण वस्तुतः जिले के सारे गांवों के निवासी इस सर्वेक्षण के साक्षात्कारदाता होने चाहिए। सीमित संसाधनों के कारण यह संभव नहीं था कि इन सारे लोगों से साक्षात्कार ले सकें।

इसलिए हमने जिले के तीन प्रखंडों के चार गांवों के कुल मिलाकर नब्बे लोगों का चयन यादृच्छिक विधि (रेण्डम मैथड) से किया।

नमूने के चयन में किसी भी प्रकार के पूर्वाग्रह से बचते हुए ऐसी कोशिश की गई कि सर्वेक्षण नमूने से धनबाद जिला के सारे ग्रामीण क्षेत्रों का प्रतिनिधित्व हो सके।

जैसी कि पीछे चर्चा की गई है, आंकड़ों के एकत्रीकरण के लिए पूर्वनिर्धारित प्रश्नावली के आधार पर चयनित ग्रामीण लोगों से साक्षात्कार किया गया।

कुल ग्यारह सर्वेक्षित विषयों से संबंधित प्रश्नों एवं सात व्यक्तिगत सूचना से संबंधित प्रश्नों के जरिए ग्रामीणों की राय जानी और इन्हीं आंकड़ों को एकत्र कर विश्लेषित किया गया (देखें परिशिष्ट-क)।

इस अध्ययन के समय बिहार के 18 जिलों को अलग कर झारखंड राज्य की स्थापना हे गई थी। जनसाधरण में इस घटना को लेकर पक्ष-विपक्ष में बहस जोरों पर थी।

जहां हमारे प्रश्नों का जवाब देने के लिए किसी के पास फुर्सत नहीं थी तो किसी को ऐसे विषयों में कोई रुचि नहीं थी। कुछ लोग हमें सरकार का नुमाइंदा समझकर अपनी विभिन्न समस्याओं को इसलिए सामने रखते ताकि उसे तत्काल हल किया जा सके।

दूसरी ओर, कई लोगों ने तो हमारी मंशा पर ही आशंका व्यक्त करते हुए हमें आयकर विभाग या किसी अन्य विभाग का जासूस सिद्ध करते हुए खुद तो जवाब नहीं दिए, दूसरों को भी 'चेतावनी' देते हुए जवाब देने से मना करने की कोशिश की।

नए राज्य झारखंड के निर्माण और इसके प्रतिफल पर चल रही बहस के बहाने अध्ययन का काम कुछ आसान हुआ और हम अपेक्षित संख्या में लोगों से सीमित समय में बात कर सके।

### आंकड़ा एकत्रीकरण की अवधि व सीमाएं

आंकड़ा एकत्रीकरण की अवधि सन् 2000 के नवम्बर माह का पूर्वार्द्ध है। यद्यपि आंकड़ों की विशुद्धता एवं पर्याप्तता पर पूरा ध्यान रखने की कोशिश की गई थी। इस तरह के अनुसंधान कार्य की प्रामाणिकता एवं उपयोगिता को सीमित करने वाले कारक इस अध्ययन पर भी लागू होते हैं। मसलन एक तो नमूनों का आकार अल्प संसाधन एवं समय के कारण अत्यधिक छोटा रखना पड़ा। दूसरी ओर चंचल-मना मनुष्य जाति से बात-चीत पर आधारित होने के कारण आंकड़ों की विश्वसनीयता भी सीमित मानी जा सकती है। इस तथ्य का आभास आंकड़ों के एकत्रीकरण के वक्त बार-बार होता रहा।

### गांवों में संचार माध्यमों की लोकप्रियता

ग्रामीण क्षेत्रों में विभिन्न संचार माध्यमों की लोकप्रियता का अनुमान लगाने के उद्देश्य से साक्षात्कारदाताओं से तीन प्रश्न पूछे गये। प्रथम प्रश्न के द्वारा ग्रामीणों से इन माध्यमों में उनकी सहभागिता की आकांक्षा जानने की कोशिश की गयी।

कुल 87 प्रतिशत लोगों ने किसी न किसी माध्यम से सहभागिता की आकांक्षा प्रकट की। इनमें से 17 प्रतिशत लोग यह तय नहीं कर पाए कि वे किस माध्यम में भाग लेना चाहते हैं। जबकि 13 प्रतिशत लोगों को किसी माध्यम में भाग लेने की आकांक्षा नहीं है।

शेष 70 प्रतिशत लोगों में से 29 प्रतिशत लोग दूरदर्शन में, 11 प्रतिशत लोग समाचार पत्र और 2 प्रतिशत लोग रेडियो में भाग लेना चाहते हैं (देखें चित्र-1)।

कोई 7 प्रतिशत लोग दूरदर्शन और रेडियो दोनों में, 6 प्रतिशत लोग दूरदर्शन और अखबार दोनों में तथा 4 प्रतिशत लोग दूरदर्शन, अखबार और रेडियो तीनों में सहभागिता की आकांक्षा रखते हैं।

संचार माध्यमों की लोकप्रियता के मापन हेतु दूसरे प्रश्न के रूप में हमने ग्रामीणों से पूछा कि सबसे अच्छा माध्यम कौन सा है?

### धनबाद के ग्रामीण क्षेत्र में संचार माध्यमों के उपभोक्ता

पूर्व धारणा कि गांव में टेलीविजन की पहुंच अभी सीमित है, के प्रतिकूल तकरीबन 87 प्रतिशत लोग इसका उपयोग करते हैं। इनमें से 80 प्रतिशत दूरदर्शन और 7 प्रतिशत जीटीवी देखते हैं। सारे संचार माध्यमों में टेलीविजन के उपभोक्ताओं का प्रतिशत सर्वाधिक, 31 प्रतिशत है।

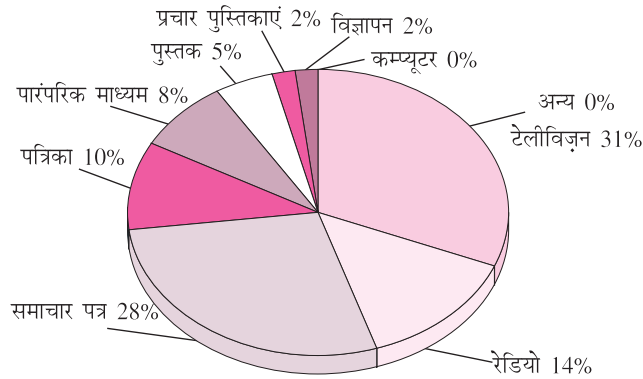
टेलीविजन के बाद सर्वाधिक उपभोक्ता हैं समाचार पत्र के लगभग 74 प्रतिशत लोग किसी न किसी समाचार पत्र के पाठक हैं। धनबाद के ग्रामीण क्षेत्रों में सबसे अधिक 33 प्रतिशत चमकता आईना पढ़ा जाता है जो यहां का स्थानीय अखबार है। दूसरा स्थान आवाज का है जिसे लगभग 14 प्रतिशत लोग पढ़ते हैं। सारे माध्यमों में समाचार पत्रों के उपभोक्ता 28 प्रतिशत हैं।

उपभोक्ताओं के मामले में तीसरे स्थान पर है रेडियो। लगभग 37 प्रतिशत रेडियो के श्रोता हैं जिनमें से तीन-चौथाई से भी अधिक लोग सिर्फ रांची स्टेशन के कार्यक्रम सुनते हैं। 10 प्रतिशत लोग बी.बी.सी. भी सुनते हैं। अन्य माध्यमों की तुलना में रेडियो के उपभोक्ताओं का प्रतिशत 14 है।

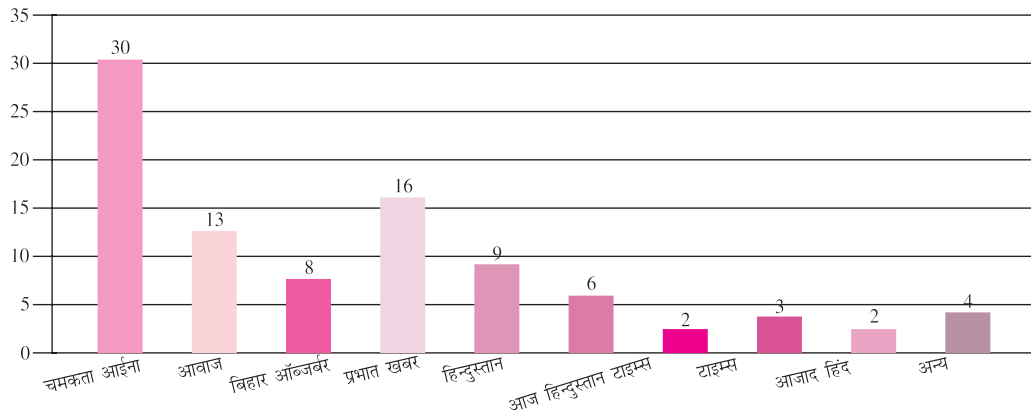
अन्य संचार माध्यमों में पत्रिकाओं का 10 प्रतिशत, पारंपरिक माध्यमों का 8 प्रतिशत, पुस्तकों का 5 प्रतिशत, प्रचार-पुस्तिकाओं और विज्ञापन के दो-दो प्रतिशत उपभोक्ता हैं। कम्प्यूटर की पहुंच गांवों में अभी तक नहीं हो पाई है।

कुल 27 प्रतिशत लोग पत्रिकाएं पढ़ते हैं जिनमें सर्वाधिक 21 प्रतिशत पाठक सरस सलिल जैसी हल्की-फुल्की पत्रिका के ही हैं। इंडिया टुडे जैसी समाचार पत्रिका का पाठक गांवों में होना इस बात का सबूत है कि देश-दुनिया की सही खबर रखने की ललक ग्रामीणों में भी है। पारंपरिक माध्यमों में सर्वाधिक लोकप्रिय झूमर है, जिसमें लगभग 18 प्रतिशत लोगों की रुचि है। नाटक देखने वालों का प्रतिशत 9 है। 6 प्रतिशत लोगों तक प्रचार-पुस्तिकाएं भी पहुंचती हैं, जबकि 4 प्रतिशत ग्रामीण लोग विज्ञापन में रुचि रखते हैं।

### धनबाद क्षेत्र में प्रयुक्त संचार माध्यमों का ग्राफ चित्रण

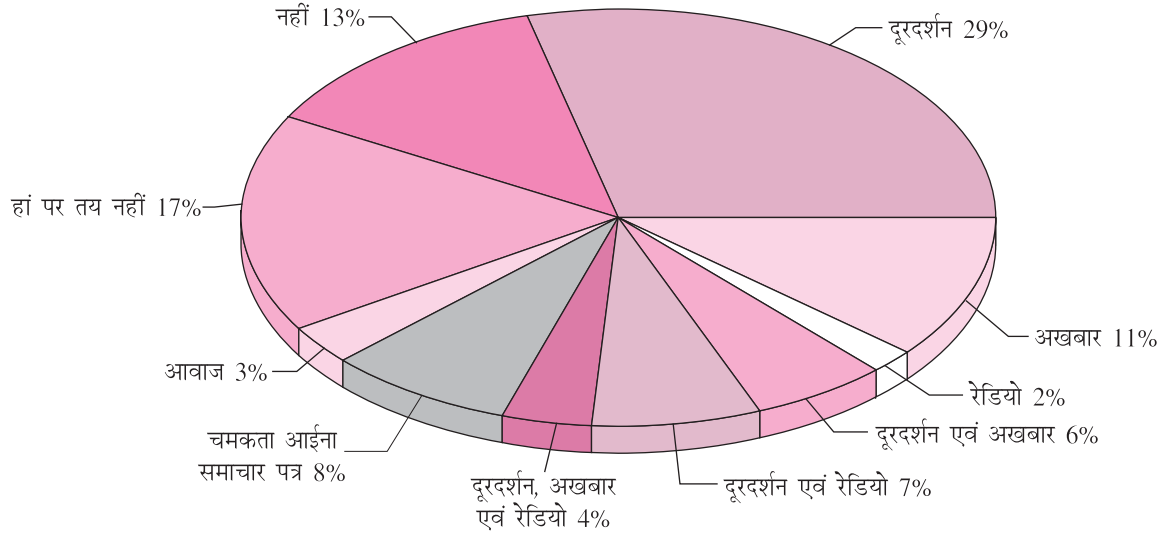


### संचार माध्यमों के उपयोग का चित्रण



### अखबारों के उपयोग का चित्रण

**चित्र 1: ग्रामीण लोगों की किस संचार माध्यम में भाग लेने की आकांक्षा है?**

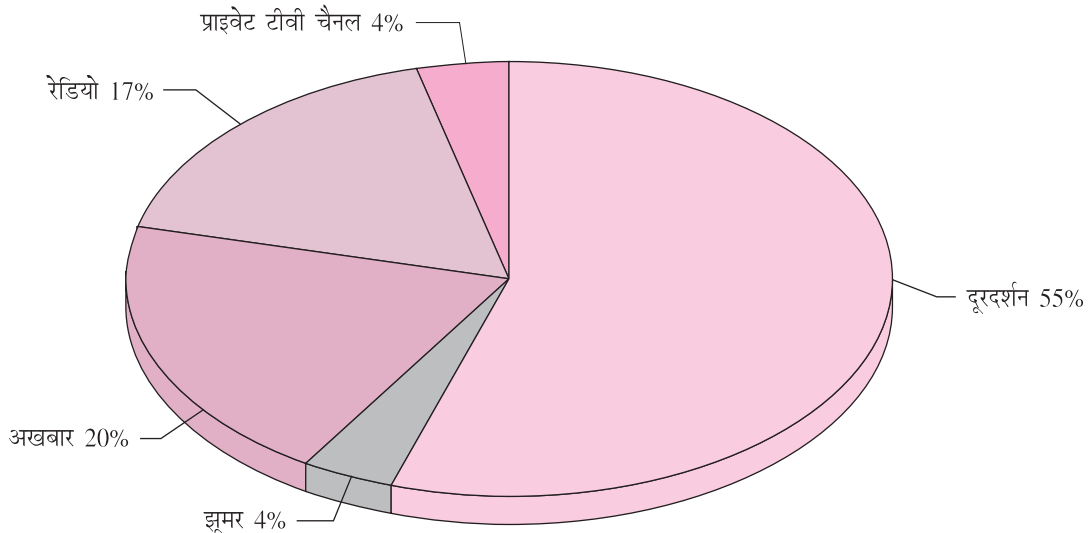


जवाब में 55 प्रतिशत लोगों ने दूरदर्शन को सबसे अच्छा कहा जबकि 20 प्रतिशत लोगों ने समाचार पत्र को, 17 प्रतिशत लोगों ने रेडियो को और चार-चार प्रतिशत लोगों ने झूमर एवं प्राइवेट टीवी को सबसे अच्छा माना (चित्र 2)।

अगले प्रश्न के द्वारा हमने गांवों में संचार माध्यमों की विश्वसनीयता को आंकने का प्रयास किया।

सर्वाधिक 47 प्रतिशत लोग दूरदर्शन को जबकि 22 प्रतिशत लोग समाचार पत्र को, 11 प्रतिशत लोग रेडियो को

**चित्र 2: सबसे अच्छा संचार माध्यम कौन सा है?**





### संचार व संचार माध्यम : एक परिभाषा

संचार शब्द की मूल धातु संस्कृत की 'चर' है, जिसका मतलब है चलना। अतए जब किसी भाव, विचार, अनुभव, आविष्कार, मनोरंजन या जानकारी से संबंधित संदेश को एक या एकाधिक व्यक्तियों के द्वारा दूसरों तक पहुंचाया जाता है तो यह प्रक्रिया 'संचार' कहलाती है।

संचार की प्रक्रिया मुख्यतः तीन प्रकार की होती है : अंतरव्यैक्तिक संचार, अंतरव्यैक्तिक संचार और जनसंचार। जब व्यक्ति खुद से संचार करता हो/यथा-चिंतन-मनन आदि/तो उसे अंतरव्यैक्तिक संचार कहा जाता है।

जब संदेशों का आदान-प्रदान दो या दो से अधिक लोगों के बीच प्रत्यक्ष रूप से हो तब उसे अंतरव्यैक्तिक संचार कहते हैं। और जब ये संदेश जनसामान्य अर्थात् विशाल जनसमूह अथवा निर्दिष्ट दर्शकों/श्रोताओं तक अप्रत्यक्षतः एक साथ संप्रेषित किए जाएं तो इसे 'जनसंचार' कहा जाता है। किसी भी संचार के लिए 'माध्यम' की जरूरत होती है। अंतरव्यैक्तिक संचार में संदेश को संप्रेषित करने के लिए 'संकेत/प्रतीक' की भी जरूरत होती है। ये संकेत या प्रतीक विभिन्न प्रकार की मुद्राओं/हंसना, रोना, गुस्साना आदि/के रूप में, भाषा के रूप में या किसी प्रकार के चिन्ह के रूप में भी हो सकता है।

जनसंचार के लिए संदेश और संकेत के साथ-साथ कुछ उपकरणों/विधाओं की भी आवश्यकता होती है। समाचार पत्र, पत्रिका, पुस्तक, रेडियो, टेलीविजन, कम्प्यूटर आदि ऐसे ही उपकरण एवं नाटक, नाच झूमर, कहानी, कविता आदि ऐसी ही विधाएं हैं। ये सारे उपकरण एवं विधा ही जनसंचार माध्यम कहलाता है, जिसे सामान्यतः 'संचार माध्यम' कहा जाता है।

### धनबाद क्षेत्र के प्रमुख संचार माध्यम

धनबाद के शहरी क्षेत्रों में किसी भी बड़े शहर की भांति आधुनिक संचार माध्यमों का संजाल सा बिछा है। इस जिले में हिन्दी एवं अंग्रेजी की राष्ट्रीय स्तर की प्रायः सभी पत्र-पत्रिकाओं के पाठक हैं। बंगला तथा उर्दू पत्र-पत्रिकाओं का भी यहां अच्छा खासा बाजार है।

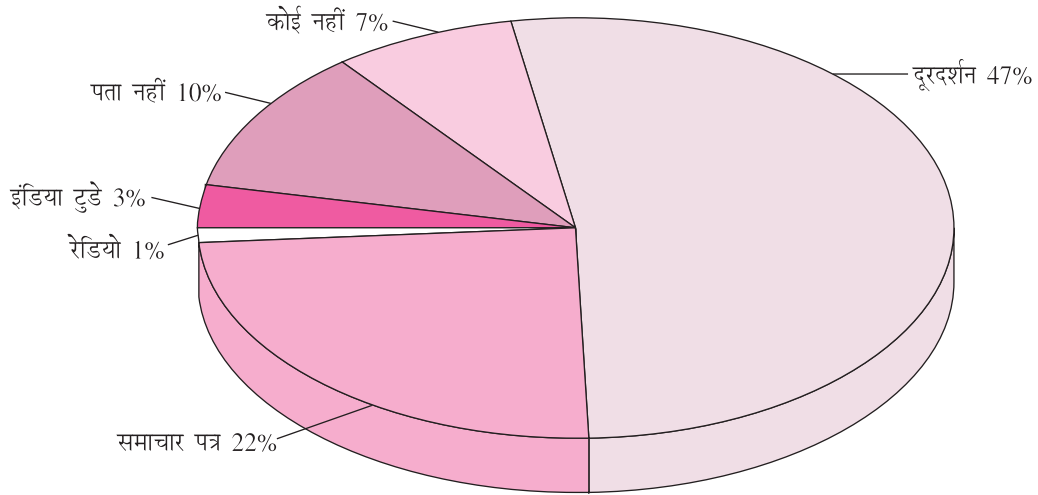
प्रदेश एवं राष्ट्रीय स्तर के अखबारों में टाइम्स ऑफ इंडिया, हिन्दुस्तान टाइम्स, हिन्दुस्तान, दैनिक जागरण, आज, टेलीग्राफ, स्टेट्समैन, हिन्दू, जनसत्ता, राष्ट्रीय सहारा, इंडियन एक्सप्रेस, कौमी आवाज (उर्दू) आदि के साथ पत्रिकाओं में इंडिया टुडे, माया, फ्रंट लाईन, आउटलुक, सरस सलिल, सरिता, सुमन सौरभ, गृहशोभा, मेरी सहेली, गृहलक्ष्मी, विज्ञान प्रगति, साइंस रिपोर्टर, हंस, योजना, कुरुक्षेत्र, प्रतियोगिता दर्पण, प्रतियोगिता किरण; बंगला में आजकल, वर्तमान, आनंद बाजार पत्रिका आदि पढ़े जाते हैं।

विभिन्न सरकारी / गैर सरकारी संस्थानों से जुड़े लोगों के आवास हेतु बने कालोनियों के साथ अन्य सारे शहरी-क्षेत्रों में भी डिश एंटीना एवं केबल के माध्यम से टेलीविजन पर तीस से चालीस चैनल दिखाये जाते हैं। इनमें दूरदर्शन के छह-सात चैनलों के अलावा जी टी.वी. के चार-पांच, स्टार के चार-पांच, बी.बी.सी. वर्ल्ड, डिस्कवरी, नेशनल ज्योग्राफिक, सब टी.वी., एम.टी.वी., ई.टी.सी., यूटीएन आदि के अलावा स्थानीय स्तर पर केबल के जरिए आई-व्यू एवं छोटानागपुर टाइम्स नामक वीडियो समाचार पत्रिका का प्रसारण नियमित रूप से होता है।

किन्तु जिले के ग्रामीण क्षेत्रों में भी टेलीविजन का एंटीना दिखाई देता है। फिर भी यहां अभी तक रेडियो, परंपरागत नृत्य/झूमर/स्थानीय अखबारों आदि का ही साम्राज्य है। टेलीविजन पर प्रायः दूरदर्शन के राष्ट्रीय चैनल के कार्यक्रम को ही देखना संभव हो पाता है। रेडियो पर भी मीडियम-वेव पर बहुत ही कम स्टेशनों की आवाज सुनाई दे पाती है। लोग अक्सर रांची स्टेशन के कार्यक्रम सुनते हैं या शार्ट-वेव पर गाना आदि का आनंद लेते हैं। स्थानीय अखबारों में आज की आवाज, बिहार ऑब्जर्वर, प्रभात खबर, चमकता आईना आदि शामिल हैं।

जिले के अंतर्गत केन्द्र सरकार के अधीन चल रहे विभिन्न संस्थानों / सार्वजनिक इकाइयों के सारे प्रशासनिक कार्य प्रायः अंग्रेजी में होते हैं। जबकि जिले भर में जनसामान्य के द्वारा बोली और समझी जाने वाली भाषा हिन्दी है। बंगाल से जुड़े अनेक समुदायों की भाषा बंगला है।

धनबाद के मूल निवासियों की मूल भाषा है-खोरठा। खोरठा भाषा का साहित्य अविकसित होने के कारण इसकी प्रामाणिक जानकारियों का अभाव है। यहां हिन्दी और बंगला साहित्य के समृद्ध अध्ययता एवं पाठक हैं।

**चित्र 3: गांव के लोग सर्वाधिक विश्वसनीय संचार माध्यम किसे मानते हैं?**

कुल 42 लोगों ने दूरदर्शन को आंखों देखा हाल सुनाने के कारण सबसे अधिक विश्वसनीय कहा जबकि 20 लोगों ने इच्छित समय में पठनीय होने और सच्चाई उजागर करने की शक्ति के कारण समाचार पत्र को विश्वसनीय माना। निष्पक्ष रिपोर्टिंग के कारण 3 लोगों ने *इंडिया टुडे* को जबकि रेडियो को 9 लोगों ने अधिक विश्वसनीय बताया। उत्तरदाताओं में से 9 लोगों को यह पता नहीं था कि किस संचार माध्यम को विश्वसनीय माना जाए। 6 लोगों ने साफ कहा कि कोई भी माध्यम विश्वसनीय नहीं है।

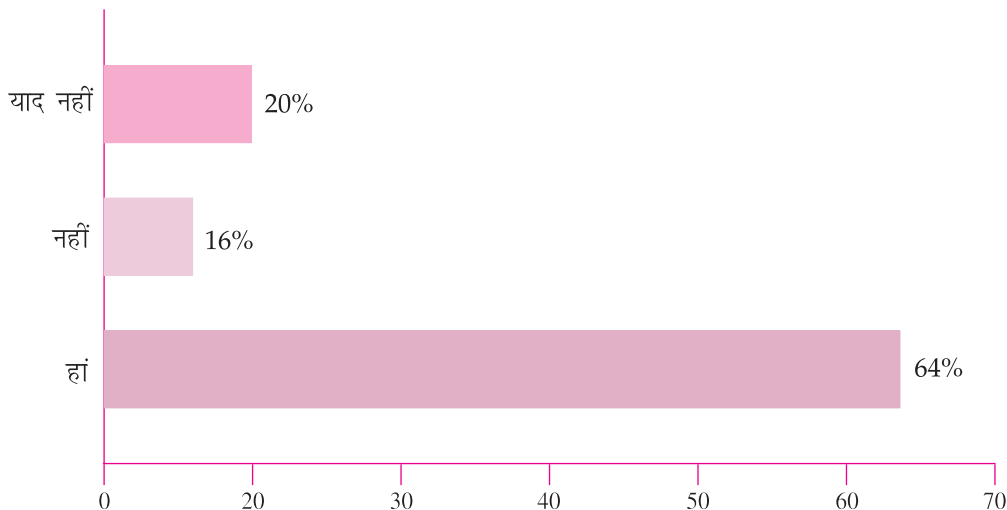
तथा 3 प्रतिशत लोग *इंडिया टुडे* को विश्वसनीय मानते हैं (देखें चित्र 3)।

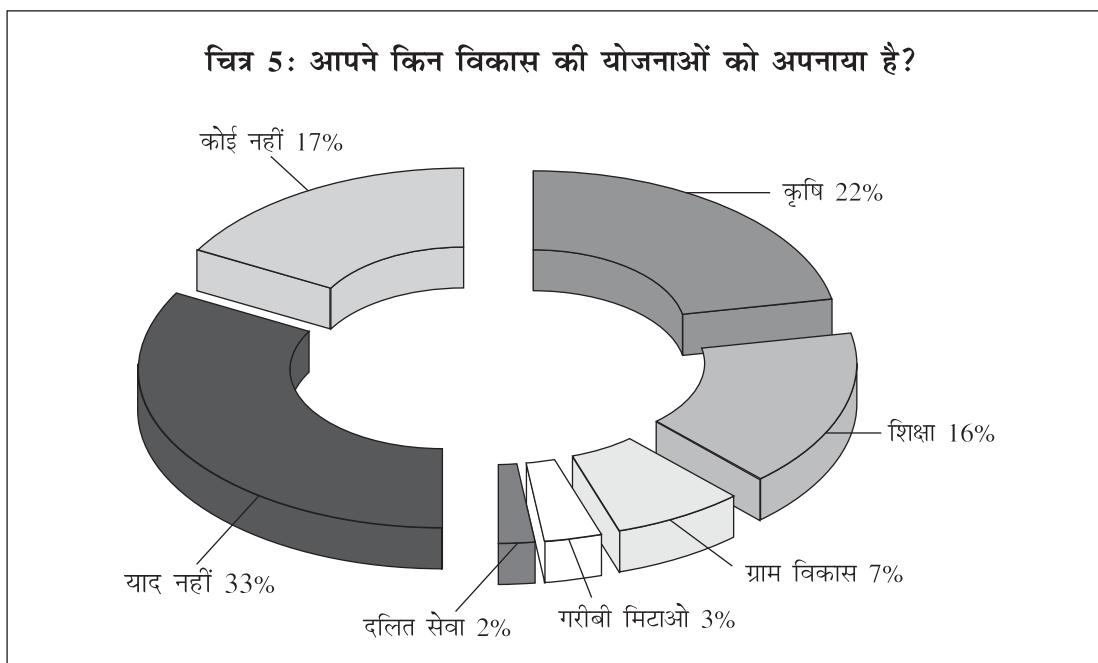
रेडियो को 9 लोगों ने अधिक विश्वसनीय बताया। उत्तरदाताओं में से 9 लोगों को यह पता नहीं था कि किस संचार माध्यम को विश्वसनीय माना जाए। 6 लोगों ने साफ कहा कि कोई भी माध्यम विश्वसनीय नहीं है।

उक्त माध्यमों को विश्वसनीय क्यों मानते हैं?

अपने पक्ष में लोगों का जवाब था कि आंखों देखा हाल प्रसारित करने के कारण वह दूरदर्शन को विश्वसनीय मानते हैं। अन्य लोगों का कहना था कि गैर सरकारी माध्यम होने के कारण समाचार पत्र अधिक निष्पक्ष होता है।

*इंडिया टुडे* के पाठकों ने निष्पक्ष एवं निर्भिक रिपोर्टिंग के

**चित्र 4: क्या संचार माध्यम से विकास कार्यक्रमों की जानकारी मिली?**



कारण इसे विश्वसनीय कहा। यद्यपि 10 प्रतिशत लोगों को पता नहीं कि कौन सा माध्यम विश्वसनीय है, जबकि 7 प्रतिशत लोग किसी भी माध्यम को विश्वसनीय नहीं मानते।

इस तरह स्पष्ट है कि गांवों में अब रेडियो की पूर्वापेक्षित लोकप्रियता बहुत कम हो कर टेलीविजन, खासकर दूरदर्शन की पकड़ काफी मजबूत हो चुकी है।

समाचार पत्रों विशेषकर स्थानीय पत्र एवं पत्रिकाओं की पैठ गांवों में बढ़ रही है। इनके पाठकों की न केवल अच्छी खासी संख्या है अपितु ये इन्हें अच्छा मानते और इनकी सामग्री पर विश्वास करते हैं।

### ग्रामीण विकास में संचार माध्यमों की उपयोगिता

भले ही गांवों के लोग इसे महसूस करते हों या नहीं लेकिन ग्रामीण विकास में संचार माध्यमों की निश्चित ही केन्द्रीय भूमिका हो सकती है। लेकिन क्या संचार माध्यम सकारात्मक पहल कर पाते हैं?

जब ग्रामीणों से पूछा गया कि जिस माध्यम को वे सबसे अच्छा मानते हैं क्या उससे ग्रामीण विकास से संबंधित कोई जानकारी मिली, तो 64 प्रतिशत लोगों ने हां में जवाब दिया (चित्र 4)। मात्र 16 प्रतिशत लोगों ने कहा नहीं, जबकि 20 प्रतिशत लोगों को इसके बारे में कुछ याद नहीं था।

### ग्रामीण विकास क्या है?

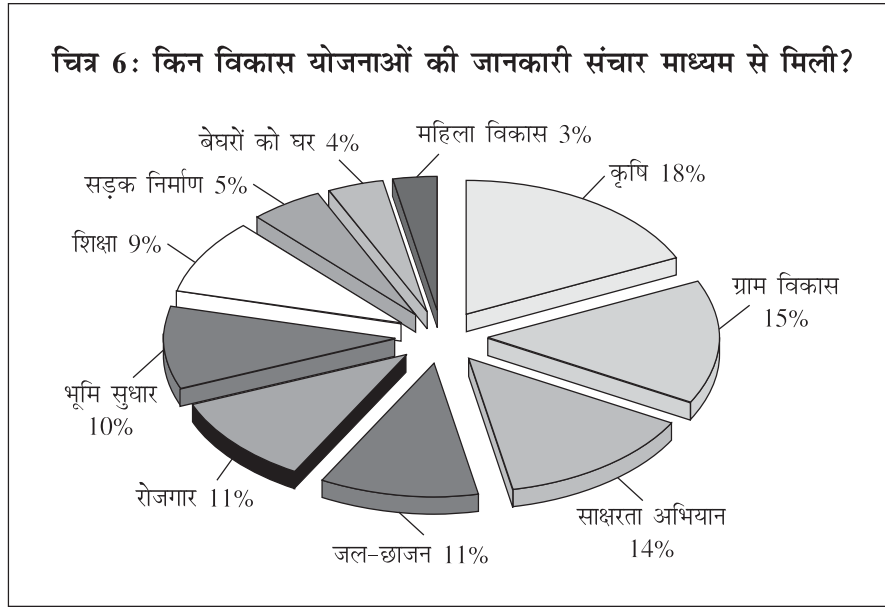
ग्राम विकास से अभिप्राय ग्रामीण जीवन के भौतिक स्तर में समग्र रचनात्मक परिवर्तन से है। इस रचनात्मक परिवर्तन में आर्थिक के साथ-साथ सामाजिक पहलू भी सम्मिलित हैं। विकास के लिए केवल आर्थिक संवृद्धि ही नहीं बल्कि आर्थिक संवृद्धि के लाभों का न्योचित वितरण भी आवश्यक है।

दूसरे शब्दों में ग्रामीण विकास का अर्थ गांवों में न्याय-युक्त संवृद्धि है। इसका अर्थ है कि बेहतर स्वास्थ्य, शिक्षा आवास व कल्याण द्वारा ग्रामीणों के जीवन-स्तर में सुधार। इस प्रकार ग्रामीण विकास के प्राथमिक उद्देश्यों में निम्नांकित महत्वपूर्ण तत्व शामिल हैं :

1. रोटी, कपड़ा और मकान एवं शिक्षा और रोजगार प्रदान कर ग्रामीणों के जीवन स्तर को ऊपर उठाना,
2. ग्रामीण क्षेत्रों में उत्पादकता बढ़ाना और गरीबी को कम करना,
3. ग्रामीणों को निर्णय प्रक्रिया में शामिल करके एवं प्रशासन का विकेन्द्रीकरण करके उनको योजना एवं विकास की धारा से जोड़ना,
4. समाज में सभी को एक समान अवसर प्रदान करना तथा सामाजिक न्याय दिलाना।

ग्रामीण विकास के विभिन्न पहलू जैसे कृषि तथा उससे मिलते-जुलते कार्यों, ग्रामीण औद्योगीकरण, शिक्षा, स्वास्थ्य, सार्वजनिक कार्य गरीबी उन्मूलन और ग्रामीण रोजगार कार्यक्रम - सब मिलकर ग्राम विकास के समन्वित मार्ग को प्रशस्त करते हैं।

चित्र 6: किन विकास योजनाओं की जानकारी संचार माध्यम से मिली?



चूँकि गांव के लोग अपने अधिकांश कार्य किसी योजना के तहत नहीं अपितु सामान्य दैनंदिन के कार्य के रूप में करते हैं। यहाँ तक कि केन्द्र या राज्य सरकार या फिर किसी स्वयंसेवी एजेंसी द्वारा संचालित योजनाओं में भी बिना इसके तह में गए या इसका नाम जाने, सहभागी हो जाते हैं।

इसलिए यह स्वाभाविक ही था कि जब लोगों से पूछा गया कि उन्होंने विकास की किन योजनाओं को अपनाया है, तो 33 प्रतिशत लोगों ने कहा उन्हें यह याद ही नहीं (चित्र 5)। लगभग 17 प्रतिशत लोगों का कहना था कि उन्होंने आज तक विकास की कोई भी योजना नहीं अपनाई है।

शेष आधे लोगों में से 22 प्रतिशत लोगों ने कृषि से संबंधित, तो 16 प्रतिशत लोगों ने शिक्षा से संबंधित योजनाओं को अपनाने की बात कही।

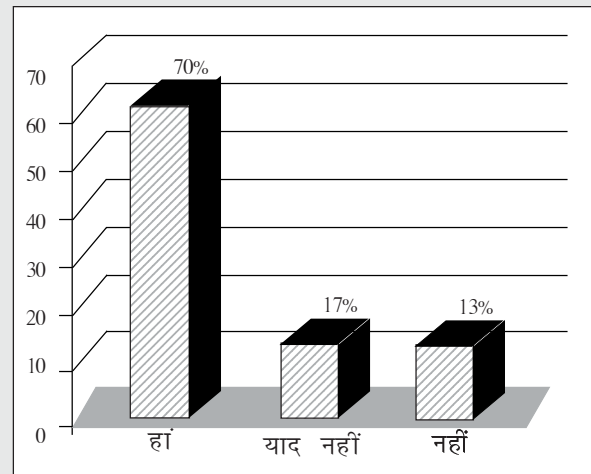
लगभग 2 प्रतिशत लोगों ने दलित सेवा, 3 प्रतिशत लोगों ने गरीबी हटाओ कार्यक्रमों को, जबकि 7 प्रतिशत लोगों ने ग्रामीण विकास से संबंधित अन्य योजनाओं को अपनाया।

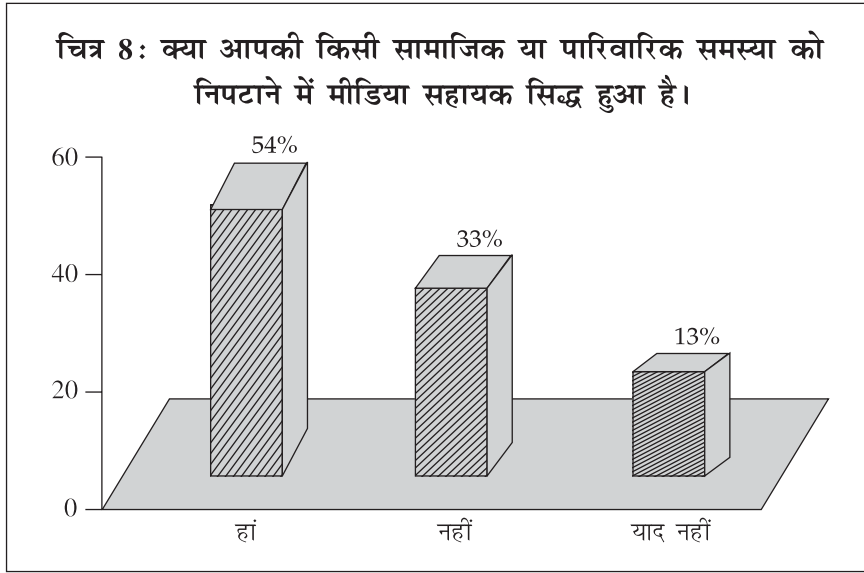
संचार माध्यमों के प्रभाव का अध्ययन करने के उद्देश्य से जब पूछा गया कि किन विकास की योजनाओं की जानकारी संचार माध्यमों से मिली तो पहले तो लोगों को जवाब देने में कठिनाई का अनुभव हुआ। अंततः जो उत्तर मिला उसमें से 18 प्रतिशत लोगों को कृषि से संबंधित और 15 प्रतिशत लोगों को

चित्र 7: क्या संचार माध्यम से प्रभावित होकर कार्य करने के ढंग को बदला है?

कुल 63 लोगों ने सकारात्मक जवाब दिया, जबकि 15 लोगों ने कहा कि याद नहीं और 12 लोगों ने संचार माध्यम से प्रभावित होकर अपने कार्य करने के ढंग में किसी प्रकार के बदलाव से साफ इंकार किया।

सकारात्मक जवाब देने वालों में से 30 ने अपने रहन-सहन में बदलाव की बात कही जबकि 10 ने खेती-बाड़ी के ढंग में, 9 ने अपने पोशाक के उपयोग में बदलाव किये और 6 लोगों ने संचार माध्यम से प्रभावित होकर खेलना आरंभ किया। 8 लोगों ने कहा कि उन्होंने बदलाव तो अवश्य किए हैं किन्तु यह याद नहीं कि किस चीज में।





ग्राम विकास से संबंधित योजनाओं की जानकारी संचार माध्यमों से मिली (चित्र 6)।

संचार माध्यमों से 14 प्रतिशत लोगों को साक्षरता अभियान से संबंधित, 11-11 प्रतिशत लोगों को जल-छाजन एवं रोजगार से संबंधित कार्यक्रमों के बारे में जानकारी मिली जिसका लाभ भी उन्होंने उठाया।

क्रमशः 10, 9, 5, 4 व 3 प्रतिशत लोगों को भूमि सुधार, शिक्षा, सड़क निर्माण, बेघरों को घर व महिला विकास से संबंधित योजनाओं की जानकारी मिली।

यू तो लगभग सभी को संचार माध्यम किसी न किसी रूप में प्रायः निर्देशित करता रहता है किन्तु क्या गांव के लोग इसे महसूस भी करते हैं?

पूछने पर 70 प्रतिशत लोगों (चित्र 7) का जवाब था कि हां उन्होंने संचार माध्यम से प्रभावित होकर कार्य करने के ढंग को कभी न कभी अवश्य बदला है।

11 प्रतिशत लोगों ने खेती बाड़ी के ढंग में, 10 प्रतिशत लोगों ने अपनी पोशाक के उपयोग में बदलाव लाया, तो 7 प्रतिशत लोगों ने संचार माध्यम से प्रभावित होकर खेलना आरंभ किया। सकारात्मक जवाब देने वालों में से 33 प्रतिशत लोगों ने अपने रहन-सहन में बदलाव की बात कही। 9 प्रतिशत लोगों ने कहा कि उन्होंने बदलाव तो अवश्य किए हैं किन्तु यह याद नहीं कि किस चीज में।

लगभग 17 प्रतिशत लोगों को यह याद नहीं था कि उन्होंने कभी संचार माध्यम से प्रभावित होकर अपने कार्य के ढंग को बदला है जबकि 13 प्रतिशत लोगों का कहना था कि उन्होंने अपने कार्य करने के ढंग को कभी नहीं बदला है।

संचार माध्यम न केवल व्यक्ति को प्रभावित करता है अपितु यह समाज को नई दिशा भी प्रदान करता है। तो क्या गांव के

लोगों ने कभी अहसास किया है कि उनकी किसी पारिवारिक या सामाजिक समस्या को निपटाने में संचार माध्यम सहायक सिद्ध हुआ है?

उत्तरदाताओं में से एक बड़ी संख्या 33 प्रतिशत उन लोगों की थी जिन्होंने स्पष्ट शब्दों में कहा कि उनकी जानकारी में ऐसी कोई समस्या नहीं है जिसका समाधान संचार माध्यम की मदद से हुआ हो (चित्र 8)।

13 प्रतिशत लोगों ने याद न होने की बात कही, जबकि 54 प्रतिशत लोगों ने सकारात्मक जवाब दिया। तकरीबन 8 प्रतिशत लोगों ने कहा कि संचार माध्यम की सहायता से महिलाओं से संबंधित डायन जैसी समस्या पर अंकुश लगाना संभव हो सका है।

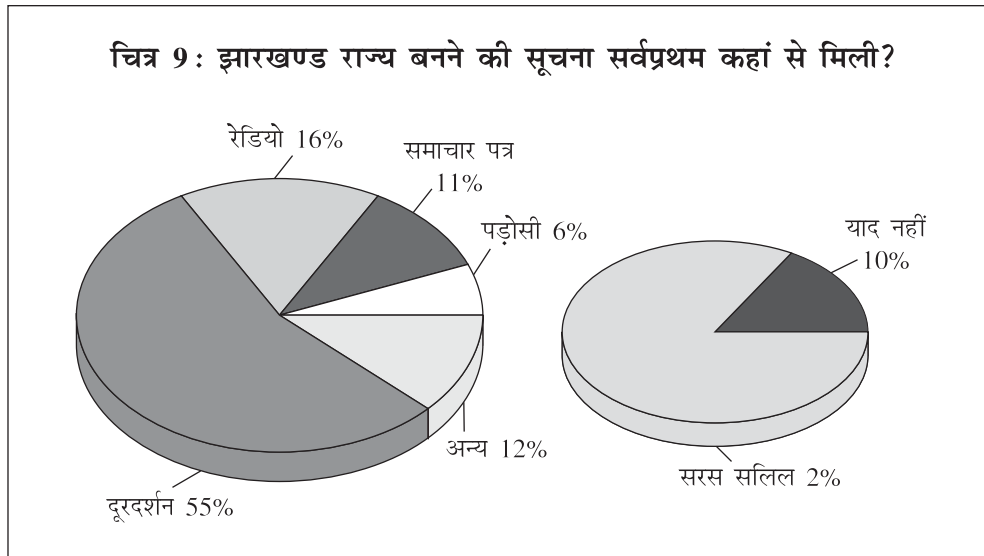
लगभग 6 प्रतिशत लोगों ने पोलियो जैसी बीमारियों को खत्म करने और 3 प्रतिशत लोगों ने अनुसूचित जाति / जनजाति के विकास में संचार माध्यम की सराहनीय भूमिका बताई।

लगभग 37 प्रतिशत लोगों ने कहा कि संचार माध्यमों की मदद से उन लोगों की कई समस्याओं का समाधान हुआ है। किन्तु वे कह नहीं पाए कि उनके किस समस्या के समाधान में संचार माध्यम सहायक सिद्ध हुए हैं।

ग्रामीण लोग संचार माध्यमों का उपयोग न केवल अपने मनोरंजन के लिए करते हैं बल्कि ज्ञानवर्द्धन और साथ ही विभिन्न विकास की योजनाओं की जानकारी हासिल करने एवं विभिन्न सामाजिक व पारिवारिक समस्याओं के समाधान में भी इनकी मदद का लाभ उठाते हैं।

ग्राम विकास के क्षेत्र में कार्यरत विभिन्न एजेंसियों के द्वारा भी जनसामान्य तक पहुंचने के लिए संचार माध्यमों का उपयोग किया जाता है। उदाहरण के तौर पर खादी एवं ग्रामोद्योग आयोग विज्ञापनों के द्वारा ग्रामीण औद्योगीकरण के कार्यक्रमों की सूचना

+



देता रहता है, जिससे अधिकाधिक ग्रामीण जनता तक इनकी पहुंच हो सके।

### संचार माध्यमों के प्रति ग्रामीणों की जागरूकता

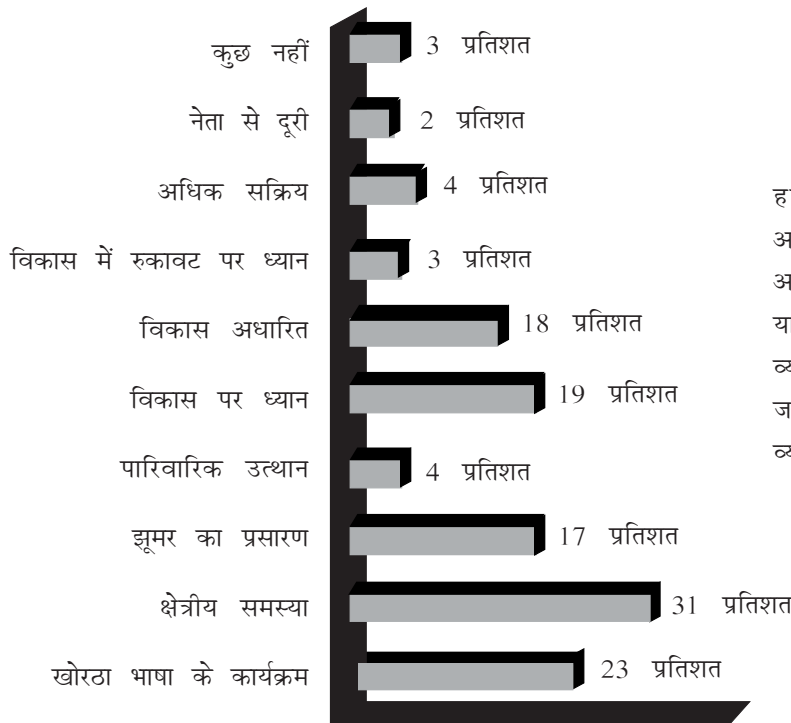
जब हम ग्रामीण विकास में संचार माध्यमों की भूमिका का अध्ययन कर रहे हैं तो एक वाजिब प्रश्न सामने आता है कि आखिर गांव के लोग इनके प्रति कितने जागरूक हैं? जवाब पाने

के लिए यहां तत्काल चर्चित विषय झारखण्ड राज्य के निर्माण का सहारा लिया गया।

प्रश्न था कि झारखण्ड राज्य बनने की सूचना सबसे पहले किस माध्यम से मिली?

कोई 10 प्रतिशत लोगों ने बताया कि उन्हें याद नहीं कि झारखण्ड बनने की सूचना सबसे पहले कहां से मिली, जबकि

### चित्र 10 : गावों के अधिक विकास के लिए ग्रामीणों की संचार माध्यमों सरकार से क्या अपेक्षाएं हैं?



हर व्यक्ति को अपने क्षेत्र और गांव के अधिक विकास हेतु सरकार से कुछ न कुछ अपेक्षा अवश्य है। चाहे वह बिजली, पानी या सड़क जैसी बुनियादी आवश्यकताओं की व्यवस्था हो या खेल, क्लब या मंदिर जैसी जरूरतों को पूरा करना। लोग इन सारी व्यवस्थाओं की अपेक्षा सरकार से करते हैं।

+



सर्वाधिक 55 प्रतिशत लोगों ने बताया कि झारखंड राज्य बनने की सूचना उन्हें दूरदर्शन से मिली।

झारखंड राज्य बनने की सूचना 16 प्रतिशत लोगों को रेडियो से, 11 प्रतिशत लोगों को समाचार पत्र से, 6 प्रतिशत लोगों को अपने पड़ोसियों से तथा 2 प्रतिशत लोगों को सरस सलिल से मिली (चित्र 9)।

अतएव कहा जा सकता है कि 80 फीसदी से अधिक लोग संचार माध्यमों के प्रति कम से कम इतना जागरूक अवश्य हैं कि तात्कालिक विषयों पर इनसे प्राप्त सूचना एवं जानकारी को अपने ध्यान में रख सकें।

### ग्रामीणों की संचार माध्यमों से अपेक्षा

किस तरह संचार माध्यम गांवों के विकास में अधिक सहायक सिद्ध हो सकते हैं? इसके लिए ग्रामीणों की संचार माध्यमों से क्या अपेक्षाएं हैं?

लोगों ने इस प्रश्न का जवाब विविधतापूर्ण दिया। तीन प्रतिशत लोगों को छोड़कर (देखें चित्र 10) अन्य लोगों की संचार माध्यमों से अनेक अपेक्षाएं हैं।

इनमें से 23 प्रतिशत लोगों की अपेक्षा है कि रेडियो और दूरदर्शन से खोरठा भाषा—जो धनबाद की स्थानीय भाषा है—में कार्यक्रम प्रस्तुत हों।

करीब 31 प्रतिशत लोग चाहते हैं कि क्षेत्र की समस्या पर केन्द्रित कार्यक्रमों को विभिन्न संचार माध्यमों में स्थान मिले। इलेक्ट्रॉनिक माध्यमों—रेडियो, टेलीविजन आदि से झूमर के प्रसारण की चाहत 17 प्रतिशत लोगों की है।

लगभग 19 प्रतिशत लोगों की अपेक्षा है कि कृषि वैज्ञानिक विकास से संबंधित कार्यक्रमों को संचार माध्यम में स्थान मिले जबकि पारिवारिक उत्थान पर कार्यक्रमों को समय या स्थान प्राप्त हो, यह 4 प्रतिशत लोगों की इच्छा है।

संचार माध्यमों द्वारा विकास आधारित कार्यक्रमों को और अधिक स्थान प्रदान हो यह 18 प्रतिशत लोगों की तथा ग्राम विकास में रुकावट पर सरकार का ध्यान दिलाना 3 प्रतिशत लोगों की अपेक्षा है।

इस तरह मात्र 3 प्रतिशत लोगों को छोड़कर शेष सभी की संचार माध्यमों से कुछ न कुछ अपेक्षाएं हैं। लेकिन अधिक लोगों

#### परिशिष्ट : क

#### ग्रामीण विकास में संचार माध्यमों की भूमिका : जिला धनबाद के संदर्भ में

ग्राम .....

प्रखंड .....

प्रमुख संचार माध्यम : 1. टेलीविजन—दूरदर्शन, जी-टीवी, स्टार टीवी, आदि चैनल, 2. रेडियो—रांची, दिल्ली, बी.बी.सी. आदि स्टेशन, 3. समाचार पत्र—आज, आवाज, आईना, हिन्दुस्तान, टाइम्स ऑफ इंडिया, आदि 4. पत्रिका—सरस सलिल, माया, इंडिया टुडे, कुरुक्षेत्र, आदि 5. पारंपरिक मीडिया—नाटक, नाच, झूमर, आदि 6. पुस्तक, 7. प्रचार—पुस्तिका, 8. कम्प्यूटर, 9. विज्ञापन, आदि।

1. आप किस संचार माध्यम का उपयोग करते हैं?
2. आपकी किस संचार माध्यम में भाग लेने की आकांक्षा है?
3. सबसे अच्छा संचार माध्यम कौन सा है? क्या इसमें ग्रामीण विकास से संबंधित कोई जानकारी मिली?
4. सबसे अधिक विश्वसनीय माध्यम कौन सा है, और क्यों? झारखंड के निर्माण को इसने किस रूप में लिया?
5. आपने किन विकास की योजनाओं को अपनाया है?
6. किन विकास की योजनाओं की जानकारी संचार माध्यम से मिली?
7. क्या आपने मीडिया से प्रभावित होकर कभी अपने कार्य करने के ढंग को बदला है?

8. क्या आपकी किसी सामाजिक या पारिवारिक समस्या को निपटाने में मीडिया सहायक सिद्ध हुआ है?
9. झारखंड राज्य बनने की सूचना आपको पहले पहल किस माध्यम से मिली?
10. नए राज्य के निर्माण से क्या आपके क्षेत्र / ग्राम का विकास तेजी से हो पाएगा?
11. आपको संचार माध्यम या सरकार से अपने क्षेत्र / ग्राम के और विकास के लिए क्या अपेक्षा है?

व्यक्तिगत सूचना

1. नाम :
2. उम्र / जन्म तिथि :
3. पेशा : सेवा / व्यवसाय / कृषि / व्यापार / मजदूरी, आदि।
4. परिवार के सदस्यों की संख्या : वयस्क..., बच्चे..., विवाहित युगलों की संख्या :
5. पारिवारिक संरचना : संयुक्त / विस्तृत / एकल।
6. शैक्षिक स्तर : स्नातकोत्तर / स्नातक मैट्रिक / शिक्षित / अशिक्षित
7. परिवार की कुल वार्षिक आय : (क) एक लाख से अधिक (ख) एक लाख से पचास हजार के बीच (ग) पचास हजार से पच्चीस हजार के बीच (घ) पच्चीस हजार से कम।

का जोर अपने क्षेत्र की समस्याओं और अपनी मातृभाषा खोरठा पर है।

### निष्कर्ष

‘ग्रामीण विकास में विज्ञान संचार व संचार माध्यमों की भूमिका’ विषय पर धनबाद जिले के संदर्भ में किए गए अध्ययन के निष्कर्ष को बिन्दुवार यहां प्रस्तुत किया जा रहा है :

1. धनबाद जिला के ग्रामीण क्षेत्र में अभी भी अधिकांश परिवार संयुक्त ही हैं। मात्र 23 प्रतिशत परिवार ही एकल हैं, जिसकी सदस्य संख्या पांच या इससे कम है।
2. शिक्षा का स्तर अपेक्षाकृत संतोषजनक है, क्योंकि 98 प्रतिशत लोग यहां शिक्षित/साक्षर हैं। अधिकांश लोग कहीं न कहीं सेवारत हैं। कृषि पर निर्भर लोगों का प्रतिशत 21 है।

### परिशिष्ट : ख धनबाद जिला : एक संक्षिप्त परिचय

**अनुमंडल :** धनबाद सदर

प्रखंड / अंचल : 1. धनबाद 2. झरिया 3. बलियापुर 4. निरसा  
5. गोविंदपुर 6. तोपचांची 7. बाघमारा 8. टुंडी।

#### अन्य सूचनाएं

1. समुद्र-तल से ऊंचाई : 840 फीट
2. कुल भौगोलिक क्षेत्र : 2995 वर्ग किलोमीटर
3. वन से आच्छादित क्षेत्र : 235.47 वर्ग किलोमीटर
4. कुल जनसंख्या : 19,49,526
5. पुरुषों की संख्या : 10,71,913
6. महिलाओं की संख्या : 8,77,613
7. शहरी जनसंख्या : 9,58,280
8. ग्रामीण जनसंख्या : 9,91,246
9. साक्षर जनसंख्या : 8,57,708
10. राष्ट्रीय राजमार्ग की लम्बाई : 114.44 किलोमीटर
11. शैक्षिक संस्थाएं : प्राथमिक विद्यालय : 1209  
: मध्य विद्यालयों की संख्या : 418  
: उच्च विद्यालयों की संख्या : 91  
: कॉलेजों की संख्या : 13
12. अस्पतालों की संख्या : प्राथमिक स्वास्थ्य केन्द्र : 23  
: स्वास्थ्य उप-केन्द्र : 8
13. लाल-कार्ड धरियों / गरीबी की रेखा से नीचे रहने वाले लोगों / की संख्या : 1,04,672
14. राष्ट्रीय बैंकों की संख्या : 133

धनबाद जिले का मानचित्र



15. जनसंख्या वृद्धि की दर : 2.51 प्रतिशत
16. जनसंख्या का घनत्व : 706 व्यक्ति प्रति वर्ग किलोमीटर
17. साक्षरता : 44.2 प्रतिशत
18. पुरुष साक्षरता : 69.47 प्रतिशत
19. महिला साक्षरता : 37.88 प्रतिशत
20. शहरी क्षेत्र में साक्षरता : 68.26 प्रतिशत
21. ग्रामीण क्षेत्र में साक्षरता : 41.32 प्रतिशत
22. कुल जनसंख्या में श्रमिकों की संख्या : 27.63 प्रतिशत
23. कुल जनसंख्या में कृषि-कार्य पर निर्भर लोगों की संख्या : 29.94 प्रतिशत

### धनबाद के ग्रामीण क्षेत्र की सामाजिक संरचना

धनबाद जिले के ग्रामीण क्षेत्र की सामाजिक संरचना के अवलोकन के उद्देश्य से हमने अपने साक्षात्कार-दाताओं से उनके पेशा, पारिवारिक संरचना, शैक्षिक स्तर एवं परिवार की कुल वार्षिक आय आदि की जानकारी प्राप्त कर यहां विश्लेषित किया है।

कहा जाता है कि बढ़ते औद्योगिक विकास से पारिवारिक संरचना संयुक्त से एकल/ नाभिकीय में बदलती है। किन्तु झारखंड के साथ अविभाजित बिहार का भी सर्वाधिक औद्योगिक जिला धनबाद के ग्रामीण क्षेत्र में अभी भी अधिकांश परिवार (77 प्रतिशत) संयुक्त ही हैं।

ग्रामीण क्षेत्र में मात्र 23 प्रतिशत परिवार ही एकल हैं जिसकी सदस्य संख्या पांच या इससे कम है।

यहां के ग्रामीणों का शैक्षिक स्तर अपेक्षाकृत संतोषजनक है। क्योंकि यादृच्छिक विधि से चयनित नमूनों में से 42 प्रतिशत स्नातक की उपाधि प्राप्त थे जिनमें से एक के पास एल. एल. बी. की उपाधि भी थी।

अन्य 46 प्रतिशत लोग मैट्रिक उत्तीर्ण थे जबकि 10 प्रतिशत लोग इससे कम शिक्षित थे। मात्र 2 प्रतिशत लोग ही अशिक्षित थे।

चूंकि धनबाद का पर्याप्त औद्योगिकीकरण हो चुका है और यहां राज्य सरकार के अलावा केन्द्र सरकार के अधीन कार्यरत अनेक संस्थान हैं। अतएव अधिकांश (46 प्रतिशत) लोग कहीं न कहीं सेवारत हैं। कृषि पर निर्भर लोगों का प्रतिशत 21 है जबकि 17 प्रतिशत लोग व्यवसाय या व्यापार में लगे हुए हैं और 10 प्रतिशत लोग मजदूरी कर जीवन-यापन करते हैं। बेरोजगार लोगों का प्रतिशत 6 है।

साक्षात्कार-दाताओं में से अधिकांश 80 प्रतिशत 15 से 35 वर्ष के बीच के युवा थे जो इस बात का सूचक माना जा सकता है कि इसी उम्र समूह के लोगों में कुछ नया सुनने और नया करने की अधिक ललक होती है। 35 वर्ष से अधिक उम्र के लोग 20 प्रतिशत में भी अधिकांश 50 वर्ष के ही थे जिन्होंने हमारी बात सुनी और समझकर जवाब दिए।

3. धनबाद जिले के गांवों में सर्वाधिक लोग टेलीविजन का उपयोग करते हैं। जिसमें से अधिकांश दूरदर्शन के कार्यक्रम देखते हैं। सारे संचार माध्यमों में टेलीविजन के उपभोक्ता सर्वाधिक हैं।
4. टेलीविजन के बाद सर्वाधिक एक-चौथाई से कुछ कम उपभोक्ता समाचार पत्रों के हैं। ग्रामीण क्षेत्रों में सबसे अधिक चमकता आईना पढ़ा जाता है, जो यहां का स्थानीय अखबार है।
5. पारंपरिक माध्यमों में सर्वाधिक लोकप्रिय झूमर है।
6. तीन-चौथाई लोगों की किसी न किसी माध्यम से सहभागिता की आकांक्षा है। अधिक लोग दूरदर्शन में भाग लेना चाहते हैं। दूरदर्शन को ही सबसे अच्छा माध्यम मानते हैं और इसे ही सर्वाधिक विश्वसनीय मानते हैं।
7. आधुनिक संचार माध्यमों में समाचार पत्रों, विशेषकर स्थानीय एवं पत्रिकाओं की पैठ गांवों में बढ़ रही है।
8. संचार माध्यम आम जन जीवन को अवश्य प्रभावित करते हैं। आधे से अधिक लोगों को ग्राम विकास से संबंधित योजनाओं की जानकारी संचार माध्यमों से मिली। जिसका लाभ भी उन्होंने उठाया।
10. लगभग एक-तिहाई लोगों का मानना है कि उन्होंने संचार माध्यम से प्रभावित होकर अपने कार्य करने के ढंग को कभी न कभी अवश्य बदला है। सर्वाधिक लोगों ने अपने रहन सहन में बदलाव की बात कही।
11. लोगों के पारिवारिक एवं सामाजिक समस्याओं के समाधान में संचार माध्यम सहायक सिद्ध हुए हैं।
12. ग्रामीण लोग इनका उपयोग न केवल अपने मनोरंजन के लिए करते हैं बल्कि विभिन्न विकास की योजनाओं की जानकारी हासिल करने में भी इनकी मदद का लाभ उठाते हैं।
13. ग्राम विकास के क्षेत्र में कार्यरत विभिन्न एजेंसियों के द्वारा भी जनसामान्य तक पहुंचने के लिए संचार माध्यमों का उपयोग किया जाता है।
14. ग्रामीणों में से लगभग शत-प्रतिशत लोग क्षेत्र की समस्या पर केन्द्रित कार्यक्रमों की आकांक्षा रखते हैं। ■

## Students' Perception of Science Learning Environment in Jammu : Attitudes and Gender Differences

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### Abstract

For the first time in Jammu, India, multiple research methods from different paradigms were used in this interpretive study to explore the nature of science classroom environments. A sample of 1,021 students from 32 science classes in seven co-educational private schools completed the questionnaire on *What is Happening in This Class* (WIHIC) and an attitude scale. Data analyses supported the validity and reliability of the instrument when used in this context. Significant positive associations between the WIHIC scales and students attitudes were found and supported the predictive validity of the WIHIC. The multiple regression showed that, three scales namely, Investigation, Task Orientation and Equity were positively and significantly related to students' attitudes. Perceptions of science classroom learning environment of male and female students in the same class were also investigated. The quantitative data provided a starting point from which other qualitative methods (interviews and observations) were used to gain a more in-depth understanding of the classroom environments with special reference to students' attitudes and gender differences there. An educational critique has been used to describe the social, cultural, economical and political factors that may be responsible for the present prevailing science learning environments. The findings from the quantitative data were supported by the findings of interviews and observations.

### सारांश

विज्ञान कक्षा-परिवेश' की प्रकृति जानने के उद्देश्य से पहली बार जम्मू (भारत) में भिन्न-भिन्न सिद्धांतों से बहु शोध विधि का प्रयोग इस व्याख्यात्मक अध्ययन में किया गया है। इसके लिए सात निजी सह शिक्षण स्कूलों के 32 विज्ञान कक्षाओं के 1021 छात्रों के प्रतिदर्श से 'हवट इज हैपनिंग इन दिस क्लास (विहिक इस कक्षा में क्या हो रहा है)' की प्रश्नावली भरवाई गई। विश्लेषणों ने इस विधि की प्रामाणिकता का समर्थन किया। विहिक' स्केल और छात्रों की अभिवृत्ति में संबंध प्राप्त हुए और इससे विहिक की उपयोगिता को बल मिला। 'मल्टीपल रिगेशन' से स्पष्ट हुआ कि अन्वेषण, कार्य दिशा और समानता का छात्र अभिवृत्ति से गहन रिश्ता है। 'विज्ञान कक्षा-परिवेश' से लेकर लिंग आधारित छात्र बोध का भी अध्ययन किया गया। आंकड़ों से यह इंगित हुआ कि अन्य विधियों यथा साक्षात्कार व अवलोकन का ऐसा उपयोग हो कि इस विषय का अधिक गहन अनुबोध विकसित हो सके। सामाजिक सांस्कृतिक आर्थिक व राजनीतिक कारणों की उपादेयता को विस्तृत करने के लिए शैक्षिक समालोचनात्मक विधियों का भी यहां प्रयोग किया गया है। आंकड़ों के विश्लेषण से प्राप्त निष्कर्षों और साक्षात्कार व अवलोकनों के नतीजों में समरसता पाई गई।

**Key Words :** Science learning environment, What is Happening in This Class (WIHIC), Students' attitudes, Educational, Educational critique, Gender differences

### Introduction

The notion that a learning environment exists which mediates aspects of educational development (sciences and otherwise) began as early as in 1936 when Lewin (1936) recognised that the environment and the personality of the individual were powerful determinants of behaviour and introduced the formula,  $B=f(P,E)$ . Since Lewin's time, international research efforts involving the conceptualisation, assessment, and investigation of perceptions of aspects of the classroom environment have firmly established classroom environments as a thriving field of study (Fraser, 1994, 1998; Fraser & Walberg, 1991). For example, recent classroom environment research has focused on constructivist classroom environments (Taylor, Fraser

& Fisher, 1997), cross-national constructivist classroom environments (Aldridge & Fraser, 1999; Fisher, Rickards, Goh & Wong, 1997), science laboratory classroom environments (McRobbie & Fraser, 1993), computer laboratory classroom environment (Newby & Fisher, 1997), computer assisted instruction classrooms (Stolarchuk & Fisher, 1999; Teh & Fraser, 1995) and classroom environment and teachers' cultural backgrounds (Khine & Fisher, 2001).

Despite the fact that a great deal of classroom learning environment research has been carried out over the past 30 years, most of the work was conducted in western cultures in early years (Fraser, 1986, 1994, 1998, Fraser & Walberg, 1991, Wubbels & Levy, 1993). However, classroom environment research has gathered

momentum in Asian countries in recent years (Aldridge & Fraser, 1999; Khine & Fisher, 2001; Riah & Fraser, 1998; Wong & Fraser, 1994). Evidence from these studies revealed that classroom learning environment dimensions are good indicators of teaching and learning process and their predictive power on a number of learning outcomes points towards the possibility of improving students' outcomes through changing classroom environments.

It is well-documented in reviews of literature that women are under-represented in science and technology courses and careers (Greenfield, 1996; Kahle & Meece, 1994) and the boys outperformed girls in science (especially physical science) (Bellar & Gafini, 1996; Kahle & Meece, 1994; Murphy, 1996). Among the sources that may cause these differences are individual, cognitive, attitudinal, socio-cultural, home and family, and educational variables (Baker, 1998; Farenga & Joyce, 1997; Kahle & Meece, 1994). In the classroom context, boys and girls may not have equal opportunities in science activities, and this could cause gender differences in science achievement (Fraser, Tobin & Kahle, 1992; Harding, 1996; Warrington & Younger, 1996). Because educational variables are one of the important sources for accounting for gender differences in students' achievement in science, and for participation in science activities, the perspective of gender differences needs to be understood.

The present interpretive study went beyond past research and involved a multi-method approach. This study explored factors associated with students' perceptions of learning environment. Furthermore, by drawing on a range of paradigms, a more in-depth understanding of socio-cultural and political influences on the classroom learning environments in India was explored.

In a study on associations between learning environments in mathematics classrooms and students' attitudes, using the WIHIC questionnaire (Rawnsley & Fisher, 1998), it was found that students developed more positive attitudes and hence receptivity towards their mathematics in classes where the teacher was perceived to be highly supportive, equitable, and where the teacher involved students in investigations.

Associations between actual classroom environment and outcomes were investigated using actual and preferred forms of the WIHIC (Chionh & Fraser, 1998). The associations between examination results,

self-esteem and attitude scale and seven classroom environment scales were investigated in mathematics and also in geography classrooms in Singapore and Australia. It was found that better examination scores were achieved where students perceived the environment as more cohesive. Self esteem and attitudes were more favourable in classrooms perceived as having more teacher support, task orientation and equity.

Hunus and Fraser (1997) used a modified version of the WIHIC in Brunei, and reported on the associations between perceptions of learning environment and attitudinal outcomes. Simple and multiple correlations showed that there was a significant relationship between the set of environment scales and students' attitudes towards chemistry theory classes. The Student Cohesiveness, Teacher Support, Involvement, and Task Orientation scales were positively associated with the students' attitudes.

Khoo and Fraser (1997) used a modified version of the WIHIC to measure classroom environment while evaluating adult computer courses. The Cooperation scale was dropped in this modified version and Student Cohesiveness and Teacher Support were collapsed into one Scale named Trainer Support. A set of 38 items was retained after factor analyses. This study indicated that the males perceived greater Involvement, while females perceived more Equity. The other striking result of the study was that older females had a more positive perception of Trainer Support than the younger ones.

Fraser and Aldridge (1999) used English and Chinese versions of the WIHIC in Australia and Taiwan, respectively, to explore the potential of cross-cultural studies. Results of the study indicated that students in Australia consistently perceived their classroom environment more positively than students in Taiwan. Significant differences were detected on the WIHIC scales of Involvement, Investigation, Task Orientation, Cooperation and Equity. This indicated that students in Australia perceived they are given more opportunity to get involved in the experiments and investigate scientific phenomena. In this study, cultural differences were highlighted. Education in Taiwan is examination based and teaching styles are adopted to suit the particular situation. In Taiwan, having good content knowledge of the subject was the yardstick for being a good teacher, while as in Australia having good interpersonal relationships between students and teachers is considered the most important factor in education process. Taiwan classrooms are teacher



centred giving very little opportunity to students to discuss issues.

### **Development and Validation of the Questionnaire 'What Is Happening In This Class?' (WIHIC) (in the context of science learning)**

The WIHIC questionnaire brings parsimony to the field of learning environment by combining modified versions of the most salient scales from a wide range of existing questionnaires with additional scales that accommodate contemporary educational concerns (e.g., equity and cooperation; Fraser, 1998). Based on the previous studies, Fraser, Fisher, and Me Robbie (1996) developed this new learning environment instrument. The What is Happening In This Class? (WIHIC) consists of 7 scales and 56 items (Fraser, Fisher and Me Robbie, 1996) The 7 seven scales are Student Cohesiveness, Teacher Support, Involvement, Investigation, Task Orientation, Cooperation and Equity. Table 1 shows the scales in the WIHIC, along with a brief description and a sample item from each scale in the questionnaire.

The WIHIC questionnaire has been used to measure the psychosocial aspects of the classroom science learning environment in various contexts since its development. In certain cases, the questionnaire has been adapted without any modification, while as in other cases modifications were made to suit the specific context. Currently, the original questionnaire in English has been translated into Chinese for use in Taiwan (Aldridge and Fraser, 1997) and Khine and Fisher (2001) used the WIHIC in Brunei to study the classroom environment and teachers' cultural background in an Asian context. The study found that teachers from different cultural backgrounds created different types of learning environments. It also indicated that the WIHIC is a useful instrument to measure the cultural background differences and it can be used as a basis for identification and development of desirable teacher behaviours that will lead to a conducive learning environment.

The above studies support the validity and reliability of WIHIC in portraying the nature of science classroom environments. These studies also have consistently demonstrated that the WIHIC can be used to gather information from students for improving teaching and learning in different classroom contexts. Thus, with such a wide use and applicability of the WIHIC, its applicability was validated in India to get an insight into its use as well as insight into the Indian classroom learning environment.

### **Methodology**

The aims of the study were to :

- Provide further validation information about the WIHIC (in terms of reliability, factor structure, ability to differentiate between classrooms, etc.) when used with an Indian sample;
- Investigate associations between students' perceptions of the classroom learning environment in India and to students' attitudes to science;
- Investigate differences in the perceptions of male and female students about their science classrooms in India; and
- Conduct observations and in-depth interviews with students to obtain a deeper understanding of science classroom learning environments in India.

This study was carried out in the city of Jammu, India. The sample consisted of 1,021 students from classes 9 and 10 who completed the WIHIC and an Attitude Scale. These students were from seven different co-educational private schools. The total number of classes covered was 31 and the average class consisted of 27 students. The qualitative component involved a subsample of two students from each class. Sixty two students were interviewed and furthermore each class was observed for a period of two lessons of half an hour each.

### **Results**

#### ***Reliability and validity of the WIHIC***

In the statistical analyses, the internal consistency (Cronbach alpha reliability), discriminant validity (mean correlation of a scale with the other six scales of the instrument) and an ANOVA to determine the ability of the WIHIC to distinguish between classrooms were used. The results are reported in Table 2. The reliability coefficients for different WIHIC scales ranged from 0.58 to 0.83. The highest alpha reliability (0.83) was obtained for the Equity scale and the lowest (0.58) for the scale Student Cohesiveness. The results being consistently above 0.50 suggest that the WIHIC can be considered to be a reliable tool (De Vellis, 1991) for use with Indian students.

The mean correlations of one scale with the other scales ranged from 0.38 to 0.47. These values can be regarded as small enough to suggest that each scale of the WIHIC has adequate discriminant validity, even though the scales assess slightly overlapping' aspects



**Table 1 : Scale description and example of items in the What Is Happening In This class? (WIHIC) questionnaire**

Scale	Description	Item
Student Cohesiveness [SC]	Extent to which students know, help and are supportive of one another.	I make friendship among students in this class
Teacher Support [TS]	Extent to which teacher helps, befriends, trusts, and shows interest in students.	The teacher takes a personal interest in me.
Involvement [TV]	Extents to which students have attentive interest participate in discussions, perform additional work and enjoy the class.	
Investigation [IN]	Extent to which there is emphasis on the skills and their use in problem solving investigation.	I am asked to think about the evidence for statements.
Task Orientation [TO]	Extent to which it is important to complete activities planned and to stay on the subject matter.	Getting a certain amount of work done is important.
Cooperation [CO]	Extent to which students cooperate rather than compete with one another on learning tasks.	I cooperate with other students while doing assignment work.
Equity [EQ]	Extent to which the teacher treats students equally.	The teacher gives as much attention to my questions as to other students' questions.

of classroom environment. In keeping with traditional learning environment, research, the  $\eta^2$  statistic, was calculated to provide an indication of the degree to which each scale could differentiate between the perceptions of students in different classes. The  $\eta^2$  statistic, which is the ratio of 'between' to 'total' sums of squares and represents the proportion of variance in scale scores accounted for by class membership. It ranged from 0.09 to 0.14 and was statistically significant for each scale. This indicates that each scale of the WIHIC is capable of differentiating significantly between classes ( $p < 0.001$ ). Overall the reliability, discriminant validity and ANOVA results confirmed that the WIHIC could be used with confidence for further research.

The very high mean scores shown in Table 3 suggest a very positive classroom environment, with the mean scores ranging between 3.89 and 4.84. The students perceived Task Orientation, Student Support and Cooperation most positively. The scores for these three scales are 4.84 for Task Orientation, 4.77 for Student Cohesiveness and 4.49 for Cooperation. The standard deviation for all the scales is less than 1, suggesting that there was not large diversity in the students' perceptions. Generally, the students perceive

a very positive science classroom learning environment in India.

#### *Associations between learning environment and attitudinal measures*

Associations between science classroom environments as measured by the WIHIC scales and students' attitude towards scientific inquiry were explored by simple and multiple correlation analyses. As shown in Table 4, the results of the simple correlation analysis revealed that all the seven scales were significantly correlated with attitude to science classroom environment ( $p < 0.01$ ). It was found that these associations were positive ranging from 0.17 to 0.38.

The multiple correlation,  $R$ , was 0.43 and is statistically significant ( $j < 0.01$ ). This strongly supports the conclusion that the nature of the classroom environment is strongly influencing students' attitudes towards science lessons. In order to interpret this relationship, the standardised regression coefficient ( $b$ ) was also examined. It was found that out of seven scales, three scales retained their significance ( $p < 0.01$ ). This means that the scales Investigation, Task Orientation and Equity are independent predictors of individual students' attitude towards science lessons. The  $R^2$

**Table 2 : Scale Internal Consistency (Cronbach Alpha Reliability), Discriminant Validity (Mean Correlation with other Scales) and Ability to Differentiate Between Classrooms (ANOVA results) for the WIHIC**

Scale	Alpha Reliability	Discriminant Validity	Anova Eta <sup>2</sup>
Students Cohesiveness	0.58	0.38	0.10*
Teacher Support	0.78	0.42	0.14*
Involvement	0.76	0.47	0.14*
Investigation	0.77	0.40	0.10*
Task Orientation	0.70	0.39	0.12*
Cooperation	0.77	0.42	0.09*
Equity	0.83	0.43	0.14*

\* P<0.001 >=1.021 students in 31 classes Student Perceptions of their Learning Environments

value, which indicates the proportion of variance in attitude towards science lessons that can be attributed to students' perception of classroom environments, was 19%.

#### ***Perception of classroom learning environments : gender differences***

Means were computed for male and female students in the same class separately. This was followed by a repeated-measure ANOVA with sex as an independent variable. In order to investigate which of the WIHIC scales gave rise to this significant difference, a paired t-test was conducted for each WIHIC scale. It was found that there were significant statistical differences in the scales for Cohesiveness, Task Orientation, Cooperation and Equity. The magnitude of these sex differences are relatively large in favour of female students. These results suggest that girls on the whole have more positive perceptions of their science classes than did boys. Girls seem to perceive their science

teacher as more cohesive, task oriented, cooperative and giving them equal opportunity in the class. On the other hand, the boys perceived for more of teacher support, involvement and investigation activities in the science classroom.

#### **Qualitative data**

The results of the large-scale quantitative probe led the researcher to generate qualitative data to provide more insight into the students' perceptions. The student's anecdote comments obtained from the interviews were generally consistent with their perceptions of their classroom learning environments as indicated by the WIHIC, adding to the validity of the instrument for measuring students' perceptions on classroom learning environment. From the student interviews, which were based on items of the WIHIC, the researcher felt that understanding of socio-cultural factors and the educational system was important. The researcher has tried to give a glimpse of the educational system along with socio-cultural and political scenarios in the form of a story (Clandinin & Connelly, 1994). This story is based on observations and interviews made over a number of occasions, to provide an authentic paradigm with which the reader can identify (Adler & Adler, 1994). Although all aspects of the story might not be present in anyone classroom, none are uncommon in the classrooms observed. The story is followed by an interpretative commentary (Geelan, 1997) to help place it in context with science classrooms in India.

#### **The school ambience : Researchers' account**

It was a cold chilly morning and I was scheduled to go and observe a Science Classroom. It was a solid

**Table 3 : Mean and Standard Deviation for Each WIHIC Scale**

WIHIC Scales	Mean	Standard Diviation
Students Cohesiveness	4.77	0.54
Teacher Support	4.00	0.87
Involvement	3.89	0.79
Investigation	3.89	0.83
Task Orientation	4.84	0.63
Cooperation	4.49	0.77
Equity	4.57	0.89

concrete three story building with a play ground at the back of the school. The entrance hall / foyer of the school was well furnished and there was hanging an eye catching nine feet by four feet poster which showed a burning candle in it and read 'TEACHER IS LIKE A CANDLE. IT BURNS ITSELF TO GIVE LIGHT TO ITS STUDENTS'. The principal deputed a teacher to assist me. After the usual protocol, we headed towards the classroom, which was on first floor. On my way to the classroom, I saw students returning quietly from a morning assembly in neat straight queue. They were all wearing neatly ironed school uniforms.

By the time, I reached the class, which I was going to observe, the teacher had already arrived. On my entry into the class, the teacher paused and all the students got up as a mark of respect and welcomed me. I thanked them and requested them to sit down. I tried not to disturb them and quietly went and sat on a chair at the back of the room. This was a well ventilated classroom with nearly 50 students in it. The classroom was furnished with desks and benches, which were nearly two and a half feet in length and three students, shared each set of bench and desk. Big satchels hung at the back of their benches. Two fans were fixed to the ceiling but being a cold day they were not working, but I was told that even in summer months they would face power failures / cuts from time to time. Male and female students sat on the opposite sides of the classroom. The walls of the classroom were decorated with educational charts, moral sayings and photographs of the national leaders. There was an elevated dais for the teacher, which was furnished with a chair and a table. The teacher faced the students most of the time with a black chalkboard at her back, the only permanent visual aid, which she used. From time to time, the teacher used charts or specimens, which had to be specifically issued by the school library on request.

The teacher started that day's lesson and, as indicated on the black board, she was going to teach 'Reflection by Spherical Mirrors'. The classroom had 'pin-drop' silence. The lesson started with an introduction to light, which the students must have done in the previous year. The teacher then unfolded a chart showing the different positions and the nature of the image formed by a concave mirror. At the same time, the students had their textbooks opened and they were also referring to the book. While going through the lesson, the teacher also

**Table 4 : Associations between WIHIC Scales and Attitudes Towards Science Lessons in Terms of Simple Correlations (r), Multiple Correlation (R) and Standardised Regression Coefficient (B)**

Scale	Attitude to Science	
Students Cohesiveness	0.17*	-0/03
Teacher Support	0.23*	0.04
Involvement	0.24*	0.01
Investigation	0.27*	0.1*
Task Orientation	0.38*	0.27*
Cooperation	0.23*	0.00
Equity	0.32*	0.15*
Multiple Correlation	R0-43* R <sup>2</sup> 0-19	
*P<0.01	n=1,0,21	

drew the figures on the black board. Later in the lesson, the teacher asked the students if they had any doubts about the content taught. The students raised their hands and the teacher answered each one of them one by one. While answering the queries of the students, the teacher also cross examined them for their understanding by asking them more questions on the same topic. After this, the teacher wrote a few questions on the black board and the students were asked to answer them in their notebooks at home. Next day they would submit the homework to the teacher for correction. Only five minutes were left before the next class and two student representatives stood up. One started distributing the note books which the teacher had corrected and brought with her, while the other one started collecting note books from the students where the home work given on the previous day was done. The teacher assistant told me that these students had class tests every Monday on the topics taught in the previous week.

The weekend was said to be the right time to learn and then revise. The students have to get these answer books signed by their parents. Soon the school bell rang for the next lesson and all the students got up in respect of their teacher and farewell her collectively. I also left the classroom at the same time.

This account is of a typical year 9, science classroom in India.

**Table 5 : Female and male students' perceptions of Classroom Learning Environment using WIHIC and Within-Class Gender Subgroup Mean as unit of Analysis.**

Scale	Gender	Mean	Std. Deviation	t-value
Students Cohesiveness	Female	4.20	0.48	2.38*
	Male	4.13	0.45	
Teacher Support	Female	3.48	0.77	-0.83
	Male	3.52	0.75	
Involvement	Female	3.37	0.69	-1.6
	Male	3.44	0.69	
Investigation	Female	3.38	0.77	-1.98
	Male	3.47	0.66	
Task Orientation	Female	4.31	0.50	5.00**
	Male	4.13	0.59	
Co-operation	Female	4.00	0.65	3.92
	Male	3.83	0.69	
Equity	Female	4.11	0.67	5.25**
	Male	3.85	0.68	
Female n=581 Male n=440		*p<0.05	**p<0.01	

### Comments on findings from Interviews and Observations

The curriculum could be a major influence on the learning environment created in the country. The classrooms are teacher centred, where the students appear to have a very passive role. This was mostly due to the fact that the curriculum was of an examination driven nature and teachers had to finish the prescribed course content in a given frame of time in order to produce results. On top of this, the socio-political instability in the country / city is making it extremely difficult to finish all the course content and the teacher has to press students hard. To achieve this students also have to produce good results, as competition is very tough for entry into the university courses they want. The social fabric of the society is such that only a student who gets a high score in the examination is accepted by his peers in specific and respected by the society in general. Keeping all these factors in mind, the lecture method of the teacher is probably justified.

The practice of written homework and weekly tests are examples of rote learning. Students when interviewed about this aspect, said that they could do well in weekly tests and then they had to go back

to these topics only towards the end of the year when they would have final examinations where they had to go through whole of the course content. The major aim of students is to work towards getting good scores. The practice of getting test papers signed was to keep parents informed about the progress of their children.

Respect for the teacher is reflected through the practices and values given to students through the school. Students get up and greet their teacher on her / his entry or when leaving the classroom. Students never question the teacher's knowledge. During an interview, a student was asked if the teacher scolded the student and if so, how would they feel? The student replied that the teacher did scold but it was for their good, and thus she never felt bad about it. While clearing the doubts of students, the teacher would cross question the students and they did not object to this. Keeping all these factors in view, it seems the teacher enjoyed an ultimate unquestionable authority position in the classroom.

The interviews and observations indicated that education is focused predominantly on the development of academic ability of students. In short, we may say that the learning environment created by educational,

social and cultural influences is favourable for the science students living in India.

### Conclusions

Science can be viewed as a cultural artifact and it is embedded in and is influenced by society and culture (Fisher & Waldrup, 1999). Many research studies have been carried out in education concerning cultural diversity in the classroom (Atwater, 1994; Cobern & Aikenhead, 1998), but very few studies have been carried out with teachers' cultural backgrounds and sex in view.

Aldridge, Fraser and Haung (1999) while carrying out a study on classroom environments in Taiwan and Australia, found that education in Taiwan focused predominantly on academic ability of the students and social and emotional development were considered to be the responsibility of the family. But in Australia, teachers considered academic advancement as one of the aspects to be developed in students among many more. In most of the Asian countries, education systems are examination oriented and the teacher follows a fixed syllabus.

This study investigated the nature of classroom environments in Jammu (India). Data analyses supports the validity and reliability of the WIHIC when used in India in this context. Being a pilot study of its nature in this part of world, an in-depth view of the learning environments is gained.

The ultimate aim of education is to produce healthy minded and scientifically thinking productive citizens. This can be achieved through positive attitudes towards learning by creating an enjoyable and productive learning environment. The existing learning environment can be re-inforced by incorporating more interactive practices.

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## Science Fiction : Science Popularisation at its Best

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“The Visitor from the 21st century seemed to read my mind. For he continued, ‘you have perhaps wrong notion about time-machines. Wells’ machine belonged to the Mechanical Age. We of the 21st century consider your machines as primitive toys. My time machine is not a machine at all. It’s a quasi-temporal hypo-astral matrix..... Why spell out the details?’

‘But just now you said you have invented a time-machine’. I objected. ‘That’s for your benefit. I know I have to express myself in mechanistic terms to make myself intelligible.’

‘More pantomime, we almost heard him say ‘Good night, ladies & gentlemen’ but he vanished once more.

“My fellow tourists could not digest the fact that the visitor might really be a time traveller. Even the technical staff on the plane were certain that we had encountered a modern ghost, who can tell?”

Thus ends my science fiction story, ‘The Visitor’. Obviously the story was inspired by H.G. Wells’ classic, ‘The Time Machine’ and at the time of this writing literally, thousands of time-travel stories must have been published under mainstream Science Fiction (SF).

The almost mystic paradoxes - which can be picked up by the dozens - make the time travel tales most enjoyable. I have projected my short story as a ghost story but with an important difference. The ‘ghost’ of my short story does not arise from the dead but materialises from the future. One might call it a ghost story in the reverse.

I have prefaced this article with a sample of a SF by the author, to illustrate some of its striking features. Like a bat, SF is neither a bird (of fancy) nor an animal. For the uninitiated, SF is still neither science nor pure literature. The alien nature of SF can best be illustrated by an example (hypothetical) picked up from the SF field itself. Imagine a space ship (UFO) from another planet which has just landed on our planet. If the alien

visitors who have piloted the ship want to contact us, how should they go about interacting with us? "(Incidentally, this is a problem in communication technique.) First, they have communicated to us that they have ‘arrived’ physically since their ship is solidly squatting on our terrain. But for real comprehension of what their arrival means, we must have a complete account or information about their evolution on a different planet and about the purpose of their landing here. Only their willingness to communicate is clear but the mode or even the possibility of communication is a tantalising question.

At this stage, SF writers take over and work out any number of ‘solutions’ to this deadlock thus creating a new type of SF under ‘extra terrestrial linguistics’.

Since the central theme of this article is to defend SF as a very effective vehicle of science communication — via my own experiments and experiences as an SF writer. I will not dwell upon the theme of the previous paragraph to develop the article.

Let me begin with the characteristic features of SF. The most striking of these is that SF is that it is a creative effort. But the second aspect, which relates SF to science (or technology) is the use of science in an extrapolatory manner to anchor the story. Broadly speaking, science fiction often leads to science facts of the future. This makes SF a futurological and many a time a prophetic enterprise. The third aspect is that science facts / marvels / paradoxes / problems provide the key ideas to SF. The rest of the homework is left to the SF writer. He often borrows a science idea (like genetic engineering or exploration of the atom) and then proceeds to weave a plot, creates suitable characters and then starts telling an incredible story in a very credible manner, like any other creative writer.

The fourth aspect, which appeals to me most and which has literally shaped my very personal development as an SF writer is that SF transcends barriers like

nationalities, creeds and even space-time. When a poet sees a rainbow and exclaims, "My heart leaps up when I behold a rainbow in the sky (Wordsworth), he is giving vent to romantic feelings about the world around him and there is a sense of liberation (both to the poet and to the readers). Likewise when a SF writer creates his story on a cosmic scale, he unshackles both himself and his readers, who are transported to worlds of infinite potentials. After all, is it not an important function of literature to transport the readers?

Like any other literary effort, SF comes in different shapes and sizes, e.g. there are short stories, noveles and novels, plays, films and even poems. Also subjectwise, there are space tales, time travel stories, utopian tales, stories of unusual inventions and of biological freaks and so on. But from the point of view of communication, I can think of only three broad kinds of SF. Probably, this approach throws more light on SF as a craft than on its contents and format.

The first type is purely academic and therefore technical to some extent. The second type is completely escapist. The third follows the golden mean and might be called classic SF.

For example, Konstantin Tsiolkovsky's (the father of Russian Space Science) works were written as SF but with a purpose. He himself described his efforts thus; "First, inevitably, the idea, the fantasy, the fairy tale. Then scientific calculation. Ultimately fulfilment crowns the idea." Even Dr. Jayant Narlikar's SF is academic, though nominally written in the form of short stories or novels. On the positive side, such SF stimulates the readers intellect but on the negative side, there is practically no story-line to entertain the casual reader. This is both the strength and pitfall of the academic kind of SF. Its merit from the communicator's view is that it is often excellent popular science. As a matter of fact, many Russian popular science books resort to the trick of writing some chapters in SF mode as a very effective way of communicating science ideas / concepts to the common man.

At the other extreme, escapist SF - which is naturally most widely read because it has practically nothing to communicate, is published and read as any other popular brand of literature. It takes so much liberty that sex, violence, fantasy and antisocial elements find their way as a matter of routine. There is every danger that such fiction might tend to be pseudo-SF, being in the class of legends, myths and fairy tales. But luckily there are some acid tests to

ensure that this kind of popular SF does not fall outside SF categories. Magazines and over-enthusiastic authors (and publishers) attempt this kind of SF. In our country, where popularisation of science is a crying need, this kind of SF is (believe it or not) most welcome.

The classic SF - though it is unfair to exclude the above two categories from this kind - is really the kind of SF which contributes mainly to the mainstream literature. But is the hardest to create. Everybody cannot become a Wells or a Clarke or an Asimov or a Narlikar just like one cannot write in the class of Shakespeare or Hardy. Among modern writers; Hoyle, Clarke, Asimov and Lem (to name a few) have established themselves as writers of classic SF.

### **SF : The Cinderella of popular science**

But the question remains : what is the status of SF in popular science? And while trying to answer this key question, I am faced with a very hopeless situation, which is almost paradoxical. There is almost universal agreement that SF is a very popular means of communication. There is also no doubt that SF has carved a place for itself in literature. But the tragedy of SF is that it is never fully being exploited, as a means of science communication, especially in popularising science. This apathy of science communicators has forced the author to call SF the Cinderella of popular science. Only recently do I find some healthy trends here and there where SF is also reckoned as a means of science communication. Neither academicians nor literary critics care to include SF in mainstream literature. At the most it is only Poe, Wells or Verne who are grudgingly recognised as 'classic' authors but even in their case, their fundamental and pioneering contributions to scientific activities (practical or hypothetical) is carelessly brushed aside.

If this is the fate of SF in the West, it is unimaginably worse in our country, which boasts of a very large number of working scientists.

What are the possible reasons for this total apathy? In other words, why is SF the Cinderella of popular science?

My experience and analysis lead to some possible causes for this neglect of SF.

Let us first confess that SF has not yet taken shape and, therefore, has not yet 'arrived', yet our writers mostly write in their mother tongues (there are at least about 15 such languages) severely limiting their circulation. As a matter of fact, Indian readers are more

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familiar with western SF than with their native SF. Whether they like it or not, Indian writers and publishers are mainly responsible for this. Why is it that Indian writers avoid writing SF and, equally so, why is it that Indian publishers do not encourage SF?

The answer is rather complicated but is not difficult to understand. The first reason is that our scientists and even popular science writers feel diffident to venture out as creative writers. There seems to be some sort of a 'superstitious' impression that writing SF is below their dignity. When I started writing SF regularly about three decades ago, some 'highbrows' tried even to condemn me. This kind of damaging attitude is not uncommon.

Secondly, a SF writer must necessarily be good in basic sciences. He must also be a good story teller. This is a formidable combination.

The third reason is very peculiar and hard to digest. Like science (in the Western tradition) SF is also an alien activity to the Indian psyche. We have accepted Western S&T out of necessity but we have yet to assimilate SF in our mainstream literature.

The fourth reason is funnier still. Though translations and adaptations of English (and Western) classics are published and read widely, the same is not true of SF. I have been advising potential SF writers and publishers to make efforts in this direction, but always with little success.

What then should we do to give the required thrust to SF as a means of popularising science? Listed below

are a few suggestions for serious consideration of the science communicator's community.

1. A SF magazine in English or Hindi and other language editions should be launched.
2. Anthologies and translations of SF (In Indian languages) must be regularly brought out.
3. SF samples must be included in our language text books at school and college levels.
4. The Sahitya Academy and similar august bodies should institute lucrative prizes and awards for good Indian SF.
5. Language departments of Indian Universities should open wings for academic study of SF. They may even start Diploma Courses in SF writing and appreciation.
6. National / state level seminars and workshops to bring together recognised and potential SF writers for serious discussions should be organised.
7. SF writers' / fans' associations should be launched. (COSFAI is one such but is yet to take off).
8. Our popular science writers should take a cue from Russian writers and try to write in SF format. The prejudice that SF is bad science is unfounded.

I sincerely hope that a convincing case has been made here for the SF as a powerful and romantic means of popularising and communicating science, hoping that our Cinderella meets her Prince Charming soon. ■

### **Moving! Keep Us Informed**

Please keep us informed of your latest mailing address, in case you have moved or planning to move from your present address, so that you do not miss even a single issue of *IJSC*. Write to 'Coordinator *IJSC*'.

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## Public Understanding of Science : Issues are many!

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We live in an age of high technology. One argument for the public understanding of science runs something like this, "Nations with low scientific literacy will not have enough competent workers. They will lose ground in the global market place. Consumers will fall prey to charlatans. Governments will make unjustified decisions that would be a shame, but there is worse. Scientifically illiterate humans could breed, bomb or pollute themselves to extinction."

The issue of scientific literacy has its roots in decades-old debates about public education. It is a general belief that if one can not read, write or add, he's not likely to know much science. According to Jon Miller, Director of the Public Opinion Laboratory at Northern Illinois University, "Scientific literacy is one of those terms that is often used but seldom defined." He begins with a practical definition – the scientifically literate should understand the scientific method and vocabulary well enough to follow public debates about issues involving science and technology. They should understand, for example what a correlation between smoking and lung cancer implies and the social impact of these findings.

One of the early opinion survey carried out in United States in 1957, indicated that only about 12% of American adults understand 'scientific attitudes'. In 1979, Miller and Kenneth Prewitt conducted an open ended survey, including three items to probe familiarity with 'basic science and social science terminology'. Each respondent was asked to report whether he or she understands radiation, DNA and GNP. Half believed they had a clear understanding of radiation; a third thought they understood GNP; a fifth felt confident that they knew the meaning of DNA.

To measure competence in another aspect of scientific understanding, awareness of the social impact of science and technology, a survey was conducted by National Science Board in 1979. The NSB asked

respondents to name at least two potential benefits or dangers of food additives, nuclear powers and space exploration. About two third came up with answers for food additives and nuclear power, but only a third could think of two things good or bad about space exploration.

Miller believes that scientific understanding requires competence in all three areas : understanding the scientific method; Knowing its common vocabulary and appreciating social impact. Miller's essential point is that the level of scientific literacy is still low and that the informal education of recent years through television, popular magazines, and museums has not produced any measurable increase.

It is also important to realise that the public understanding of an issue depends on how the people on their own see that issue or rather how it is presented to the people. The perception would be influenced by the angle through which the people are made to see that issue. Scientific issues may be seen by the people in the light of developments directly related to that particular item. This is especially true in the case of nuclear power generation.

It is a quirk of fate that the public becomes aware of the awesome destructive potential of nuclear energy much before it learnt of its beneficial uses. The people saw nuclear energy being harnessed for war time activity much before it became aware of its peaceful uses. It is true that Hiroshima and Nagasaki happened but once and have not been repeated. The mere mention of the hypothetical possibility of a repeat performance is enough for people to shut their minds to reason. Add to that the Three Mile Islands and Chernobyls and the opponents of nuclear power find the ground extremely fertile for their ideas to take deep root. This is where the proponents and those who participate in the generation of nuclear power need to have taken the preliminary steps to educate the public about the true status of nuclear





power or its relevance in the context of the general energy scenario.

The veil of secrecy that has shrouded nuclear establishments, even those totally dedicated to peaceful or beneficial uses, has made the situation worse for it helps create an impression that all the uses are for defence and hence destructive purposes. It is essential to correct this misinterpretation and to take the people in confidence.

Similar somewhat, is true in the case of aminocentesis test which is used to detect genetic diseases at the foetal stage but it is being misused by the people. As sex of the foetus can also be determined by this test, people have been using this test to find out the sex of the baby. In our male dominated society where the birth of a female child is still considered unpreferred, people have been using this test to find out the sex of the baby so that a female foetus can be aborted. Several associations and social workers have raised their voice against this female foeticide despite a ban on sex determination of foetus. Under such circumstances, the burden of educating the public and make it not

only scientifically literate but also well informed, lies squarely on the shoulders of scientists as well as science journalists.

It is the responsibility of journalists, mediemen as well as scientists to assist people overcome deep suspicion of scientific research, it can be well understood by the following example. Once upon a time, some diseases like small pox, plague and malarial, etc., were considered quite dreadful but now smallpox has been eradicated. This became possible only because of public awareness. Without community participation it was quite impossible. Even today, a nationwide surveillance network against the spread of AIDS is being setup. Community itself becomes a major resource in developing effective and efficient health services but individuals and communities must be well informed.

Even so, it may not be too late, the scientists may still rise to the occasion and create a higher level of public understanding of their objectives, their rationale, their priorities, their sets of values, processes, achievements and above all their concern for humanity at large. ■

### Commissioned Studies/Papers

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

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





## Teaching Science in an Exciting and Interesting Manner

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It involves multi disciplinary teaching of science subjects. Use of limited and low cost resources, which are easily available anywhere even in schools in rural areas.

By involving the students with easily practicable experiments the subjects can be made very interesting and exciting and the student is able to grasp the different subjects very easily and this precisely is the hallmark of this teaching concept.

Given below is a simple project for a classroom (for 3rd to 5th standards) of about 40 to 60 students. It is important that a teacher is always present and only about 15 minutes a day need to be spent on these assignments.

As the project progresses, the students are practically exposed to many aspects and some of them can be pointed out by the teacher. The students' curiosity is aroused and they will ask many questions which need to be clarified there and then. The teacher also should encourage the students to raise more and more questions.

The project with which the author has worked cover the following subjects :

- Photo-synthesis
- Environment – oxygen / carbon-dioxide
- Measurement of lengths
- Measurement of areas
- Generating statistics
- Preparing graphs
- Reproduction
- Botany
- Pollination
- Organic farming – kill pests and weeds without using pesticides – use of biological pesticides for controlling pest.

- Dignity of labour
- Selling
- Value for money

Resource required :

1. A very small plot of land (around 100 sq. metre is enough for about 50 students)
2. Limited quantity of water for irrigation
3. Tomato or any other plant seeds

The preferred time to carry out this project is before school starts or just before lunch break, about 10 to 15 minutes is allotted for the project.

A small area of about 2 sq. ft. is allotted to every student. A small name card or painted plywood with a spike where the name of the student is written, is put up in the area to identify and establish that a particular area belongs to a specific student. This brings in a sense of belonging and whatever grows there is the student's own.

With the help of a fork or spike the student is asked to clean up the weeds, loosen the soil, remove the stones, etc., and a small ridge is formed. The student is asked to pour water into the ridge. As all this is going on, the teacher gives a small explanation about the importance of soil, why and how it should be treated, removal of weeds, etc.

Next day a few seeds are planted and watering done. Explanation of seeds, germination, role of water, etc., is explained.

Everyday the students are asked to water the plants allotted to them, each plant as it is growing will be known as student's own.

As the plant starts sprouting, the student can be asked to measure the growth using a scale and to maintain a record book, noting everyday growth. As the leaves start growing bigger, the length of the leaves and number of leaves can be noted.



Around this time the teacher can give small explanations everyday near the plants – about importance of water, water conservation, functions of leaves, photo-synthesis, absorbing of carbon-dioxide and releasing of oxygen, plants and environment, rain water harvesting, etc.

The students will absorb whatever is told as it involves their very own plant.

Measuring the height everyday will make the students aware of measuring lengths in millimetres, centimetre, etc. Also the students are exposed to perception of length and estimating.

Entering the measurements in a log book or record book is done voluntarily by the student as he compares the growth with his classmates.

When the leaves are of a certain size, one or two leaves can be plucked and each student can be taught to measure the areas of the leaves. This exposes the students to measurement areas in sq. millimetres and sq. centimetres or any other unit.

After a month or so each student can be given a graph paper and can be asked to plot the growth of the plant. Explanation of 'X' and 'Y' axes, relation of time to the growth, etc., are learnt in a natural way. Exposure to plotting of graph and its application is learnt by the students in the most practical manner.

Some plants may be tall, some not so; some might be in the shade; the teacher can explain about photosynthesis and importance of sunlight in relation to growth.

Some may have attracted insects and are spoiled. The teacher can explain about natural pesticides, weeding, removing of weeds, insects, etc.

Exposure to organic farming and its advantages can be explained. Measures to kill pest and weeds without using pesticides, recycling of agriculture waste can also

be explained. An exposure to biological pesticides can also be given.

When flowering takes place, the teacher can speak about pollination and can touch on reproduction, etc.

As the tomato grows, the teacher can slice a raw and a ripe tomato and explain the various parts, the contents, the various vitamins it contains, etc.

Now, around four month later the tomatoes have ripen. The good ripe tomatoes can now can be plucked and a group of 4 or 5 students can be asked to combine their produce and take them to the streets and sell it.

The students learn the value and dignity of labour; the value of money, how to identify, count and handle money, team work and team spirit and can develop scientific attitude in the process.

It was noticed that the students who have undergone the above exposures had different outlook than earlier, their sense of appreciation, the pride that they can also grow and produce, etc., made them much more calm and responsible. Their self confidence and analytical ability went up many folds.

The tomato is not the only example which can be grown and others such as spinach, potato, etc., can also be selected for this exercise, depending upon the environment and conditions.

This is just one project which has helped gain tremendous exposure for students. Many more such projects can be developed. The onus lies on educationists to create such projects using low cost resources to teach, which is what India and other developing countries need most. The approach, with or without minor adjustments can be very effective again for science communication, because there exist undoubtedly many overlaps in science education at primary school level and science communication activities. ■

### 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'.



# Sciencoon

## SAVE TEARS, SAVE WATER



"As tears are chemically water only". So if you want to conserve water, always laugh and water would be conserved without efforts.

- Praseon



- Praseon

Praseon Paliwal,  
Class X, Vadodara (Gujarat)

## Indian Journal of Science Communication

*An International Half-yearly Research Journal in Science & Technology Communication*

A Joint Publication of

National Council for Science & Technology Communication, New Delhi  
and Indian Science Communication Society, Lucknow

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## Some of Our Premier Science and Techonology Institutions

"It is an inherent obligation of great country like India, with its tradition of scholarship and original thinking and its great cultural heritage, to participate fully in the March of Science, which is probably mankind's greatest enterprise today".

**Review**

Scientific Policy Resolution 1958



Dr. A. P. J. Abdul Kalam  
A President with a Difference



Shri Atal Bihari Vajpayee  
Prime Minister of India



Sri Bachi Singh Rawat  
Minister of State for Science & Technology

### Calendar with a Difference

**Publication : Calendar, Year 2004**

**Publisher : National Council for Science and  
Technology Communication**

Dept. of Science and Technology,  
New Mehrauli Road, New Delhi-16

**and  
West Bengal Voluntary Blood  
Donor's Forum**

Raktadan Bhavan, 76, Pioneer Park  
Barasat, Dist. 24 Paragans (W.B.)

**Language : English**



If one thought a calendar merely is record of days and dates for a year, then you are totally outdated. A calendar can be a real tool for communicating science. In fact the year 2004 Calendar brought out by the National Council for Science and Technology Communication (NCSTC) and West Bengal Voluntary Blood Donor's Forum is a collectors' delight. It communicates innovatively about the nation's Premier Science and Technology Institutions.

One of the pages of this calendar has its focus on the Survey of India (SOI), Dehradun. It gives an artistically done photograph combining with a collage of photos taken for the various activities it is responsible for. This institution is probably the oldest scientific government department, having established on January 1, 1767. The insets carry photographs of legends associated with the Survey of India. These are the Tower Station at Kanyakumari, 24 component Tide Predicting Machine at G&RB Museum, The Great Theodolite that was used in developing Great Arc Series, etc. Another inset picture is that of the Constitution of India, printed by the SOI.

Alongside the photograph, a concise yet detailed enough text describes all the important information from a common man's point of view, like responsibilities

of the organisation, a chronology of significant achievements / recognitions, major programmes, besides some other highlights.

There is another dimension to the contents of the page, that of blood - the fluid of life . Which is also treated in the manner above, however subtler in approach. The photograph therein is credited to the World Health Organisation (WHO). The text is about the chemistry of the blood. On exploring all the pages of the calendar, it reveals a series attempted at creating awareness about the importance of blood and promotion of blood donation and blood safety.

All the 12 pages of the calendar cover such institutions one by one, namely the Geological Survey of India, India Meteorological Dept., Indian Association for Cultivation of Science, Indian Agricultural Research Institute and Forest Research Institute. These are followed by the Indian Institute of Science, Zoological Survey of India, Bhabha Atomic Research Centre, All

Every moment, everyday, blood is needed somewhere

India Institute of Medical Sciences, Indian Space Research Organisation and International Advanced Research Centre.

The folio page details salient points of the science and technology policies adopted by Govt. of India so far; Scientific Policy Resolution, 1958; Technology Policy Statement, 1983 and Science and Technology Policy, 2003. Key policy objectives of the latest policy are also enumerated. The slogans for these parallel information campaigns are 'Science for Quality of Life'

and 'Every moment, everyday, blood is needed somewhere'.

NCSTC's this initiative underlines innovation and creativity in efforts for communicating science to common man. In the year 2003 too, NCSTC had brought out such a calendar depicting life and work of famous Indian scientists. Such efforts are need of the hour and they do contribute immensely towards the cause of popularising science and scientific values. ■

**L D Kala**

### To Our Advertisers

*Indian Journal of Science Communication* addresses to everyone having any take in science, technology and communication. The IJSC is of immense value to students, researchers, scientists, communicators, media persons and also to a concerned man. IJSC intends to reach out to an entirely different class of highly specialised people in the area of S&T communication the world over. It pays to advertise in IJSC. Advertising space as under is available in the journal.

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## EKLAVYA Technology Channel

Technology can play a definite role in universalising education and here is an example in quality engineering education. Eklavya - the dedicated technology channel fed by programmes of the Indian Institutes of Technology (IITs) is available equally for front ranking established engineering colleges as well as resource scarce open university engineering students or just those, interested in refreshing their academic knowledge. Technical education has truly been revolutionised.

The channel was inaugurated by the then Human Resource Development, Science & Technology and Ocean Development Minister, Prof. Murli Manohar Joshi, on 26th January, 2003. This is a joint initiative of IITs and IGNOU and is catalysed by Ministry of Human Resource Development.

Educational Technology Service Centre (ETSC) of the Indian Institute of Technology, Delhi has been entrusted with the coordination, production and broadcast of this Technology Channel, which was a conscious decision on the part of the IIT Delhi, in keeping with its tradition of producing high quality human resource for the country.

It is a channel dedicated to technical education running programmes generated at different IITs. This channel marks the beginning of a new era in the dissemination of technical education in the country. The vision is to share the knowledge and expertise with all and to bring about true socialism in engineering education cutting across all boundaries.



EKLAVYA epitomises the true spirit of learning and dedication, so irrespective of wherever you are, you will be able to share the resources available at IITs. And that too, without any 'Guru Dakshina' because it is a free-to-air channel. One's motivation and enthusiasm are the only pre-requisites. It being a totally digital transmission, one receives crystal clear images.

The entire concept is designed around sharing of the knowledge and expertise of IIT faculty with all and to bring the much sought after quality engineering education to the door steps of the entire student community. This grand initiative will bring the students pursuing the degrees in various disciplines in the area of technology and engineering much closer.

Eklavya Technology Channel brings the actual IIT classrooms virtually at the students' study table via satellite television. The channel is designed to carry video courses in different disciplines generated at various IITs on weekdays and special interest programmes on Sundays. The courses are being run in parallel, contributed by IIT Bombay, IIT Delhi, IIT Kanpur, IIT Kharagpur and IIT Madras and are repeated in the same sequence without a break. Courses from other IITs shall also be made available in future. It started as a 16 hours-a-day affair and from 1st October 2003, it is now a 24 hours Channel. ■



*Video recording in progress*

**Prof. Arun Kanda**  
 Educational  
 Technology Service  
 Centre (ETSC)  
 Indian Institute of  
 Technology, Delhi  
 Hauz Khas,  
 New Delhi-110016

## News

### E-guide on science communication launched

An e-guide (web based guide) was launched by SciDev.Net, at the annual meeting of the American Association for the Advancement of Science (AAAS) in Seattle, United States, on Saturday 14, February 2004. SciDev.Net (Science and Development Network) is an independent not-for-profit company, registered in UK.

In the words of the Secretary-General of the United Nations, "Today, no nation that wants to shape informed policies and take effective action can afford to be without its own independent capacity in science and technology. The Science and Development Network offers up-to-date information on science-related issues and the developing world." (Science, February 13, 2004).



As Kofi Annan calls for more attention to be paid to building capacity in science and technology, the Science and Development Network announced the launch of a new e-guide on science communication.

The e-guide is a 'one-stop shop' providing both original articles and links to the best material elsewhere. Designed to inspire dialogue, it will grow as registrants from around the world add their own resources and tips. Wherever you are in the world, if you are interested in communicating information about

science more effectively, this is the guide for you. It already contains a wide range of indispensable information:

- Practical guidance on reporting on science, dealing with the media, interacting with policymakers and organising events.
- Opinion and analysis on the use of science communication in development and on communicating science to the media and public.
- A wide range of contacts, with details on international, regional and national science journalism, science communication organisations and related email lists.

The launch of the new e-guide has been welcomed by James Cornell, the president of the International Science Writers Association. "As the first science and technology news services for, by and about the developing world, SciDev.Net has finally realised the power and potential of the communications revolution promised decades ago," says Cornell. "Its new online service completes that promise by offering developing world journalists the resources they need to compete successfully in the global market."

The Science and Development Network aims to build capacity through the provision of free reliable information on science based issues for the developing world. The website is backed by the world's two leading scientific journals, *Nature* and *Science*, and the Third World Academy of Sciences. Financial support has been provided by the UK Department for International Development, the Swedish International Development Cooperation Agency, the International Development Research Centre in Canada, and the Rockefeller Foundation.

In addition to the e-guide to science communication, the SciDev.Net website ([www.sci-dev.net](http://www.sci-dev.net)) has a wide range of other materials, including daily updated news and in-depth guides ('dossiers') on topical

issues such as biodiversity, brain drain, climate change and GM crops.

**(Barbara Keating on +44 (0) 20 7291 3693;  
Email : barbara.keating@scidev.net)**

### **Ireland's first science magazine launched**

*Science SPIN* is Ireland's first science magazine. But its not just for scientists; it's for anyone with a fascination for finding out how and why.

Covering everything from astronomy to zoology, *Science SPIN* is dedicated to the science behind the news, what's coming out of Ireland's labs and the movers and achievers in Irish science.

Find out how animals communciate...why computers are set to get much smaller and smarter...see what the car of the future will look like...read about why attraction is more than just physical.

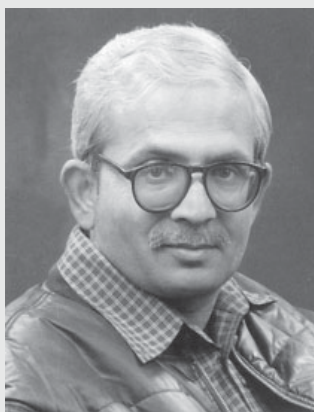
*Science SPIN* puts the big issues under the microscope and attempts to explode the myths that surround science. Coverage combines local immediacy with a global perspective.

On top of all that, *Science SPIN* is Ireland's first print media one-stop-shop for announcements about funding calls and results, events, jobs opportunities and research positions. ■

**([www.sciencespin.com](http://www.sciencespin.com))**

## **Salwi and Science Popularisation**

An inordinarily ordinary persona and a penchant for science writing, that was Salwi to most of his friends. He would visit them with a small looking bag but surprisingly larger content in it, in terms of a number of books, out to grab opportunity to meet a kid nearby and offering him one out of his bag. He had developed a knack for children, as had his writings. Out of his fifty books, most have been for young ones. He would jostle out to be amongst them. His books like 'Fire on the Moon' (science fiction) had similar tendency, this one selling three lakh copies. He subsequently enters Limca Book of records for



### **Obituary**

writing the largest number of popular science books in English. You could enjoy his company during travel away from home. He would tell you that altogether the number of all small big belongings that one carries alongwith amount to 89 odd items.

He wrote with great frequency. Had a long stint with *Science Reporter* as one of its editors, contributed columns in newspapers and won many awards and accolades including every top award for science popularisation in the country.

Dilip M. Salwi breathed his last on April 2, 2004 at the age of 52. He is survived by his wife, a daughter and a son.

## Forthcoming Events

### 4th National Science Communication Congress (NSCC-2004)

Gwalior, December 20-24, 2004

NSCC is an initiative towards addressing the issues of science and technology, its comprehension and appreciation by masses and also achieving the goal of science for all. The 4th National Science Communication Congress (NSCC-2004) is being organised jointly by the National Council for Science & Technology Communication (NCSTC), Yuva Vigyan Parishad (YVP) and Indian Science Writers' Association (ISWA) at Gwalior in Madhya Pradesh.

#### Objectives :

1. To have discussion and interaction on issues and aspects concerning science communication.
2. To bring science communicators, scientists, journalists, academicians and other interested people together for the common cause of development of science and technology communication.
3. To offer budding science communicators a wider exposure and enable them to express their views / ideas.
4. To address various issues vital to promotion of science and technology communication.
5. To explore and share newer tools, ways, and means for better S&T communication aimed at various target audience.

**Technical Sessions/Themes :** There will be 5 technical sessions on the following themes, i.e., i) Science and Society Interface. ii) Scientific Awareness and Decision Making, iii) Communication of Traditional Knowledge, iv) Scientific Temper and Mass Media and v) Alternative Modes of Science Communication. There will be a special workshop for encouraging interaction between young researchers and science communication experts. Deliberations will be in Hindi and English.

**Who can participate :** The NSCC is of interest to active researchers and practitioners of science, communication and science communication, writers, journalists, editors, researchers and faculty members of university departments of journalism, public relations and information officers of scientific organisations,

representatives of media organizations, newspapers, magazines, science cells of radio / TV channels, etc., and voluntary organisations active in this area.

**Address for communication :** Mr. Sunil Jain, Yuva Vigyan Parishad, 103, anand apartment, Naya Bazar, Lashkar, Gwalior – 474001;  
Email : [vigyanparishad@yahoo.com](mailto:vigyanparishad@yahoo.com)

### Science, Communication and Society: Needs and Challenges in South Asia - Public Discussion Meeting

New Delhi, November 19, 2004

This one-day public meeting will discuss the role of science communication in modern times and in particular address the experience, needs and challenges facing South Asian Countries (Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka)

Speakers and panellists from across the region will address the topic from a range of perspectives; those of scientists, science communicators, policy specialists and decision makers.

The meeting will be chaired by Dr. R.A. Mashelkar, Director-General of the Council of Scientific and Industrial Research (CSIR). Those who have agreed to take part include :

P. Balaram (Editor, *Current Science*, Bangalore), Nalaka Gunawardene (Director, TVE Asia Pacific, Colombo), Pervez Hoodbhoy (Winner, Kalinga Prize 2003, Quaid-e-Azam University, Islamabad), Ashok Khosla (Development Alternatives, Delhi), Muhammad Ibrahim (Centre for Mass Education in Science, Dhaka, Bangladesh), Tanveer Naim (Former Chair, Pakistan Council for Science and Technology, Islamabad), Geoff Oldham (Former Director, Science Policy Research Unit, University of Sussex), N. Ram (Editor, *The Hindu*, Chennai)

Participation in this meeting is free, but only ticket holders will be admitted.

Preference will be given to those actively engaged in the practice or study of scientific communication and /or in the use of scientific information in decision-making. ■

Contact [www.scidev.net](http://www.scidev.net) for online registration.



# Indian Journal of Science Communication

## Instructions to Contributors

*Indian Journal of Science Communication* accepts original papers in the area of science communication for publication. Besides, articles on related issues; write-ups on science communication skills, innovative ideas to communicate science, cartoons (scientoons) are also published.

Books, monographs, copies of TV and radio programmes are accepted for review. News, views, opinions, letters to the editor and suggestions on various aspects of communicating science are welcome for inclusion.

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

**General :** Manuscripts should be submitted in hard copy as well as electronic form. Good quality printouts (two copies) with a font size of 12 pt. are required. The pages should be numbered. Print outs must be double spaced with margin on one side of the white paper. The corresponding author should be identified by an asterisk (include Email address). Electronic form of the manuscript should be submitted in a floppy (3.5 inches, 1.44 MB). Text should be entered using word processing softwares such as MS Word (IBM compatible). For illustrations, Corel Draw, Harward Graphics or any compatible format software (BMP, GIF, JPG, PCX, TIF) may be used. Label the floppy disk with the author(s) name(s), the word processing package used, software for illustrations and the type of computer. In case of any discrepancy between the electronic form, and hard copy, the latter will be taken as the authentic version.

**Order of Text :** The matter should be arranged in the following order : Title, Name(s) of author(s), Affiliation, Abstract (in English and in Hindi), Keywords, Main text, Acknowledgements, Appendics, and then References. The abstract, tables, figures and captions for figures should be typed on a separate page. In electronic form, figures or tables may not be imported into your text.

**Units :** The use of SI units in papers is mandatory. Commonly used units may also be given in parentheses following SI units.

**Abstracts :** Should not usually exceed 200 words in each language.

**Key words :** Five or six in alphabetical order should be provided.

**Acknowledgements :** Include only special nature of assistance. No routine 'permissions' to be mentioned.

**References :** References for literature cited in the text should be given at the end of text, numbered consecutively. In the text, the reference should be indicated by a number placed above the line (superscript). If done so, the reference should be listed in that order. References should be given in the following form :

Vilanilam J V, Science Communication and Development, Sage Publications, New Delhi, 1993.

Kotler Philip and Zaltman Gerald, Social Marketing - An approach to planned social changes, *Journal of Marketing*, 35 (4), pp 3-12, 1971.

Even if a reference contains more than two authors, the names of all the authors should be given.

Unpublished papers and personal communications should not be listed in the references but should be indicated in the text, e.g. (Vijayan C K, Unpublished work), (Das Anamika, Personal Communication).

**Tables :** Each table should be typed on a separate sheet of paper not containing any text. Tables should be numbered consecutively and given suitable captions.

**Illustrations :** All illustrations should preferably be provided in camera ready form on white drawing paper suitable for reproduction without retouching and about twice the printed size to facilitate reduction.

All photographs charts and diagrams to be referred as figures(s), should be properly numbered and the captions should be provided on a separate sheet. The figure numbers should be marked on the back of the illustration along with the author's name.

In case of photographs, only originals should be provided, photocopies are not acceptable.

Manuscripts sent for publication should necessarily conform to the above guidelines.

**Address :** All contributions may be sent to :

### The Editor

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Fax : 26960207, E-mail : mkp@alpha.nic.in



## **National Council for Science and Technology Communication**

The National Council for Science and Technology Communication (NCSTC) is an apex body of the Government of India for promotion, coordination and orchestration of science and technology communication and popularisation programmes in the country, with two major objectives of popularisation of science and technology and stimulation of scientific and technological temper among people. It has seven major work elements :

- ◆ Training in Science and Technology Communication
- ◆ S & T Software Development/ Production/ Dissemination
- ◆ Information Networks/ Databases
- ◆ Incentive Schemes
- ◆ Field Based Projects
- ◆ Research in Science and Technology Communication
- ◆ International Collaboration