Indian Journal of Science Communication

Communicating Science of Science Communication

Intercultural communication to improve students' global leadership competence: A phenomenological approach

Commercialization of scientific ideas: New platforms and skills

Communicating Indic science: Perspectives and challenges

AASSA - INSA - NISCAIR Regional Workshop on SHARE Communication

February 20-22, 2019 New Delhi, India

Mooha Lee

of Academies and Societies

A Special Committee on SHA Indian National Science Aca

ience Communication and Info The Interacademy Part

Science Breakthroughs

National Inst

Rameshwar Singh

Science Breakthroughs: Paid News, Fake News and Ethics

Asia (AASSA)

Nguyen Tuong Lan

Paid News.

Ethics

Volume 18 Number 1

Manoj Kumar Patairiya

January – June 2019

Indian Journal of Science Communication

Advisory Board

Chairman

Prof. K.G. Suresh

Director General Indian Institute of Mass Communication New Delhi, India

Members

Prof. Sung Kyum Cho

Dean of Social Science Studies Chungnam National University Deijeion, South Korea

Prof. K.K. Dwivedi

Vice Chancellor ITM University Gwalior, India

Dr. Abdul Waheed Khan

Former Asst. Director General, Communication & Information United Nations Educational Scientific & Cultural Organization Paris, France

Prof. Krishan Lal

President Association of Academies and Societies of Sciences in Asia New Delhi, India

Prof. Bruce Lewenstein

Director, Science & Technology Studies Cornell University Ithaca, New York, USA

Dr. Maria Ines Nogueira

Vice Director, Science Centre University of Sao Paulo Sao Paulo, Brazil

Dr. Kannan Purakayasthya

Science Columnist The Daily Observer London, UK

Dr. Narottam Sahoo

Director Gujarat Council of Science & Technology Ahmedabad, India

Dr. V.K. Srivastava

President, Indian Science Writers' Association New Delhi, India

Member Secretary

Prof. Dr. Manoj Kumar Patairiya

Director National Institute of Science Communication and Information Resources, New Delhi, India

- The Indian Journal of Science Communication (IJSC) seeks to promote and disseminate knowledge and activities in the area of science and technology communication and provides a forum for addressing issues emanating from concept to research and practice.
- The phrase 'science communication' covers a broad canvas of communicating all basic and applied sciences, such as health communication, agriculture communication, environment communication, technology communication, innovation communication, etc. It also includes science and media interface with attitudinal, social and cultural implications.
- The IJSC is a peer reviewed half yearly international research journal published twice in a year in January and July.
- The IJSC is brought out and disseminated by Indian Science Communication Society (ISCOS) and Indian Science Writers' Association (ISWA); Catalyzed by NCSTC-DST.
- The ISCOS and ISWA assume no responsibility for the opinions offered by the contributors.
- Address for submission of contributions for publication: The Editor, Indian Journal of Science Communication, Indian Science Communication Society, Chandrika Bhawan, 577-D, Near Dandahiya Masjid, Lucknow 226022, India; E-mail: editorijsc@gmail.com; mkp@nic.in. Refer Instructions for Contributors.
- Address for subscription and advertisements: The Coordinator IJSC, Indian Science Communication Society, Chandrika Bhawan, 577-D, Near Dandahiya Masjid, Lucknow – 226022, India, Phone: +91-8090907153; E-mail: info@iscos.org. Payments may be sent by demand draft/ cheque issued in favour of Indian Science Communication Society, payable at Lucknow or online bank transfer. Refer Subscription Form.
- The IJSC follows **Open Access** (OA) policy and available online for reading and academic consultation only; it cannot be used for any commercial purpose. The print version is available on subscription.
- © 2019, ISCOS. The contents of IJSC may not be used or reproduced in any form as it is or otherwise without prior written permission of the Editor/ Publisher.
- Price per copy for Individual:

Inland:	₹300
Overseas:	US \$ 15

Indian Journal of Science Communication

Indian Science Communication Society Chandrika Bhawan, 577-D, Near Dandahiya Masjid, Lucknow – 226022, India Phone: +91-8090907153 E-mail: info@iscos.org; mkp@nic.in; editorijsc@gmail.com Website: www.iscos.org



Indian Journal of Science Communication

CONTENTS





COVER

Experts at the Panel Discussion during AASSA-INSA-NISCAIR SHARE Communication Workshop

Scientoon:

Visitors to Antarctica may Harm Penguins by Infecting Them A nap a day keeps high blood pressure away

RESEARCH PAPERS

- 3-12 Intercultural communication to improve students' global leadership competence: A phenomenological approach in higher education in Jakarta Panji Hendrarso and Baby Poernomo
- 13-15 Engaging social media for health communication in Rajasthan: Approaches and results Ruchi Singh Gaur

COLUMNS

Editorial: Open scientific and academic resources:

Emerging policies and concerns

16-19 Case Study:

Uttarakhand State Children's Science Congress: An assessment

D.P. Uniyal, Pranendra K. Kaushik, J.S. Aswal, S. Khadija Bari, Rajendra Dobhal, Ankita Pokhriyal and Vikas Chander

20-24 Information:

Commercialization of scientific ideas: New platforms and skills *Gopal Jee Gopal, Awanish Kumar and Pramanik Rinka*

25-29 Debate:

Communicating Indic science: Perspectives and challenges T.V. Gopal

30-39 Report:

AASSA-INSA-NISCAIR SHARE Communication Workshop

39 News: AASSA elects new Chair of SHARE Communication

EDITORIAL BOARD

Editor *Prof. Dr. Manoj Kumar Patairiya* Associate Editor Layout *Shakuntala Sharma Ravi Agarwal*

1

Communicating Indic science: Perspectives and challenges

Dr. T.V. Gopal

Coordinator, Center for Applied Research in Indic Technologies Professor, Department of Computer Science and Engineering, Anna University, Chennai, India

Indic traditions influence many facets of life all over the world. **Indic** as an adjective means "of or relating to India or her people or cultures". As a matter of fact, all over the world, India is regarded as the fountainhead of ideas that enshrined in many scriptures written in languages closely related to Sanskrit. The challenge is to communicate the science in these scriptures and the concomitant practices in current languages such as English.

Effective communication in a chosen language implies an ability to use a limited set of symbols, signals, sounds and gestures to share the knowledge with others. An artifact in a language typically captures the emotion, culture, situational context, and personal understandings. The resulting artifact should ideally be language independent and span across a set of knowledge systems prevalent in the localized context. Certain topics blend the Indian traditional sciences enshrined in the scriptures with modern scientific achievements.

Introduction

"Eloquence is the power to translate a truth into language perfectly intelligible to the person to whom you speak."

- Ralph Waldo Emerson

Popular science is an expression of science intended to create awareness for a general audience. It may be documented in many forms including books by either professional science journalists or by scientists themselves. However, Science communication generally refers to public communication presenting science related topics to non experts. Science communication is distinct because it is evidence or practice based communication of science to foster institutional commitments and formal collaborations. The Indic scriptures are well defined strings of Vedic alphabet that enshrine all knowledge. One is expected to experience the vision of these well defined strings directly. There is a process by which one gets this vision and the people with this vision are called "Seers".

"The Self stirs with an intention. Together with the intellect, it takes a direction, and engages the mind. The mind strikes the fire of the body, which in turn drives out the air. The air moving within the lungs, causes the emergence of subtle sound, which becomes sound - "Swaram" - the reverberation of the Self".

- Paniniya Siksha (Ghosh, 1938)

"Rtam vachami, satyam vachami", It is an oath to speak words that will strengthen both rtam (cosmic truth and order; cosmic law of life) and satyam (worldly, human truth). This is the foremost challenge in communicating science enshrined in the Indic scriptures. Max Mueller summarized the problems in translation efforts as: "The clearness of a translation depends on the right rendering of such words as *atman, sat,* and *satyam*". Max Mueller approximated in language and not in the rigour or discipline.

"We have to make much and wide allowance for cultural estrangement too. So it is ordinarily most difficult for a western observer "here and now" to see things and thoughts under exactly the same angle and in the same light as they would appear to an eastern eye "there and then" under other circumstances".

– Max Mueller

The genesis

In the beginning there were connections in the brain to produce sounds (Gopal, 2000) by listening constantly to various existing natural sounds around. Usage of tools started producing newer sounds as the materials being used differed. Harmonious blending of these newer sounds with the natural sounds strengthen the connections within the brain facilitate the formation of mental images. Initially this could have been attributed to the power of concentration. As the associated thought persisted about this sound it could have become an 'Aksharam' - one that remains forever.

A set of such *Aksharams* are the Sanskrit alphabet. Indic scriptures are written using this alphabet. Chanting the resulting strings is believed to facilitate the visualized of *"Satyam"* in due course of time. There are stipulated methods and concomitant practices that are believed to halt once the *"Satyam"* is visualized. Violation of these methods and practices are believed to invoke the ire of the nature resulting in chaos and havoc.

Indic scriptures enshrine a fascinating set of thoughts in areas such as metallurgy, mathematics, medicine, architecture, physics and astronomy. The outcomes and proofs are all based on direct experience and Indic traditions aver that it can also be the result of the power of meditation and concentration. Indic scriptures are veritably treasure troves of physical and spiritual knowledge. This domain of scientific exploration is replete with not only challenges of translation and expressions but also with the imperative need for "experienced truths" that can light the path for the futures. "Localization" has been the central ideology that several generations thrive on. There are many written works in regional languages that serve as valuable references within a given locality that uses a specific language. Sanskrit remains the language with a maximum span all over India. English is the chosen language to enable a global exploration of this wealth of knowledge.

Experiment based scientific endeavours are sometime unknown and contradictions do happen.

The typical solution is to tide over the uncertain science for a span of time and establish the "experienced truth" beyond a reasonable doubt. The critical task is to express this "experienced truth" in its pristine form and enable its seamless integration with other such exercises in arriving at the "supreme or complete truth" in a blissful manner. There is a felt need to change this perspective to acknowledge that "localization" results in an "adapted experienced truth" that has a form and format. The localization can be tailored to a specific individual or a group of individuals and the context of the "experience". The question then is "How and Why are these experienced truths made global or cosmic?" Indic traditions aver that there are meta-physical powers that can be harnessed through this globalization effort that transcends all localization barriers and becomes a generic science for everyone with applicable localized or laboratory conditions. It is well known that variation, uncertainty, and judgment can skew results within a given observation for an experiment.

Centuries of wisdom positions the Indic scriptures as treasure troves of "experienced truths" those are inherently cosmic. There are methods and practices that make them "tailorable" to individuals or local context without any disconnect with the pristine forms enshrined the scriptures. Such tailored experiences are also believed to scale seamlessly to the pristine form with the persistence of the methods and practices. Science communication in this domain is a real challenge!

A preliminary illustration

The airplane has shaped our lives and the way we think. It has vastly changed the world view of many. It was the first technology that shrunk the physical world. airplane has changed our culture remarkably. Ancient Indic scriptures use the word "*Vimana*". It can refer to the palace of an emperor or the tower above the Sanctum sanctorum in a Hindu temple or to a vehicle. Today, this word is popularly used to mean an aircraft. Sage Bharadwaja (Josiar, 1973) describes *Vimana* or aerial aircrafts as follows: Those that travel from place to place, i.e. within the country; those that travel from one country to another, i.e international travel; and those that travel between planets, i.e space travel.

"Vega-Saamyaat Vimaano Andajaanaam" Owing to similarity of speed with birds, it is named Vimaana.

- Sage Bharadwaja, Vaimanika Shastra

The word "andaja" means "egg-born", and includes eagles and other birds which fly by their own volition. Sage Bharadwaaja described 31 components of a *Vimaana* that resemble almost a Human in flight. *Va-Nara* also means "almost human". The Indic scriptures have many quaint descriptions of flying machines including chariots, human and almost human forms, i.e the pilot is unified with the machine. There are 32 secrets of the working of the *Vimaana*. A pilot should acquaint himself thoroughly with them before he can be deemed competent to handle the aeroplane.

"The pilot should have had training in maantrica and taantrica, kritaka and antaraalaka, goodha or hidden, drishya and adrishya or seen and unseen, paroksha (indirect) and aparoksha (direct), contraction and expansion, changing shape, look frightening, look pleasing, become luminous or enveloped in darkness, deluge or pralaya, vimukha (turned against), taara (knowledge pertaining to star), stun by thunderous din, jump, move zig-zag like serpent, chapala (quick; restless), face all sides, hear distant sounds, take pictures, know enemy manoeuvres, know direction of enemy approach, stabdhaka or paralyse, and karshana or exercise magnetic pull." - Rahasya Lahari

The aircrafts used in ancient warfare are described as impregnable, unbreakable, non-combustible and indestructible capable of coming to a dead stop in the twinkling of an eye; invisible to enemies; capable of listening to the conversations and sounds in hostile planes; technically proficient to see and record things, persons, incidents and situations going on inside enemy planes; know at every stage the direction of the movement of other aircraft in the vicinity; capable of rendering the enemy crew into a state of suspended animation, intellectual torpor or complete loss of consciousness; capable of destruction; manned by pilots and co-travelers who could adapt in accordance with the climate in which they moved; temperature regulated inside; constructed of very light and heat absorbing metals; provided with

mechanisms that could enlarge or reduce images and enhance or diminish sounds.

Leonardo Da Vinci presumed that man had sufficient coordination and muscle power to copy a bird flight. Replicating the flapping of the wings of the bird in flight consumed more than twenty five years of his work. In retrospect, it is easy to observe that the feathers were not factored by him for a long time. His motor was like a man with a test bed for the flapping of the wings like those of a bird in flight. There have been many such attempts in the west that are vibrant with thoughts related to the age old Indic scriptures.

"Newton was not the first of the age of reason. He was the last of the magicians, the last of the Babylonians and Sumerians, the last great mind that looked out on the visible and intellectual world with the same eyes as those who began to build our intellectual inheritance rather less than 10000 years ago."

- Address at the Royal Society Club (1942), as quoted in A Dictionary of Scientific Quotations (1977) by Alan L. MacKay, p.140

Current technology can provide a realistic model of any given infrastructure and this model can be transmitted to anywhere within no time. This model is a wrapper of a building or a facility that can be construed as a flying building or a facility. Immersion technologies, virtual reality and human body modeling are all indicators certain quaint descriptions found in the Indic literature.

Proof that life experiences

In this adventure of life and the quest for a proof that life experiences, the core challenge therefore is character. It is not a product of logic, but of faith in ideals and sacrificial devotion to them. Every method and practice in Indic scriptures reflects this aspect in abundance.

"Science for me is very close to art. Scientific discovery is an irrational act. It's an intuition which turns out to be reality at the end of it - and I see no difference between a scientist developing a marvelous discovery and an artist making a painting."

- Carlo Rubbia, Shared the Nobel Prize in Physics in 1984, CERN Communicating Indic science: Perspectives and challenges

The Language of mathematics cleverly conceals the "seemingly irrational" in science. Scientific communications using a language that can be understood by professionals is challenging as it mandates reproducible outcomes from scientific experiments with similar aim and scope. The language used ought to be true to the nature of mathematics. Professionals from many disciplines have been trying to express the "experienced truths" in this manner with a mind boggling range of expressions. Science communications that adheres to the format of research works in this domain of expertise is proving to be a challenge in itself.

"Communication is the process involving the transmission and reception of symbols eliciting meaning in the minds of the participants by making common their life experiences"

- Baird Jr. E John

For the concepts to be converted into science and hopefully into technology the representations or symbology must be concrete. Technology needs plenty of details related to the concept represented as unambiguously as possible.

The task might have been too great for humankind to attempt at the dawn of modern science. One can imagine there was a deep, subconscious wisdom in the resolve to shackle the greater part of the human and commit to the discipline of mathematics, where rigour and objectivity are imposed. Science has remained wedded to this approach and any set of symbols and notation in any domain can be traced back to this foundation.

Arguably, without such an approach the voices of magic and superstition, of myth and legend, of religion and irreligion, of ethnic pride and prejudice could have disrupted the works of Kepler, Galileo and even Newton.

Richard Feynman writes "philosophically we are completely wrong with the approximate laws [such as Newton's]. Our entire picture of the world has to be altered even though the mass changes only by a little bit".

"Proof that life experiences" is very intricate to express and challenges many established tenets in science communications. On the other hand, if the professionals do not take on this challenge, such experiences invariably result in the theory of black swan events. It is a metaphor that describes events of large magnitude that come as a surprise, have a major effect, and are often inappropriately rationalized after the fact with the benefit of hindsight. Such events, considered extreme outliers precipitate what is usually termed "silent risk".

It is thus a social responsibility to position the Indic knowledge in perspective and announce it to interested professionals who may use it. In some sense, what is being mooted is a philosophy of mathematics. It is not a surprise that some major philosophers, such as Descartes, Leibniz, Pascal and Lambert, have also been major mathematicians. Their works also serve as unconventional proofs for certain topics.

The Vedic

The most dominant set of Indic scriptures are four Vedas. The expressions therein are Vedic. Vedic speech was called *Chandas* and it is all about direct experience or *Aparokshanubhuti*. Panini was dealing with Sanskrit as *Bhasha*, a spoken language for expressions, distinguishing it from the Vedic.

Rene Descartes theorized that the soul (Atman) was not bounded by the laws of physics and that it uses the body as a mechanical mechanism to exist in this world. Once again the definitional challenges of religion, ritual, experience and expression come into focus. When the human endeavor is at such crossroads, the machine enabled a new and profound expansion of the human ambition to dominate, subjugate, and eventually transcend the limitations imposed by physical realms of nature.

The early machines were perhaps made of human bone, nerve, and muscle that were reduced to their bare mechanical elements and rigidly standardized for the performance of their limited tasks. Maybe the pyramids were built by such machines. The regularity, standardization, and functional specialization of these flesh and blood machines are a huge step away from the nature that does not foster such efforts.

"Man cannot remake himself without suffering, for he is both the marble and the sculptor."

- Dr. Alexis Carrel, Nobel Laureate in Medicine and the author of the book "Man the Unknown" India ushered in the "Prashna" or "question" method to facilitate the process of "experienced truth" with bliss over a long span of time. The Big Small Questions of the basic Indic learning process are enumerated in the Niralamba Upanishad (Krishna, 1999). Some of these questions that are frequently asked in the study of Indic scriptures are listed here: What is Brahman? Who is living being? What is Prakriti? Who is the Supreme Self? Who is Brahma? Who is Vishnu? Who is Rudra? Who is Indra? Who is (the god of) Death? Who is the Sun? Who is the Moon? Who are the Gods? Who are the demons? Who are the evil spirits? Who are men? Who are women? Who are animals and so forth? What is the immobile? What is deed? What is a non-deed? What is knowledge? What is ignorance? What is pleasure? What is pain? What is heaven? What is hell? What is bondage? What is liberation? What is to be adored? Who is the disciple? Who is the sage? Who is the deluded? What is the demoniac? What is austerity? Which is the supreme abode? What is to be sought after? What is to be rejected? Who is the renounced (Sannyasin)? Science communications ought to begin with answering these questions in text only mode. The interrelationships among the answers will foster the initial visualization of "experienced truth". One can then move onto larger ideas and concepts such as Aparokshanubhuti, Chandas, Vyakarana, Kalpa, Siksha, Jyotish and Nirukta.

Indic science and technology

Science and technology designed and fabricated based on the culture, tradition and needs of the people and which is adopted for use in the environment of those people is often termed indigenous. It is unfortunate but true that modern technologies and knowledge ushered in a commodity generating economy relegating the indigenous (local) knowledge systems almost into the oblivion. There are some good research papers reporting encouraging results of deploying indigenous knowledge and technology from ancient India, China and Africa in the following sectors: agriculture, animal husbandry and ethnic veterinary medicine, use and management of natural resources, primary health care (PHC), preventive medicine and psycho-social care, saving and lending, community development, and poverty alleviation.

Conclusions

Indic science and technology stemming from the scriptures as outlined in this paper are better termed traditional knowledge systems. Inclusive growth is the first challenge for assuring techo-nationalism and techno-globalism in these systems. Although, much work on the cataloguing and documenting of Indic scriptures is known, there is a paucity of attention to the scientific rationale and technological content and methodologies enshrined in these scriptures.

A quick flashback into the history reminds that metaphysics, otherwise called 'After Physics' following a title given to Aristotle's works by Andronicus of Rhodes, had a beginning dates back to the ancient times when India was reflecting on the ultimate stuff or substance of the universe or what is there? Science communications need a blend of logic and reasoning chains to unravel the mystery and mysticism of the universe. There is a felt need for promoting journals and other scientific activities in these areas that are widely believed to effect life. The context of declarations, regional agreements, ethical guidelines, research protocols, and policy frameworks, which reinforce traditional and indigenous enlightenments need an in-depth focus in all sorts of communications!

References

- 1. Gopal T.V. (2000), Hrishikesa: Krishna A Natural Evolution, Universal Publishers, USA.
- 2. Josiar J.R. (1973), The Vimanika Shastra, Coronation Press, Mysore, India.
- 3. Krishna Warrier A.G. (1999), Niralamba Upanishad, The Theosophical Publishing House, Chennai, India.
- 4. ManoMohan Ghosh (1938), Paniniya Shiksha (Critical Edition) with Translation, University of Calcutta, India.