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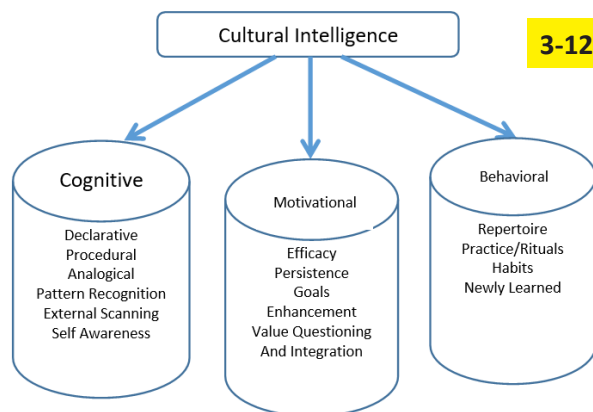
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Open scientific and academic resources: Emerging policies and concerns



The keenness to know how to use information, retrieve data, and access research literature as a means to carry out advanced research in a variety of areas in science, technology and innovation is increasing. It is important to build clear understanding on the open access as a platform for research advancement especially at a time when the states are pouring in millions of their currencies to procure online access of international research journals for their scientists and scholars! However, there are instances where several organizations across the world have raised concerns over such practices and advocating for open access and finding more sustainable alternatives.

The issues of monopoly and self styled negotiation practices of different international publishers are loudly coming to the fore. Many countries are now considering more economical and democratic approaches to overcome the problem of capital intensive publication and access of research literature. The proposed Plan S by Science Europe seems to be a way forward in the direction of independent, democratic and economical access of research information for the benefit of scholars, launched on 4 September 2018 with a view of open access publishing in science, an initiative of cOAlition S, a consortium of major research institutions and funding agencies of 12 European countries. The scientists and researchers engaged in public funded research are required to publish their works in open repositories or journals under the Plan S to be available by 2021.

The plan is based on 10 key principles: i) Authors should retain copyright on their publications, which must be published under an open license such as Creative Commons; ii) Members of the coalition should establish robust criteria and requirements for compliant open access journals and platforms; iii) They should also provide incentives for the creation of compliant open access journals and platforms if they do not yet exist; iv) Publication fee should be covered by the funders or universities, not individual researchers; v) Such publication fee should be standardized and capped; vi) Universities, research organizations, and libraries should align their policies and strategies; vii) For books and monographs, the timeline may be extended beyond 2021; viii) Open archives and repositories are acknowledged for their importance; ix) Hybrid open access journals are not compliant with the key principle; and x) Members of the coalition should monitor and sanction non-compliance. However, publication of research findings in any journal will be possible with the condition that an accepted copy of the manuscript or final published paper be deposited in an approved open access repository with open access and creative commons licence!

Open Access (OA) is a mechanism through which research findings are disseminated online free of cost without any other restrictions on use and reuse of these resources. The focus of the open access has been the peer reviewed research literature. The OA has been centered primarily on printed academic journals. Subsequently, OA has been extended to all forms of published research findings, including peer reviewed and non peer reviewed papers, articles, conference papers, theses, book chapters, and monographs, etc. Different practices are prevalent; some journals cover publishing costs through access fee, such as subscriptions, site licenses or viewing charges, etc., whereas, some charge publishing fee and make the journal open access. Many of them charge all fees, including publication fee and access fee, as well as sell the printed copy of the journal; some state run journals on the other hand do not charge publication or access fee, but collect subscription for printed copies.

Creative Commons (CC) is yet another phrase often used in academic or creative spheres nowadays. CC is a non-profit American organization for expanding the sphere of various creatives so that these works are freely available for others. Several copyright licenses, known as Creative Commons licenses were released free of charge for all. Anyone can use any creatives available under CC, but one has to share his or her work under CC, created using others' works available under CC. All kind of creatives come under CC, i.e. research paper, article, artwork, cartoon, publications, data, audio-visual, digital copy, and technical reports, etc. Open Educational Resources (OER) are immensely useful especially in today's context of online and open education scenario. OER are freely accessible, openly licensed texts, media and other digital forms useful in teaching, learning, review and research. OER Commons is also a dynamic and interconnected digital library and its network accessible to different users. The menace of predatory and fake journals has been the hot topic of recent discussions. The researchers are under pressure for publications to score higher for different purposes and tend to fall prey of such journals that claim to publish their works in fast-track manner or even overnight on huge expenses! Recent reports in media revealed number of such syndicates operate in many areas making undue profit! Consortium for Academic Research and Ethics (CARE) of the University Grants Commission is a welcome initiative of the government to bring consolidated lists of quality journals in India keeping the substandard and unethical publications away.

The Plan S also shows the way to speedy submission and access of research outcomes minimizing scope for malpractices and undue expenses in research publishing and access. However, a number of publishers of non open access journals have raised concerns over the Plan. Springer Nature: "urge research funding agencies to align rather than act in small groups in ways that are incompatible with each other and for policymakers to also take this global view into account". AAAS, publisher of Science, argued that Plan S "will not support high quality peer review, research publication and dissemination". Tom Reller, Elsevier said, "if you think that information should be free of charge, go to Wikipedia". 1500 researchers signed an open letter expressing concerns over anticipated outcomes of the Plan; a set of 1900 researchers signed another open letter to support Plan S in December 2018. Australia, Jordan, USA, Zambia and 12 European countries have joined the Plan. K. Vijay Raghavan, Principal Scientific Adviser to the Government of India announced on 12 January 2019 that India is joining Plan S. Though, some research repositories are already in place, the Plan S is all set to change the way research literature is published and accessed the world over.

Prof. Dr. Manoj Kumar Patairiya

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

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Nowadays, organizations, companies, and other institutions need leaders who are capable of moving in and through divergent cultural environments. An increasing number of studies in recent years have examined issues related to intercultural communication competence which is important for leaders in global era. This study aims at answering the questions why university students in Jakarta are still lack of intercultural communication competence and how to improve students' competence in creating global leaders. This study employed a phenomenological approach to understand how participants experienced the phenomenon. Semi structured interviews were conducted to a total of 17 participants, consists of university students, leaders of student organizations, university graduates who have been working in public and private sectors, and an official of the Ministry of Research, Technology and Higher Education to get the perspectives on the ideal 21st century leaders and what the universities should do to achieve it. The research proved that intercultural communication plays a significant role in improving leadership competence in the global era. Further analysis indicated that there were differences between students who are competent in intercultural communication and those who are not which can be seen from various aspects. This study provides insights on the importance of intercultural communication competence for university students to be global leaders, discusses the advantages and disadvantages of having and not having inter-cultural communication competencies in the global era and offers recommendations for future research.

Keywords: Intercultural communication competence, Global leadership, University students

Introduction

In organizational settings, intercultural communication competence has been a profound increase within businesses across the globe. In today's world, many business meetings occur among managers from different cultures around the world. They make deals, settlements and business offers without having to see each other or know each other. This advantage comes from our technological resources that allow us to travel, connect with each other through technological communication no matter where we are in the world. In recent years, many services such as education, hospitality, banks and investment agencies have become more and more globally oriented (Alnashi, 2012).

Intercultural communication competence requires the ability and understanding to cross-culturally adjust, task effectiveness within overseas assignments and maintaining healthy cultural relationships with individuals from different cultures (Miller, 2006, p.102). The challenge of creating and carrying out business propositions and solutions with people from the same country is already difficult enough, now, imagine the challenge to work and deal with people from another culture (Mohsin, 2006).

The literature recognizes the crucial role of leadership in the multicultural environment of global business (House et al. 2004; Karpin 1995; Sinclair & Wilson 2002). It also argues that new skills are required from today's leaders working in the global economy, because leadership itself became more multicultural (Sinclair & Wilson 2002) and it could be now defined as 'influence across national and cultural boundaries' (Mobley & Dorfman 2003: xiii). Further, it was argued that leadership was 'enacted through communication' (Barge 1994: 21) and communication competence was a prerequisite for effective leadership (Flauto, 1999). Addressing the existing problems and building on the suggestions of a relationship between communication competence and leadership (Flauto 1999; Rouhiainen 2005) as well as on the argument that in the global environment, communication competence should be intercultural (Chen 2005; Chen & Starosta 1996; Samovar & Porter 2004; Samovar et al. 2007).

One of the major organizations that create leaders of a country is a higher education institu-

tion. However, until now there are still many leaders who graduated from universities do not have intercultural communication competence whereas a big country like Indonesia with more than 700 ethnics, 300 local languages and more than 7 religions and beliefs requires leaders who can bridge the differences. In globalization era, the need for leaders with global perspective and intercultural competence is demanded to meet these growing challenges and opportunities. In line with this, this study aims at answering the questions whether university students are able to apply intercultural communication and how to improve students' intercultural competence to gain global leadership skills.

Literature review

As is known, the world is becoming nowadays a global village, in the sense that the technological achievements of this modern time have brought people closer together. This also means that people from different parts of the world and with different cultural backgrounds are working and communicating together (Kawar, 2012). To be effective in another culture, people must be interested in other cultures, be sensitive enough to notice cultural differences, and then also be willing to modify their behavior as an indication of respect for the people of other cultures (Bhawuk and Brislin, 1992).

We have established that communication is a critical competitive advantage for businesses. For instance, effective communication enables a company to explain more succinctly to the customers the differences and superiority of the company's products and services in comparison to their competitors (Hilton, 2007). Employees in firms come from various walks of life and different cultures thus resulting in different personalities.

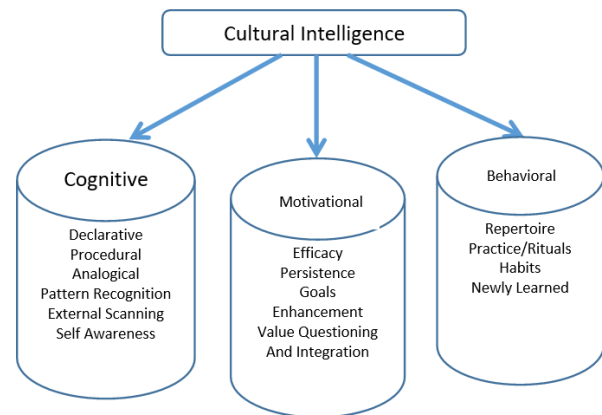
Cultural Intelligence Quotient (CQ)

CQ is a person's ability to function skillfully in a cultural context different than one's own (Earley and Ang, 2003; Ng et al., 2009a, 2009b). Van Dyne has identified four factors of CQ which include CQ strategy, knowledge, motivation, and behavior. CQ strategy involves how a person acquires and then uses knowledge of other cultures, which includes contemplating assumptions, deciphering actions,

and adjusting perspectives about the situation. CQ knowledge means that a person knows what she knows, but also knows what she doesn't know. Knowledge includes understanding about specific norms and behaviors, worldviews, values; and even historical, political, and governmental aspects of people and their culture. CQ motivation is a person's interest in engagement with people and the culture itself—the CQ motivated person enjoys learning and applying what she has learned with interest and confidence, she is comfortable with herself and with the ambiguity that comes when crossing cultures. CQ behavior is the person's ability to engage with others through language and nonverbal behavior that is developed through trial and error. In essence, the culturally intelligent person is highly motivated and interested in interacting with people from other cultures and is successfully able to assess a situation, scan for cues, and then act accordingly—this is also known as the concept of “mindfulness”. (Van Dyne et al. cited in Ng et al., 2009a, 2009b).

Whereas the CQ framework based on Sternberg and Detterman (1986) integration of the various loci of intelligence is residing within the person. According to Sternberg and Detterman, meta-cognition, cognition, and motivation are mental capabilities that reside within the head, whereas overt actions are behavioral capabilities. Meta-cognitive intelligence refers to control of cognition: the processes individuals use to acquire and understand knowledge. Cognitive intelligence refers to knowledge structures and is consistent with Ackerman's (1996) intelligence-as-knowledge concept, which argues for the importance of knowledge as part of intellect. Motivational intelligence refers to the mental capacity to direct and sustain energy on a particular task or situation and recognize that motivational capabilities are critical to real world problem solving (Ceci, 1996). Behavioral intelligence refers to outward manifestations or overt actions: what a person does rather than what he or she thinks (Sternberg and Detterman, 1986).

Earley and Ang (2003) conceptualized a multifactor concept of CQ that includes mental (meta-cognitive and cognitive), motivational, and behavioral components. Those with high meta-cognitive CQ are consciously aware of the cultural preferences and norms of different societies prior to and during interactions as seen in the following figure.



Source : Earley & Ang (2003)

Figure 1: Multifactor concept of Cultural Intelligence

The cognitive factor of CQ refers to an individual's level of cultural knowledge or knowledge of the cultural environment. Cultural knowledge includes knowledge of oneself as embedded in the cultural context of the environment. Motivational CQ reflects the capability to direct attention and energy toward learning about and functioning in situations characterized by cultural differences. Those with high motivational CQ direct attention and energy toward cross-cultural situations based on intrinsic interest (Deci and Ryan, 1985) and confidence in cross-cultural effectiveness (Bandura, 2002). Finally, behavioral CQ reflects the capability to exhibit appropriate verbal and nonverbal actions when interacting with people from different cultures.

Intercultural communication

Relationship between communication competence and leadership has been found (Flauto 1999; Rouhiainen 2005). Rouhiainen (2005) has recently studied communication competence of leaders in knowledge based organizations. When such diverse individuals work in a firm to achieve a common goal, it is common that the disputes between personalities occur, causing interpersonal tension, resentment and frustration (Jia-Chi, 2010). Therefore, intercultural communication is particularly important to avoid conflict caused by a diverse cultural working environment. The importance of intercultural communication is not just for the needs of the business world. Almost all areas require intercultural communica-

tion skills, especially to be leaders in regional, provincial, especially leaders of a country whose population consists of different cultural backgrounds and different local languages. It is conceivable what will happen if we have leaders who do not possess intercultural communication skills. Conflict will always happen.

Generally, the ability to communicate effectively is undeniably a challenge in the global environment. For an instance, misunderstandings can still arise when both parties speak the same language because of different cultural backgrounds (Hilton, 2007). Intercultural communication occurs when the part involved in the communication activity brings with it a different cultural background, experience and reflects the values held by the group, whether in the form of experience, knowledge, or values as stated by Samovar and Porter (1972) as cited in Gudykunst and Young Yun Kim (1984) that intercultural communication is an event that refers to the people involved in it, either directly or indirectly having a different background.

Marquardt and Horvath (2001) argue that, "Leaders around the world are now recognizing the critical importance of global teams as the key to future competitiveness and productivity in today's new networked-style global organization" (p. 3). The need for globally minded and intercultural competent leaders is not only a reality in virtual global teams; it is needed in the multicultural context of regional teams and organizations as well. With the cultures of the world around and within even local expressions of organizations, some authors are beginning to utilize the creative language of "glocalization" to emphasize that global influence is now a local reality (Eoyang, 2005; Roberts, 2007).

According to Chen and Starosta (1996), intercultural communication competence is an umbrella concept that consists of a person's cognitive, affective, and behavioral abilities in the process of intercultural communication. Intercultural sensitivity is the affective aspect of intercultural communication competence, referring to "an individual's ability to develop a positive emotion towards understanding and appreciating cultural differences that promotes appropriate and effective behavior in intercultural communication" (Chen & Starosta, 1997). Intercultural sensitivity may be understood as the ability to discriminate and experience relevant cultural differ-

ences. Related to this, intercultural competence may be understood as the ability to think and act in intercultural appropriate ways (Hammer, et.al., 2003). Increased cultural diversity in different settings calls for abilities to adapt to the unfamiliar environment and to learn to work and live productively with people from different cultural backgrounds, which highlights the ability of intercultural sensitivity (Chen & Starosta, 1997).

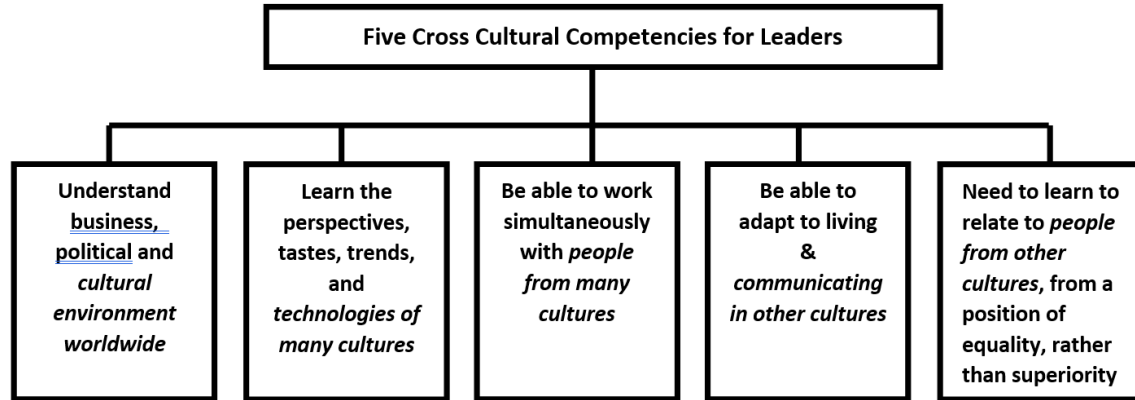
Global leadership

In pursuit of leadership effectiveness in today's globalized world, cross-cultural leaders need to be able to manage culturally diverse settings efficiently, known as a capability of cultural intelligence or cultural quotient, CQ (Rockstuhl et al., 2011). Since CQ is significantly related to individual international experiences (Lovvorn & Chen, 2011), global leaders should be aware and appreciate the diversity they face in leadership practices.

It is important to acknowledge that competent leadership has been argued to stem from communication competence of the leaders (Barge 1994; Flauto 1999). Therefore, communication competence becomes a prerequisite for competent leadership (Flauto 1999). In the 21st century, with the advent of globalization, being able to negotiate effectively across cultures is a crucial aspect of many inter-organizational relationships, including strategic alliances, joint ventures, mergers and acquisitions, licensing and distribution agreements, and sales of products and services (Adler, 2002).

Adler and Bartholomew (1992) contend that global leaders need to develop five cross-cultural competence which include understanding business, political, cultural environments worldwide, have a willingness to learn technologies of many other cultures, able to work simultaneously with people from many cultures, able to adapt to living and communicating in other cultures, and have to relate to people from other cultures. This can be seen in the following figure.

The literature recognizes the crucial role of leadership in the multicultural environment of global business (House et al. 2004; Karpin 1995; Sinclair & Wilson 2002). It also argues that new skills are required from today's leaders working in the global economy, because leadership itself became



Source : Adler and Bartholomew (1992)

Figure 2: Five Cross Cultural Competencies for Leaders

more multicultural (Sinclair & Wilson 2002) and it could be now defined as ‘influence across national and cultural boundaries’ (Mobley and Dorfman 2003: xiii).

Therefore, leaders should develop their intercultural communication competence, which can be broadly defined as involving ‘knowledge, motivation and skills to interact effectively and appropriately with members of different cultures’ (Hammer, et al., 2003: 192). Global leaders need to build their interpersonal skills to deal with racial conflicts that have occurred to develop individuals and groups in the workplace (Byrd, 2007). To create a leadership that lasts over time, global leaders must show expected competence in cross-cultural awareness and practice. It is important they understand the significance of leadership and leadership expectations, and to develop and sustain effective leadership strategies for long-term change (Ulrich and Smallwood, 2012).

In addition to high levels of intellectual intelligence (IQ), and emotional intelligence (EQ), twenty-first century leaders also need cultural intelligence (CQ) to navigate the unique complexity of a global environment (Chin and Gaynier, 2006). This includes the ability to understand key cultural norms of a counterpart’s culture; to be ready to listen, observe, and alter one’s behavior or communication preferences; and to be open and flexible to reflect and change interaction strategies and expectations depending on the situation and the context (Earley, 2002; Earley & Ang, 2003; Ng, Van Dyne, & Ang, 2009a, 2009b). If a person possesses intercultural

competence, he will be open minded and tolerates different cultures and positively accepts culture that is different from their own. Such a person takes an active role in an unfamiliar environment that may be in conflict with a personal sense of the best practice or etiquette (Bennett, 1993; Kelly & Mayers, 1995; Wiseman, et.al., 1989). Earley and Ang (2003) also state that leaders with high CQ are able to adapt to new global environments as well as effectively interact with people of diverse cultures. Global leaders also have to possess empathy. Empathy as stated by Goldsmith and Walt (1999) and Goleman (1998 and 2000) leads to cross-cultural sensitivity, and expertise in hiring, building, motivating and retaining talent in different cultures. Chin and Gaynier (2006) modified Hollander’s approach (1978), depicting the Leaders-Followers-Situation dynamic, by introducing task, relationship and the three intelligences, IQ, EQ and CQ. Chin and Gaynier (2006) states obviously that IQ, EQ and CQ are the triumvirate of leadership competence in the 21st century.

Research methods

In this research, a qualitative research method is applied. According to Patton (1990) as quoted in Crabtree & Miller (1992, p.19) the purpose of qualitative research is not formulating general statements but exploring specific social contexts to achieve better understanding of specified social settings. That is why the qualitative sample is selected purposively.

The types of data required in this study include primary data and secondary data. The data were col-

lected by interview and documentation techniques. This study employed semi-structured interviews, because it can direct the interview more closely, to have a pre-determined set of questions while simultaneously allowing the interviewees sufficient flexibility to shape the flow of information given (Wilkinson and Birmingham, 2003). Robson (2002) also says that it is appropriate to use the interview when the individual perceptions of processes within a social unit are to be studied and the interviewer can ask more questions, if the answer does not come up to expectations.

In this study, a phenomenological approach is employed. Phenomenology is an approach to qualitative research that focuses on the commonality of a lived experience within a particular group. The fundamental goal of the approach is to arrive at a description of the nature of the particular phenomenon (Creswell, 2013). According to Creswell (2007), a phenomenological study "describes the meaning for several individuals of their lived experiences of a concept or a phenomenon" (p. 57). When the research problem is to understand the common experiences of several individuals about a phenomenon, a phenomenological study is appropriate. Therefore, this study uses a phenomenological approach since it explores the experiences of the participants.

Data analysis technique used in this research is qualitative analysis technique. The process of data analysis begins by reviewing all data that has been obtained from various sources. Then data reduction was done by making the abstraction. The next step is to organize the data in units. The units were then categorized in the next step. Categorization was done while making coding. The last stage was to check the validity of the data. After this stage was completed, then interpretation of data was done, so that the stages in qualitative data analysis include: data unit processing, data reduction, categorization of data including checking the validity of data, and interpretation of data (Moleong, 2008).

The participants for in depth interview consists of 17 people namely 5 students who have joined student organizations and any other communities, 5 students who have never joined any student organizations to gain information about their knowledge on intercultural communication and global leaders, 2 leaders of student organizations to dig deeper their perspectives on the criteria of global leaders and

what they know about intercultural communication. The interviews were also conducted to 4 university graduates who have been working in public and private sector to gain information on their perspectives towards the competence of university graduates in intercultural communication and the demand to be global leaders. Finally, an official of the Ministry of Research, Technology and Higher Education was interviewed to get the perspectives on the ideal 21st century leaders and what the universities should do to achieve it.

Discussion and findings

The data obtained from this study show that not all students both from public and private universities understand the importance of intercultural communication for a leader. In general, students who have never joined any organization do not understand about intercultural communication. Of the 10 students interviewed, only 5 said that students must have intercultural communication skills in order to become global leaders. They are students who are members of organizations and are accustomed to leading members with diverse backgrounds, while the other 5 students who have never joined a student organization do not really consider intercultural communication as something important for each individual. They tend to say that to be a 21st century leader requires creativity and mastery of technology.

If a leader does not keep up with the times, he will run out of time, but only those with organizational experiences who say that a global leader should not only be seen from the ability of his hard skills but also his soft skills in order to become a leader who is open minded so that there is no more discrimination towards certain ethnics and religion. An open minded leader is a leader who is tolerant and can accept the differences. Global leaders are not only demanded to possess the CQ (Cultural Quotient) so that they can adapt with the new global environment. All the three specifically IQ, EQ and CQ are the main requirements of the global leaders. From the data obtained even shows that in general university students without organizational experiences still do not understand what is meant by Intercultural Communication. It can be seen from the way they speak, and how they solve problems. They also said that they had never been taught about In-

tercultural Communication specifically except students studying at the communication sciences. When asked whether there was a student exchange program on campus, all students with no organizational experiences said that there were student exchange programs but lacked socialization so that they still did not see the benefits of taking a student exchange abroad. They also said that there is a Student Executive Board which has a lot of non-academic programs. However there is no mandatory from the university to opt one of those. So, it depends on the student himself whether he wants to involve or not. These students also said that if they want to propose a scholarship for tuition fees, the university only considers their academic achievement.

However, the other 5 students with organizational experiences and actively involve in non-academic activities said that having a competence in intercultural communication is really an added value for them.

“We have got more opportunity compared to those who are not really active in a non-academic program. We have great experiences in joining the student exchange and overseas cultural performance that make us become more open minded, more tolerant and able to appreciate the differences. We also can build networks with youths all over the world and we’ve got opportunity to take internship in multinational companies and international organizations”.

While the interview with 4 university graduates proves that intercultural competence must be owned by all university graduates who later will not only become ordinary employees but become leaders since they have to manage people from different cultural background. Nowadays, many leaders do not have empathy and do not appreciate other people. If a leader possesses empathy, he will have a cultural sensitivity and will not do things which hurt other people. This conforms the statement of Goldsmith and Walt (1999) Goleman (1998 and 2000) who say that empathy leads to cross-cultural sensitivity, and expertise in hiring, building, motivating and retaining talents in different cultures. All university graduates both working in government institutions and private companies said that global leaders are not only demanded to possess Intelligence Quotient

and Emotional Quotient, but also CQ (Cultural Quotient) so that they can adapt with the new global environment.

“All the three specifically IQ, EQ and CQ are the main requirements of the global leaders. Intercultural communication competence must be owned by all individuals, especially college and university students because when they enter the real world of work, they will face many people from different background. Leaders who have a cultural quotient (CQ) have the ability to communicate with many people because they value the diversity, more tolerant, and have high empathy”.

From the interviews conducted, it was found that currently we are lack of broad-minded, tolerant and respectful leaders of differences that can resolve conflicts with the right approach. This is the absolute requirement that leaders must have in the global era.

“If we want to create qualified leaders, it is the time for universities and youth organizations to equip the students and cadres with intercultural communication. Global leaders should possess awareness, understanding, appreciation, acceptance, and also adaptation. Even today, all universities not only faculty of communication but also other faculties should teach this subject because all the youths will be our future leaders. Today, we can not rely only on the IQ and EQ. In the 21st century everyone must have CQ in order to build networking, negotiate, managing conflicts well, especially our country, Indonesia consists of diverse ethnics, cultures and religions and we also have to build networking with people around the world. If students have high competence on Intercultural Communication, they can be successful leaders in the future”.

Efforts should be done to improve the quality of global leaders. There are now a lot of companies provide intercultural communication training to its top management, especially multinational companies since they want to improve the soft skills of the top leaders. The subjects given also very up to date such as Assertive Leadership, Public Speaking, Conflict Management, Service Excellence and also Intercultural Communication. All of those are need-

ed by leaders in the 21st century. However, the most important thing is that the competence of Intercultural Communication cannot be gained only through training but all of them must understand that it will be obtained through a process.

From the analysis conducted, the results obtained that the factors must be owned by leaders in the current global era is not only having good educational background and familiar with current technological developments but also must be open minded so that there is no more discrimination towards certain ethnics and religion. An open minded leader is a leader who is tolerant and can accept the differences. This conforms the statement of Bennet (1993), Kelly & Mayers (1995), Wiseman, Hammer & Nishida (1998) who say that an open-minded person tolerates different cultures and positively accepts culture that is different from their own. Such a person takes an active role in an unfamiliar environment that may be in conflict with a personal sense of the best practice or etiquette. In line with the development, global leaders are not only demanded to possess Intelligence Quotient and Emotional Quotient, but also must possess CQ (Cultural Quotient) so that they can adapt with the new global environment. This conforms the statement of Earley and Ang (2003) who say that leaders with high CQ are able to adapt to new global environments as well as effectively interact with people of diverse cultures. Also the statement of Chen Oi Chin and Lisa P. Gaynier (2006) saying that IQ, EQ and CQ are the triumvirate of leadership competence in the 21st century.

In addition we are currently lacking leaders who are knowledgeable, tolerant and able to respect differences so as to resolve conflicts that occur with the right approach. This is the absolute requirement that leaders must have in the global era. This is in line with the statements of Goldsmith and Walt (1999) saying that 21st century leaders "must have" characteristic of global leaders, and in line with the opinion of Bennett (1993), Kelly & Mayers (1995), Wiseman, et al. (1989) who say that an open-minded person tolerates different cultures and positively accepts cultures that are different from their own. Such a person takes an active role in an unfamiliar environment that may be in conflict.

Factors should be possessed by university students and graduates to help improve their leadership

competence are awareness, understanding, appreciation, acceptance, and also adaptation. This conforms the statement of Chin, C., Gaynier, L (2006) stating about the Global Leadership Competency Model: Ignorance, Awareness, Understanding, Appreciation, Acceptance, Internalisation, and Adaptation. All universities not only faculty of communication but also other faculties should teach this subject because all youths will be our future leaders. "Today, we can't rely only on the IQ and EQ. In the 21st century everyone must have CQ in order to build networking, negotiate, managing conflicts well, and finally he can be a successful leader." This is in line with the statement of Chen Oi Chin and Lisa P. Gaynier (2006) who state that IQ, EQ and CQ are the triumvirate of leadership competence in the 21st century.

An interview with an official of the Ministry of Research, Technology and Higher Education found the fact that the subject of Intercultural Communication for university students has already been instructed in the National Education System Act No. 20/2003 on Character Building. Character is a person's skills in dealing with others (inter-personal skills) and self-regulating skills (intra-personal skills) that are able to develop a person's performance optimally. In the university itself, the soft skills related to Intercultural Communication should have been implemented in various non-academic student activities, but unfortunately there are still many universities that still focus only on student academic achievement so that soft skills are not developed well. There are a lot of graduates who fail in the job interview because lack of soft skills not the hard skills. When asked about how the Ministry conducts the monitoring and evaluation to higher education institutions, he said that it can be done through various competitions and championships for students in which the non-academic achievement that universities implement can be measured.

Conclusion

From the findings described above, it is seen that there are still many university students who have not understood the importance of Intercultural Communication Competence for the 21st century leaders, except those with organizational experiences and non-academic activities. Universities as educational

institutions should focus not only in student academic achievement but also non-academic achievement which can support the improvement of students' intercultural communication competence so that global leaders who are knowledgeable, tolerant, respect the differences and able to resolve conflicts that occur with the right approach can be generated. Therefore, efforts should be made to improve the intercultural communication competence of university students so that the quality of future leaders will be better. For future research, the researchers recommend to dig deeper the issues on the model of the implementation of Intercultural Communication in universities with different approaches to be adopted.

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Engaging social media for health communication in Rajasthan: Approaches and results

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Advancements in digital media and communications technology have generated considerable optimism on the role of social media in achieving developmental and public health outcomes globally. The unprecedented availability of digital devices and platforms has also prompted different development institutions to design and implement a range of social media interventions for social and behavioural changes. The paper examines how social media are transforming health communication in Rajasthan. The study demonstrates the effective intervention using different mobile devices and approaches in addressing multiple health issues. Communication is central to public health delivery and advances in digital health and communication technology. It holds significant prospects for addressing major public health and development issues. Such optimism is grounded in increasing levels of internet penetration as well as intrinsic characteristics of social media. M-Health has become important practice for common mass. The interventions target different population groups and not limited to only young people who are considered as the prime users and consumers of social media content. However, the study cautions against “new media utopianism” or “social media centralism” as technology is only a tool for intended solution, not the solution itself! It brings out workable strategies for effective use of social media in health communication.

Keywords: Digital media, E-Health, Social changes, Health communication

Introduction

More than 22.50 crore Indians use internet to access research information, enjoy online entertainment, and participate in social networking. In 2016, India became the second largest country to reach

100 crore mobile phone subscribers, with many Indians opting to access internet using mobile devices. Among Indian internet users, about 62% are on social networking sites such as Facebook, Twitter, Instagram, YouTube, and Quora. In fact, India is the largest market for Facebook after the United States,

with 14.20 crore users. Among social media users in India, 90% access websites from mobile devices. Digital communication can dispel myths, disseminate evidence-based information, promote behaviour change, empower individuals, engage and organize communities. A recent research by Research Triangle Institute Global India found that Indian communities are increasingly turning to digital platforms, such as Wikipedia and social media sites, for information on different serious diseases. However, Indian organizations often lack the resources, digital literacy, and strategic planning to harness digital techniques for health impact. To create social media impact there should be focus on these two major elements. Strategy means the 'big picture' or overall approach you take to achieve the objectives you set for your initiative, whereas tactics include various activities you conduct to implement your strategy.

Multiple digital platforms, such as websites and social media accounts, can overwhelm and confuse internet users. To facilitate this integrated communication strategy, use one logo and colour scheme across all platforms. Also, develop a #hashtag to connect your content across social media platforms like Facebook, Twitter, and Instagram. As an example, the HIM initiative used a primary website to distribute its breast self-examination tool and the #HIMInitiative hashtag to engage users in a contest on social media and drive users back to the site to use the tool. Sample tactics or spokes might include the following: A YouTube video contest in which users submit their own videos. A Twitter feed updated daily with the latest campaign news and updates. Text messages reminding people to make appointments to get screened and support early detection. Emails highlighting new resources and tools, for example: Amitabh Bachchan served as a goodwill ambassador for UNICEF's campaign for a polio-free India "do boond zindagi ki".

Methodology

1. Questionnaire designed and structured
2. Sample population identified for eliciting the response
3. Interview conducted with respondents
4. Data analyzed and interpreted Data were collected through mainly primary sources.

Stratified random sampling technique was used for the purpose of this research. Questionnaires were compiled with the help of well-trained interviewers. Interviewers explained the respondents different terms used in the questionnaire before eliciting the response. The data was analyzed and results drawn.

Impact of social media

Social media allow us to share relevant content in new and emerging channels, test how our messages resonate in different spaces, and provide opportunities for multiple exposures to messages. Through the use of social media channels, public health organizations can share relevant content where users are already spending their time. As public health communicators, we can connect "starting where the people are", as people tend to share health content in new spaces allowing public health communicators to potentially tap large audiences of social media channels. For example, explosive growth in the use of Instagram, a photo-sharing social media site, there seems great opportunity to determine the best ways within the channel to target public health messaging for these users.

Defining social media engagement for public health is important. In simple term, the social media engagement has to be social, participatory and reciprocal, leading to conversations and interactions between and among public health organizations and diverse audiences. Social media has been characterized as mutually beneficial for public health organizations and their audiences to connect to each other in ways that promote a "common good". Drawing from these characteristics, we arrive at a social media engagement definition that frames engagement as a multi-way interaction between and among an organization and digital communities that could take many forms, using social media channels to facilitate interaction. Health messaging is shared in a way that creates opportunities for information to be acted upon by the audiences, thereby opening a dialogue with the organization that allows both parties to work collaboratively to address issues affecting health and well being of people at large.

Analysis of Research Questions

Table 2.1 Media spread awareness about health

Response	Strongly Agree	Agree	Neither Agree/ Nor Disagree	Disagree	Strongly Disagree
Number of Respondents/ % age	74/ 56.92	34/ 26.15	14/ 10.77	8/ 6.16	0

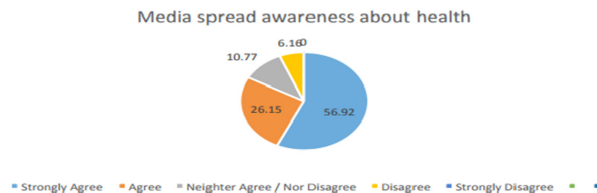
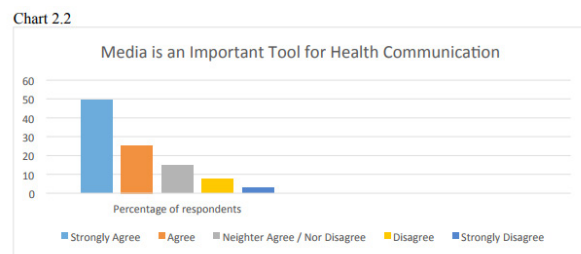


Table 2.2 Media is an important tool for health communication

Response	Strongly Agree	Agree	Neither Agree/ Nor Disagree	Disagree	Strongly Disagree
Number of Respondents/ % age	64/ 49.23	33/ 25.38	19/ 14.62	10/ 7.69	4/ 3.08



Recommendations

People are more likely to support your effort, spread your message, and adapt to your promotional behaviour if they get something in return. Having people read or share your content is a great first step, but how do you get them to actually take action? Consider the following tactics:

- Host a contest, encourage audiences to participate in your initiative through a social media

platform. For example, as part of the HIM initiative for breast cancer awareness, Philips India hosted a social media contest in which those who posted the top five social media ‘selfies’ were given the chance to win household products from Philips.

- Build anticipation to encourage interest and engagement, create a buzz about your contest before it begins. Try revealing bits of information about the contest over the time. For example, for the social media campaign ‘Ray of Hope,’ HDFC Life promoted financial preparedness in case a family member is diagnosed with cancer. Over a week, HDFC Life promoted its upcoming contest by slowly revealing its celebrity spokesperson, Lisa Ray a cancer survivor.
- #RayOfHope campaign that highlights the need of financial preparedness to fight cancer. The idea is to promote Cancer Care plan that provides financial protection for both early and major stage.

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Uttarakhand State Children's Science Congress: An assessment

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Introduction

The 25th Children's Science Congress (CSC) 2017 was organized at Uttarakhand State Council for Science & Technology, Dehradun on 20 December 2017; 130 schools participated from 11 districts of the state and presented posters, oral presentations and science models on 7 themes. Being a mountainous state it is difficult to communicate science, generate curiosity and develop scientific temper especially among the school children in rural areas. Children's Science Congress offers a platform to address these issues and promote science awareness. The presentations by the children included the topics, among others, climate change, biodiversity conservation, information technology, and agriculture productivity, etc. The programme was able to address several issues of regional importance and generate curiosity among them. It emerged that the CSC has the potential to promote science and technology communication if taken in the wider sense and include more interactions.

Background

The National Council of Science and Technology Communication, Department of Science and Technology, Government of India, New Delhi organizes various scientific programmes across the country to disseminate science in the society. National Children's Science Congress is one of the mega flagship programmes organized from block level to national level in different states throughout the country. Uttarakhand State Council for Science & Technology (UCOST) being a nodal agency hosted 25th State

Level Science Congress consisting sub themes, viz., Ecosystem and Ecosystem Services; Health, hygiene and Sanitation; Waste to Wealth, Society; Society, Culture and Livelihoods and Traditional knowledge systems. Considering all these the focal themes for 2018 and 2019, National Children's Science Congress has been chosen as "Science, Technology and Innovation (STI) for a clean Green and Healthy Nation". With clear understanding of these areas narrated so far, local and regional issues may lead one for innovative thinking and come up with new solution(s) while considering the overall health of nation as one cannot ignore the role of society and culture and its linkages to livelihoods, lifestyles and sustainable progress.

Curiosity is a basic trait of human nature. Curiosity leads to keen observation and questioning. Programmes like science exhibitions, lectures, science mela and children science congresses are considered useful to generate curiosity. Such exposures educate people and more importantly, it expands their horizon of understanding. Early exposure to research may encourage students to adopt science as carrier. Similarly, exposure to modern discoveries and inventions may also encourage science literacy which in turn may help improve scientific temper. One's natural curiosity and interest are important factors to motivate common people towards scientific temper.

An innovative approach

Science plays a crucial role in modern society and the popularization of science in any form is closely related to the rise and development of the society. Science popularization is an attempt to reduce the distance standing between science specialists and

the public. Science popularization is the interpretation of scientific information intended for general audience. This could be achieved by providing platforms for students to attempt to exhibit their creativity and innovativeness and more particularly their ability to solve a societal problem experienced locally using method of science. In the last few years, direct interactions have gained popularity and are accepted as a popular mode of science communication. It has become a regular feature during the national level and many district or state level Children's Science Congresses. Some of the best known scientists have interaction with students. The Children's Science Congress prompts children to think and perceive some significant social problems, ponder over its causes and eventually try and solve the same using scientific approach. This involves close and keen observation, raising pertinent questions, building models, predicting solutions on the basis of a model, trying out various possible alternatives and arriving at an optimum solution using experimentation, field work, research and innovative ideas. The Children's Science Congress encourages a sense of discovery. It emboldens the participants to question many aspects of our progress and development and express their findings in regional languages.

The field-based programmes (street plays, puppet shows), blending art and science, have also come up as popular alternative modes of science communication. Given the power conditions in the rural areas, radio may be more relevant there than TV. The fresh advent of Frequency Modulated (FM) transmission in India is a welcome step. It should help enhance the reach of audio medium especially as even some schools have started their own transmissions. With information abundant at fingertips, there is also the fear of mis-information being free. Therefore, more scientists taking to science writing would be desirable. Even in villages or small towns, there are people who develop indigenous tools and aides for agriculture. These days, the media play a critical role in creating role models. It's necessary to project (deserving) scientists, international or otherwise, to show that society wants them. However, it will be damaging to be confined to the foreign scientists alone, or to only those decorated by the advanced countries. This is because people from the developing or under developed countries wouldn't easily relate to the heroes from advanced

places. Models who belong to the same place, give the people a feeling of self respect. Social similarity with the role model reassures people that they can emulate the models. 'Jugad', in local parlance, refers to the local indigenous methods of somehow managing things creatively. This projection will be useful to the society by encouraging of fulfilling local needs. The Indian Science Congress did indeed take an initiative in this direction by inviting such inventors and arranging their interaction during its annual meets. If we look at accounts of the early twentieth century in India and the renaissance in Europe during 14th to 17th century, both of which saw an emergence of so many creative people, we can appreciate that it's not the material returns alone that attracts a potential practitioner to a profession. Many of them died paupers but they commanded respect from the society. Science communication and popularization has been picking up momentum again. In addition to increasing number of planetariums, science museums/ centers and science cities, there is increased coverage in media.

Analysis

Uttarakhand State Council for Science & Technology (UCOST), Dehradun hosted 25th State Children's Science Congress (CSC) 2017. Many national and state level organizations also actively contributed in the event, including Society for Pollution & Environment Conservation Scientists (SPECS), National Academy of Science, India (NASI) UK Chapter, National Council of Science Museums (NCSM), Swami Rama Himalayan University (SRHU), Oberai Motors, and Himalaya Drug Co. Their enthusiasm mixed with academic and industrial experience boosted curiosity among school children. 130 school students from all over Uttarakhand participated in the congress. It was divided under seven themes represents local as well as global concerns viz. Food & Agriculture; Natural Resource Management; Disaster Management; Energy; Lifestyle & Livelihood; Traditional Knowledge System and Health, Hygiene & Nutrition. District-wise representation was maximum from Pauri (12), followed by Udham Singh Nagar, Chamoli, Haridwar and Dehradun (11), participation from each school respectively. The participation of school students or mentor also depend on the school location and communication

facilities available. Minimum representation was from district Pithoragarh (2), which is considered a remote area as compared to other schools. Simultaneously, the minimum male (2 students) and Female (1 student) were from the same district. Whereas, maximum female students (8) participated from district Dehradun and Uttarkashi, followed by district Rudraprayag (7 student). Since, agriculture is a major livelihood profession of the people in the state, maximum presentations (26 students) through poster/ oral/ model were under Food and Agriculture theme, followed by Health, Hygiene and Nutrition (23 students), Traditional Knowledge System (13), and Natural Resource Management (11 students). 27 escort teachers and mentors also participated along with school students. A panel of judges drawn from various reputed institutions was present to assess the performance of students and guide them. A fair representation of both male and female candidates was observed from all the participating districts. Out of the total participants, 14 students (male and female) were recommended by expert panel for participation at national level. The analysis of the data has revealed that the children after participation in the CSC became more inquisitive and adapted to a scientific approach in their day-to-day life.

Table 1: District-wise participants

No.	Name of District	Participants	Male	Female
1	Rudraprayag	9	2	7
2	Nainital	7	3	4
3	Pithoragarh	2	1	1
4	Udham Singh Nagar	11	5	6
5	Bageshwar	9	4	5
6	Pauri	12	6	6
7	Chamoli	11	6	5
8	Haridwar	11	6	5
9	Dehradun	11	3	8
10	Tehri	6	3	3
11	Uttarkashi	11	3	8

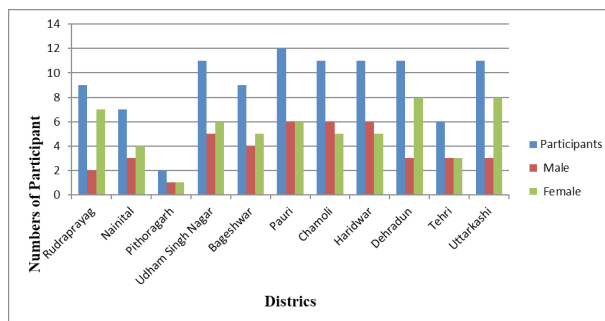


Figure 1: District-wise participants

Table 2: Theme-wise participants

No.	Name of Themes	Participants	Male	Female
1	Natural Resource Management	11	4	7
2	Disaster Management	7	4	3
3	Food and Agriculture	26	13	13
4	Health, Hygiene and Nutrition	23	13	10
5	Energy	12	6	6
6	Lifestyle and Livelihood	9	1	8
7	Traditional knowledge System	13	3	10

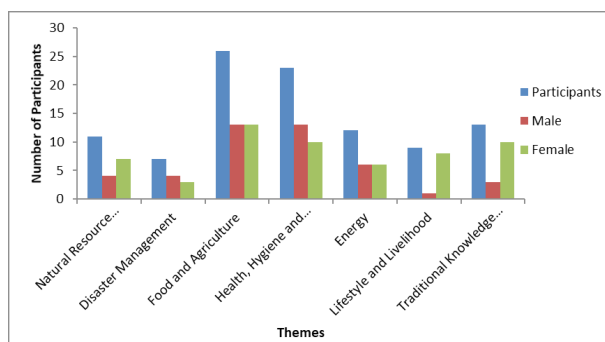


Figure 2: Theme-wise participants

Table 3: Winning contestants

No.	Theme	Male	Female
1	Natural Resource Management	2	1
2	Disaster Management	2	1
3	Food and Agriculture	2	1
4	Health, Hygiene and Nutrition	1	2
5	Energy	2	1
6	Lifestyle and Livelihood	1	2
7	Traditional knowledge System	1	2

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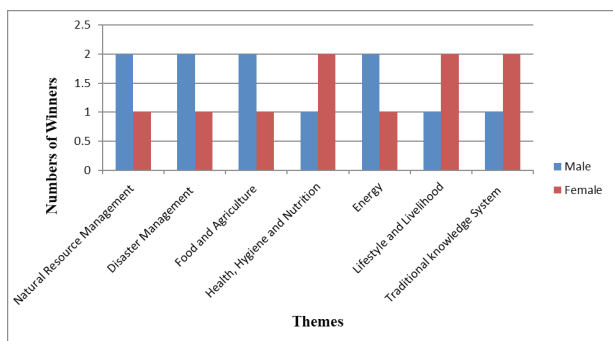


Figure 3: Winning contestant

Commercialization of scientific ideas: New platforms and skills

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Introduction

The development of civilization of human being has always been supported by scientific advancements be it invention of fire or wheel. But the magnitude of its impact was restricted to handful of people or close groups for long time due to lack of dissemination of that critical information. Even some important scientific advancements took unexceptional time to reach to mass and impact their lives. Nowadays, the integrated approach of scientific community and supporting ecosystem helping various stakeholders to leverage the modern technology and communication skill to reach right audiences and help in scaling up the process. Modern systems allow scientific fraternity to get their best ideas disseminated to maximum number of people.

Technology and communication skills move side by side and provide a common platform for commercialization of scientific achievements. They not only fill the knowledge gap but their compatibility is very helpful for product design, manufacturing, innovation, and marketing. Proper access of information and resources helping speedy development in scientific field and all this is possible because of two main factors: a) technology enabled platform

where most of the stakeholders are connected; and b) proper flow of information based on well defined communication skills enabling stakeholders to get necessary information ensuring sustainable growth of scientific achievements. To understand the role of communication skills and technology to commercialization of innovation, it is essential to know the necessity of commercialization of innovation, steps of commercialization and players or contributors of successful commercialization of innovation [1].

Scientific achievements

Scientific achievement can be classified into following categories:

Creation of new knowledge: Any kind of new information and innovative idea, e.g. Newton's theory of gravitation, Einstein's theory of relativity.

Creation of new technology: The technology which did not exist earlier. e.g. In-vitro fertilization.

New product: Any kind of novel product like TV, mobile, transistor, etc.

New process: Novel or new process for production of any product, e.g. production of therapeutic recombinant protein using E. coli bacteria.

Discovery: Discovery is finding out or figuring out something that preexists, e.g. discovery of America by Christopher Columbus.

Invention: Invention is the creation of something new (that is first of its kind). Creation of a product or introduction of a process for the first time can be defined as invention, e.g. Alexander Graham Bell invented telephone.

Innovation: Someone meliorate on or makes a substantial contribution to an existing product, process or service, e.g. there are new innovations in mobile every year, new features are added, size reduced, etc.

Research: Any originative systematic activity attempted in order to increment the stock of knowledge, including knowledge of man, culture and society, and the use of this knowledge to devise new applications.

Commercialization of scientific achievements

Commercialization of research provides new products and services. These new product and services can be used to solve various problems, as well as making incremental improvements to the quality of life of users [2].

Societal benefit: Society will get benefitted from new product and process due to commercialization and availability of new products and processes to all.

Economic growth: Commercialization of innovation creates wealth. Not only innovator gets economic benefit (through technology transfer) but also other stakeholders of the value chain. New business creates revenue as well as job for regional people or may be global. Government also gets benefit through taxes and job creation.

Partnership with investor and industry: Commercialization provides an opportunity to engage with

industry partners, investors and other businesses. These partnerships can result in additional funding sources to further research. Successful commercialization of one innovation creates a chain reaction. Revenue generated by one innovation will be used to invest in next innovation and so on [3].

Social impact and scientists' recognition: Research contribution in terms of knowledge creation is not perceived and acknowledged by all the citizens of the nation. Commercialization of innovation becomes visible to everyone in the society and so society realizes the importance of research. Policy making and allocation of budget become easier, if major population realize the importance of research and innovation.

Commercialization: Commercialization is the process through which revenue/ income is generated using new idea, process or product. Usually, idea alone has less commercial value or no value. Idea or new knowledge can be commercialized by infusing value into it so that people can purchase or use it. The knowledge/ idea of thermophilic bacteria that has heat stable enzymes has no commercial value until we isolate/ purify the industrially viable enzyme/s out of it and roll out a product ready to sell. Commercial value of technology means there is a market and customer for that particular technology who are willing to pay. Commercialization is the process to introduce new product or service to the general market. It takes into account production, distribution, marketing, sales, and customer support required to achieve the commercial success of the new product or service. The strategy of commercialization requires a business development and marketing plan, ascertain the product supply to the market, and foresee barriers to success. The three major segments of the commercialization process are: ideation, business process, and stakeholder acceptance.

Converting idea into product

It carries following steps:

Opportunity: This phase consists of identifying the scientific and commercial value of the discovery by gathering expert opinion, collection of relevant data and documentation.

Protection: Once a meticulous description of the discovery is complete, a patent, trademark or copyright protection process can be initiated. A patent gives you the exclusive right to prevent others from making and selling your invention [4]. Trademarks offer protection for brands, symbols, logos, and colors.

Business case and commercialization plan: This part of the process will determine if the innovation or discovery is truly feasible. Comprehensive analysis of the industry and market, creating the value proposition, and close identification of the customer are involved in commercialization plan.

Building team and securing capital: Only expertise, laboratory level product and process are not sufficient for commercialization. For scaling up the product and sustaining in the market need high investment of capital. It is very critical step to get investment and sharing the ownership against that investment. There are several Govt. Schemes are available. Angel investors and Venture capital can be approached. Innovators have to satisfy the all queries of investor in terms of rate of returning and potential of commercial value etc.

Executing the Plan and developing the product: This phase consist of deal-making negotiations of selling the technology to an existing business or the start-up process of a new business speculation. Roughly, the start-up process includes finding a physical location to operate your business, hiring personnel, physically organizing your business work flow, stocking supplies, developing prototypes and general administrative organization [5]. Successful commercialization has one trickier step i.e. marketing. It has been observed that despite of useful product and service society don't accept it and use it and ultimately product from the market is get with draw. Success requires cooperation between individual actors and organizations, and support from stakeholders because single company is rarely capable of generating successful diffusion in the commercialization of an innovation.

Contributor of successful commercialization of innovation

Different stakeholder have different expectations from you and your innovation, have different level of knowledge and understandings and have different reputation and level of ego. Being lead innovator, you should know how to communicate your idea and get their proper help in successful commercialization. You must communicate with different contributor with different style without diluting the idea/technology and without compromising the ethical value. Even non cooperation by single actor (fig. 1) shall lead to abortion of idea of commercialization.

Importance of language of communication: Although, the Europe-centric world order has made English most versatile and common language to use for economics and science being a global language. Most of the tools and apps are available in English language only. Since most of the communication tools and technologies are available in English it is easier for you to use those tools for communication and for other applications. However, the companies prefer to prepare their handouts, specifications, user manuals, and maintenance and repair instructions in country specific languages to attract customers. For instance, such materials available by international companies even in major regional languages.

Social websites: Web applications are used by people for making social networks or social relations. Here people share similar personal or career interests, activities, backgrounds or real-life connections. This can also use for propagation and commercialization of scientific knowledge. Example: Orkut, FaceBook, etc. YouTube is a video sharing service that allows users to watch videos posts by other users and upload videos of their own. Scientist can use this for commercializing their product. LinkedIn is a social networking site designed specifically for the business community. It allows registered members establish connection with each other and form professional networking.

Organizational websites: These are created by an individual to share personal information of the create contents pertaining to a company, organization or institution. A journal, books or magazines contains information regarding particular subject or professional activity and is a collection of academic research papers or writing from several people based

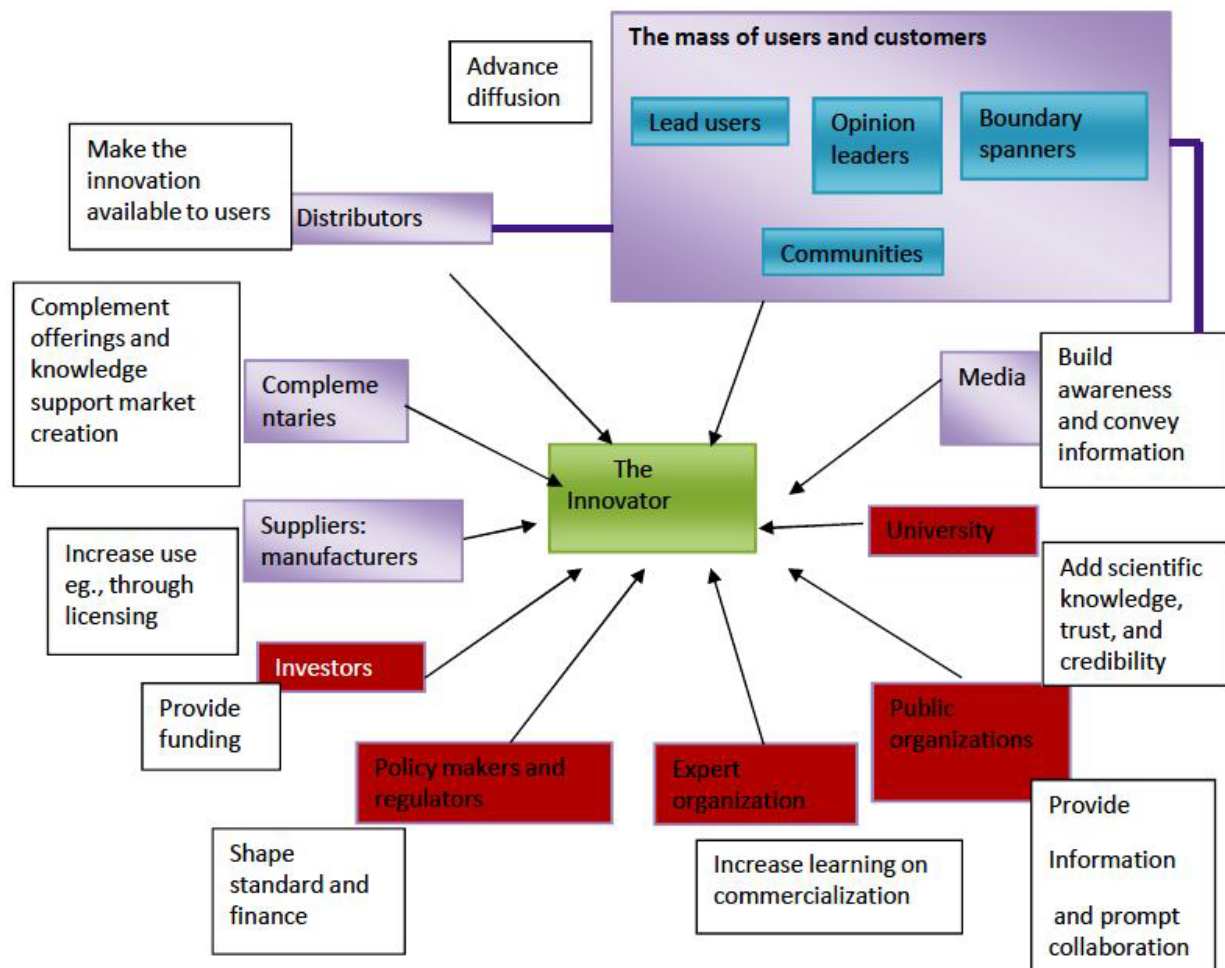


Figure 1: Work-flow showing the contributor of successful commercialization of innovation

on a theme and they are published from time to time (either weekly, fortnightly, monthly, bimonthly, annually, biannually). It provides a platform for creation, dissemination and commercialization of scientific knowledge.

New age platforms of collaborative work: These include virtual platforms to connect various stakeholders. BiotechZone: Marketplace for all Lab input supply and selling your research work at any stage. Science Exchange: a great platform for outsourcing your scientific research in collaboration with public and privet research agencies and individuals. This platform can help you get associated with academic institutions and commercial companies like Spacex, NASA, NIH, etc. Research Gate: It is a social net-

working site where scientists and researchers share research and review papers. Here people can ask and answer the questions and also find collaborators. Scientist.com: Yet another platform with strong network of 18,000 scientists and privet commercial companies with all support from legal to technical and 24x7 consulting service to help at every step from idea formulation to its final commercial venture. Innocentive: A strong network of 3,80,000 specialists from 200 countries making this platform a great place for collaboration and solving particular problem for fixed and transparent cash award. It also allows you to get associated with commercial companies to take your research at next level of value creation. Incubation Centre: A space with basic facilities provided by company or institution to nur-

ture the Start-up. The setup provides platform for managerial training, collaboration opportunity and basic concept through experimentation. Literature database: Research articles can be accessed from online databases and also submitted in these data bases e.g. Pubmed, medline, google scholar, Web of science, Scopus, etc.

Opportunities

Career opportunities in scientific field could be as: Researcher, College/ University teacher, Scientist in Research Laboratories, Editor of Science journal, Editor of news media, Patent attorney, Freelancer consultant of company, Working in companies, Book author/ reviewer/ editor, Freelance tutor, Technology Transfer officer, science communicator, etc. The success depends on one's effective communication skills and command on basic tools and techniques in addition to scientific domain knowledge. Basic tools that help propagate and effectively disseminate knowledge include: Power point; 2. Excel; 3. Microsoft Word; 4. Photoshop; 5. Corel draw; 6. Animation, and 7. Graphics, etc.

Conclusion

Scientific achievements should be commercialized for the benefit of society, nation and continuation of further research. Commercialization is the process of generation of revenue using new product or process. There are several players in each step and all players should cooperate for success of commercialization. These players may be of different region and religion, academic standard, and have different

perception of advance technology. To get optimum cooperation from these players depends on effective communication. To convey the message about the innovation to maximum global population in minimum investment, you should have knowledge of different social platforms where you may discuss your new idea. Computer based software and tools play vital role in effective communication. Scientists must learn these tools besides their core domain area. There is no dearth of opportunities for researchers and scientists if they are well versed with computer based basic tools, domain specific scientific knowledge and equipped with better communication skills. Eventually, commercial ventures of their research and innovation using new platforms may not only draw satisfaction but also reap profit and serve the society.

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Commissioned Studies/ Papers

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

Communicating Indic science: Perspectives and challenges

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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 an-

gle 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-Saamyat 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 Bharadwaja 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

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 man-

agement 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 techno-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!

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AASSA-INSANISCAIR SHARE Communication Workshop

Science Breakthroughs: Paid News, Fake News and Ethics



The dignitaries at inaugural function (right to left) Prof. Manoj Kumar Patairiya, Director, CSIR-NISCAIR; Prof. Yoo Hang Kim, President, AASSA; Prof. Hak-Soo Kim, former President, AASSA; Prof. K.G. Suresh, Director General, Indian Institute of Mass Communication; Prof. J.P. Khurana, Vice President, INSA; Dr. Narender K. Sehgal, Former Adviser, Govt. of India; Dr. Ramaswamy Bansal, Head, International Science & Technology Directorate, CSIR release the Workshop Book

An Asia-Pacific Regional Workshop on Science, Health, Agriculture, Risk, and Environment (SHARE) Communication was organized in New Delhi during February 20-22, 2019 by the Association of Academies and Societies of Sciences in Asia (AASSA), AASSA Special Committee on SHARE Communication, Indian National Science Academy (INSA) and CSIR-National Institute of Science Communication and Information Resources. Over 50 delegates from India and abroad participated in the programme.

The tentacles of the all-pervasive paid and fake news are spreading to science breakthroughs as

well. This undesirable spread has adverse repercussions among all stakeholders, including researchers, scientists, science communicators, students and the lay public. It is vital to not only recognize the problems, but also evolve solutions that can arrest the generation and spread of these unethical practices.

To share, discuss, brainstorm and find solutions, the Association of Academies and Societies of Sciences in Asia (AASSA), Indian National Science Academy (INSA), CSIR-National Institute of Science Communication and Information Resources (NISCAIR) and the InterAcademy Partnership (IAP), jointly organized the Regional Workshop on

“Science Breakthrough: Paid News, Fake News and Ethics” during 20–22 February 2019 in New Delhi.

About 50 experts, including science communicators, policymakers and scientists from seven Asian countries *viz.*, South Korea, Thailand, Vietnam, Indonesia, Nepal, China and India congregated in New Delhi to share their experiences, discuss and brainstorm on the instances and impact of fake news on science breakthroughs, misinformation in the digital age, dissemination of paid and fake news, ethical dimensions, etc.



Welcoming the guests during the welcome reception on February 20th, Prof. Manoj Kumar Patariya, Director, CSIR-NISCAIR welcomed all the delegates. He said that the topic of the regional workshop is of great concern worldwide and can only be tackled through sustained and accurate communication efforts. He said that there is a need for networking in order to bring about the best communication and that AASSA provided such a networking framework.



Prof. Manoj Kumar Patariya, Director, CSIR-NISCAIR delivering welcome address

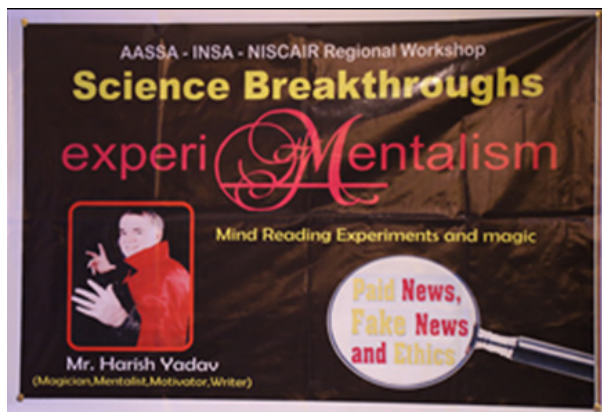


Prof. Krishan Lal, Co-Chair, IAP for Science delivering his address

Echoing similar sentiments, the chair of the session, Prof. Krishan Lal, Co-Chair, IAP for Science and former President, INSA said that greed for money, power and influence leads to the generation and propagation of fake news.



Mr Harish Yadav from Jaipur putting on an interesting show on Mentalism



In a Science Magic Show, later in the evening, Mr

Harish Yadav from Jaipur, Rajasthan put on an interesting show on Mentalism which captivated the participants.



Mr Hasan Jawaid Khan, Chief Scientist, CSIR-NISCAIR presents vote of thanks

Proposing the vote of thanks, Mr Hasan Jawaid Khan, Chief Scientist and Head of the International & Popular Science Division, CSIR-NISCAIR said that fake news has made its presence felt in the field of science as well and a recent example was the anti-vaccine movement fuelled by misconceptions.



Prof. Manoj Kumar Patariya, Director, CSIR-NISCAIR gives opening remarks

Giving his opening remarks and setting the tone for the discussions, Prof. Manoj Kumar Patariya, Director, CSIR-NISCAIR said that an interdisciplinary approach is required in science communication and that the Regional Workshop on SHARE Communication that draws on a number of experts in Asia in the areas of science, health, agriculture, risks and environment is an ideal platform to discuss the sub-

ject.



Prof. J.P. Khurana, Vice President, INSA addressing at inaugural session

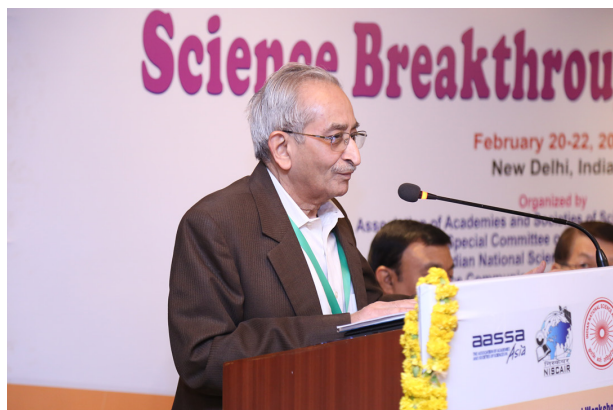
Prof. J.P. Khurana, Vice President (International Affairs), Indian National Science Academy, New Delhi in his keynote address highlighted the role played by the science academies in India that among other things are also communicating about scientific developments in the country. He stated that such science communication efforts should also focus on children. Prof. Khurana stated that debates on new scientific technologies like transgenics should be scientifically tempered for easy understanding by the masses.



Dr Rama Swami Bansal, Head, International S&T Affairs Directorate, CSIR

Dr. Rama Swami Bansal, Head, International S&T Affairs Directorate, CSIR, Guest of Honour at the inaugural function highlighted many contributions of CSIR and dwelled upon the measures taken for communicating them to the masses. She spoke spe-

cifically about the first bio-jet fuel for air-crafts and also raised the issue of fake journals and plagiarism.



Dr Narender K. Sehgal, Former Adviser, Govt. of India giving inaugural address

Dr. Narender K. Sehgal, UNESCO Kalinga Prize Winner for Science Popularization, highlighted the unethical scientific studies sponsored by commercial interests that are increasingly making inroads into the scientific literature, as the guest of honour at the inaugural session. He expressed his concern that such scientific studies can mislead not only the masses but also the researchers and scientists. It is difficult to identify such published studies, making the situation even graver, he said. Dr Sehgal was of the view that exposure to the etymology of fake news could sensitize the masses about the perils of fake science news.



Prof. K.G. Suresh, DG, Indian Institute of Mass Communication addresses as chief guest

Prof. K.G. Suresh, Director General, Indian Institute of Mass Communication was the Chief Guest of the

inaugural function. In his address, Prof. Suresh said that one of the reasons of misinformation is because researchers are not willing or are not able to reach out to the media. He added that on-spot journalism has been replaced with desktop journalism, giving rise to instances of misreporting. Prof. Suresh said that there is a need to create an army of internet warriors to combat fake news.



Prof. Yoo Hang Kim, President, AASSA, delivering the Presidential Address

The President of AASSA, Prof. Yoo Hang Kim in his address said that the boundary between true and fake news has become blurred. He called upon scientists to keep their guard and take an active role to prevent misuse of social media in scientific matters. He added that it is the duty of the scientists to protect the general public by using this scientific knowledge and expertise to ferret out misinformation, half-truths, lies and fake news which are rampant in the social media.

Mr S.P. Mishra, Deputy Executive Director, Indian National Science Academy proposed the vote of thanks. The inaugural session was followed by four scientific sessions and a panel discussion spread over two days.

The first scientific session on impact of fake news on science breakthroughs : a global concern was chaired by Prof. Hak Soo Kim, Chair, AASSA Special Committee on SHARE Communication and co-chaired by Prof. Anjana Singh of the Nepal Academy of Science and Technology, Lalitpur, Nepal.

Prof. Anjana Singh of the Nepal Academy of Science and Technology, Lalitpur, Nepal, speaking on the effects of fake news said that Nepal is grappling with the menace of fake science news and re-

marked that there is a need to create a news ecosystem that values truth.



Prof. Hak Soo Kim, South Korea, and Prof. Anjana Singh, Nepal Academy of S&T

Dr Wijitra Suriyakul Na Ayudhya, Director of Collection Division, Information Technology Museum, Thailand speaking on man-made errors in reporting scientific information said that the museum where she works, has a group to check the authenticity of science news and bust myths.



Dr Wijitra Suriyakul Na Ayudhya, Thailand

Prof. Yatish Agarwal, Dean, School of Medical and Paramedical Health Sciences, Guru Gobind Singh Indraprastha University, New Delhi addressed the issue of paid and fake news in medical science breakthroughs. Prof. Agarwal said that with a huge and fast-growing medical industry, the reasons of fake, planted and paid medical news are obvious.



Prof. Yatish Agarwal, Dean Medicine, GGSIPU



Dr R.K. Bhandari, INAE

Dr R.K. Bhandari, Chairman, Forum on Disaster Mitigation, Indian National Academy of Engineering spoke on the challenges of disaster risk communication. He said that many times disasters are sensationalized by the media rather than ethically reporting facts educatively and constructively



Dr Xiaomin Zhu, China and Dr Daljit Singh Bedi, NISCAIR chair a session

The second scientific session on misinformation in digital age: a challenge for true science was chaired by Dr Xiaomin Zhu, Associate Professor of Philosophy and the Director of Centre for Science Communication, Peking University, China and Dr Daljit Singh Bedi, Chief Scientist, CSIR-NISCAIR.



AASSA-SHARE Communication Special Committee Chair Prof. Hak Soo Kim

Why do news reports of scientific breakthroughs fail to engage the public? By way of answering this question, Prof. Hak Soo Kim, Chair, AASSA Special Committee on SHARE Communication stated that we are not emphasising on the problem but merely reporting the news. Prof. Kim was of the view that public engagement can be better if the reportage focused on the solutions to the problems as well.



Prof. Dinesh Kumar, Lucknow University

Prof. Dinesh Kumar, former Director, Institute of S&T Communication, University of Lucknow gave several examples of fake news. He said that the public should be cautious about fake and exaggerated

reports about herbal medicines. Dr S.K.S. Rathore, Senior Principal Scientist, CSIR-AMPRI, Bhopal speaking on manipulation in communication through paid and fake news and R&D management said that validation of science news depends on credentials of scientists, research labs, etc.



Dr S.K.S. Rathore, CSIR-AMPRI

An analytical perspective of dissemination of paid news and fake news was the focus of the third scientific session on dissemination of paid news and fake news: an analytical perspective session chaired by Prof. Finarya Legoh, Vice Chair, AASSA Special Committee on SHARE Communication and co-chaired by Dr Ashwin Sasongko Sastrosubroto of the Indonesian Institute of Sciences. In her opening remarks, Prof. Legoh spoke about the need for collaboration to research and check fake news and promote a culture of news that values truth.



Prof. Finarya Legoh and Dr Ashwin Sasongko Sastrosubroto, Indonesia

Dr Xiaomin Zhu, Associate Professor of Philosophy and the Director of Centre for Science Communication, Peking University, China discussed Tai Chi – China’s ancient Chinese martial art practised for both defence training and health benefits. He narrated how Tai Chi is presented to the global community and added that many times Tai Chi is communicated wrongly even in China. He said there is a need to promote Tai Chi in China.



Dr Xiaomin Zhu, China

Speaking on issues of climate change in the mass media, Prof. Arul Aram of Anna University, Chennai said that journalists need to take care when reporting on uncertainties regarding climate change coverage. There is a need to combine technical expertise with communication approaches, he said and suggested that both scientists and journalists need to be sensitized on the ways to address climate change as media mediates science.



Prof. Arul Aram, Anna University

Ms Nguyen Tuong Lan, Deputy Manager, Science and Technology Development Forecasting Department, Vietnam Academy of Sciences and Technology, Vietnam gave the perspective of Vietnam in addressing the issues concerning fake news, paid news and ethics in science. She said that there is not enough time to authenticate new information and by the time authentication is done, the undesirable news has rapidly spread on social media. She was of the view that the people should verify the information before accepting and believing the information reaching them through social media.



Ms Nguyen Tuong Lan, Vietnam

Dr M.A. Ansari, Professor, Agriculture Communication at the G.B. Pant University of Agriculture and Technology, Uttarakhand said that issues like the impact of climate change on agriculture matters are not being reported by media.



Prof M.A. Ansari, GB Pant Agriculture University

Dr Aphiya Hathayatham, Vice President, National Science Museum of Thailand and Dr R.S. Beniwal, Chief Scientist, CSIR-NISCAIR chaired and co-chaired the fourth scientific session on breaking the paid news, fake news phenomenon: ethical dimensions.



Dr Aphiya Hathayatham, Thailand and Dr R.S. Beniwal, NISCAIR chair a session

Dr Surya Pratama and Dr Ashwin Sasongko Sastrosubroto of the Indonesian Institute of Sciences presented a case study about fake news in the social media in Indonesia. They said that the fight against fake news in Indonesia is being led by the government and opined that international cooperation and regulation are required to fight the menace of fake news.



Dr Surya Pratamam, Indonesia

A panel discussion on dealing with issues: communication strategies and initiatives was the focus of the summing-up session on February 22nd. Speaking at the panel discussion, Dr M.H. Srinarhari, General Secretary of the Indian Association for Science Fiction Studies, Bengaluru stated that honesty in reporting and integrity in validation are necessary to combat fake science news. Dr Rameshwar Singh, Vice Chancellor, Bihar Animal Sciences University, Patna was of the view that unscrupulous pushing of agenda gives rise to fake news. He also expressed his concern on the growing numbers of predatory

research journals.



Dr M.H. Srinarhari

Dr N. Ramamurthi, Scientific Officer H, Bhabha Atomic Research Centre, Mumbai said that we need to worry about large industries that have the power to suppress the truth, deny climate change and falsely claim cures to diseases. He also said that if there are genuine breakthroughs, fake news does not happen and even if it happens, the fake news will not prevail.



Dr N. Ramamurthi

On the conclusion of the panel discussion, Prof. Manoj Kumar Patariya summed up the proceedings and the recommendations of the two-days workshop.

Recommendations

Following recommendations emerged out of deliberations during the workshop and Prof. Patariya presented a summary of the same at the summing-up session, which was considered and adapted for implementation as given below:

1. The media cannot be controlled. Information consumers have to be vigilant about the information that they receive from all sources, including social media. The workshop recommends strengthening media literacy and information literacy programmes to combat the menace of paid and fake science news.
2. Scientific research in labs is not generally communicated by the media and it does not seem to be a priority of the media. The workshop recommends that scientists should reach out to the media and take to popular science for accurate reportage and enhanced coverage.
3. The workshop reinforces that the Science Academies have an important role to play in communicating scientific developments to the masses, especially the children. It also recommends stronger networking by the Academies for strengthening different organizations and individuals.
4. The workshop recommends that a generic science undergraduate course that develops a scientific temper among students may be introduced in all the undergraduate courses.
5. Fake journals are a menace and scientists should be made aware of such fake journals.
6. The boundary between true and fake news has become blurred. Grossly exaggerated distortions do irreversible damage to public goods. It is recommended that the damages inflicted by the spread of fake science news should be studied.
7. Misinformation and disinformation are fundamentally different and both are spread in different ways. The workshop recommends that there is a need to identify and stem the spread of misinformation and disinformation.
8. Often disasters are sensationalised by the media. The workshop recommends that risk communicators should be educated about the need for accurate but sensitive reporting of disaster information.
9. With a 10 trillion-dollar medical industry, paid and fake news is common in health communication all over the world. Unethical self-promotion about healthcare is also rampant. Medical councils and other such bodies should play a more proactive role in curtailing paid news and prevent unethical practices in health communication.
10. Authentication and verification of new information are essential. The workshop recommends that projects such as 'Myth Buster' of Thailand that verifies scientific information before disseminating it to the public should be adopted in science communication programmes.
11. Science breakthroughs fail to engage the public because communicators focus excessively on the solution than also highlighting the initial problems. Recommends that there is need to reorient science communication so as to engage the public.
12. Some countries are not promoting traditional practices like Tai Chi. This results in unscrupulous players spreading fake and false information about such traditional practices thereby affecting the centuries-old practices and traditions. Recommends that governments should use effective communication methods to popularise such traditional practices accurately.
13. In a fiercely competitive media environment, adequate time is not spent to authenticate new information. Journalists need to take care when reporting on uncertainty regarding climate change. Recommends that journalists should closely network with scientists to get a correct picture and avoid misreporting. There is a need to combine technical expertise with communication approaches.
14. Agriculture communication in the media does not focus on Farm/Farmer's income, price rise of agri-inputs, climate change impact on agriculture, etc. Recommends that these important areas also should be included in agriculture communication.
15. A course may be introduced for children on science in daily life, a science communication academy should be established and onsite training on science communication should be provided.
16. Networking among share communication members be promoted and experts of other countries be included in training workshops.
17. AASSA awards and fellowships may be introduced.
18. NISCAIR may provide infrastructure support for science communication activities.

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AASSA elects new Chair of SHARE Communication



Prof. (Dr.) Manoj Kumar Patairiya has been elected as the Chair of the International Special Committee on Science, Health, Agriculture, Risk, and Environment (SHARE) Communication as part of the Association of Academies & Societies of Sciences in Asia (AASSA), an inter-academy international organization comprising 31 member countries. The Indian National Science Academy (INSA) is one

of the members. Dr. Patairiya had been the Vice-Chair of the AASSA Special Committee on SHARE Communication during 2015-2019. At present, Prof. Patairiya is the Director of the National Institute of Science Communication and Information Resources (CSIR-NISCAIR), Editor General of Science Diplomacy and Editor of the Indian Journal of Science Communication.

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 2. Sharma R.D., *Communication of science and technology in ancient India*, *Indian Journal of Science Communication*, 1(1), pp 3-7, 2002. The sources such as unpublished papers and personal communications should also be included in the references in the following form:
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