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CHANGING ROLE OF SCIENCE CLUBS IN COMMUNICATING SCIENCE

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Abstract:

The growth of scientific awareness among humans is a mere necessity for the development of society. It can be generated through science communication. Science communication is a specialized skill to make people acquainted with the methodology of science in different ways. The arena of science communication can be specified with the trinity of popularisation of science, spread of scientific temper and use of science and technology for the welfare of the common people. The role of individuals, periodicals and organisations (both governmental and non-governmental) in the context of science communication can be taken into account. In this paper an attempt will be made to look into the role of science clubs of West Bengal in communicating science. The process of establishment of science clubs was started before independence, i.e. before the birth of the state of West Bengal. Primarily, the activities of the science clubs were confined to the science popularisation programmes only. Later, the working domain of the science clubs expanded. The initiatives that were taken in developing science club movement in the formative years and in the later days were certainly in keeping with the contemporary social conditions. As time passes, the objective condition changes. It is important to explore the changing role of science clubs which the present paper is aimed at.

Key-words: Science Clubs, Science Communication, Science Organisations, Science Popularisation, Scientific Temper

Science communication has been defined as "the use of appropriate skills, media, activities, and dialogue to produce one or more of the following personal responses to science (the AEIOU vowel analogy): Awareness, Enjoyment, Interest, Opinion-forming, and Understanding"[1] It is a specialized skill to make people acquainted with the methodology of science in different ways. The arena of science communication can be specified with the trinity of popularisation of science, spread of scientific temper and use of science and technology for the welfare of the common people. The role of individuals, periodicals and organisations (both governmental and non-governmental) in the context of science communication can be taken into account.[2] In this paper an attempt will be made to look into the role of science club in communicating science.

The process of forming science clubs was started before the independence. But after independence the numbers of these clubs increased. However from 1930s-1940s to the present days the character of these science clubs did not remain the same. Evolution has been made in the activities, participations and expansions of science clubs. The aim of this paper is to explore the changing role of science clubs in communicating science. But to explore the changing role it is necessary to trace the evolution of the science clubs in a historical outline. Before tracing the evolution, the aims of the science clubs need to be specified.

The aim of a science club is to make people scientific in their attitude to life. To reach this goal the science clubs organize some activities like model-making, sky-watching, science exhibition, science quiz, discussion etc. To spread their ideas, these clubs publish periodicals and pamphlets on science. These clubs try to expose the so-called supernatural event through scientific clarification. It is done for the spread of scientific temper. These clubs try to utilize scientific knowledge and their technological application for the welfare of the common people. And along with that these science clubs, inspired by social consciousness engage themselves in some specific areas like the anti-nuclear movement or in the movement for donation of bodies after death. Thus it can be said that these science clubs had played a crucial role in communicating science in different ways.

The process of establishment of science clubs was started in 1931. The name of that science club was *Bangiya Bijnan Parisat.* [3] It was established under the influence of *Swadeshi* movement. The initiators of that club were some scientists and engineers. Its president was

Rabindranath Dey who was by profession the PWD secretary of the Calcutta Corporation. He joined the Calcutta Corporation because of the interest of Deshbandhu Chittar Ranjan Das. This organisation had established two educational institutes, namely *Kolikata Shilpa Vidyapith* and *Kolikata Bijnan Mandir*. Two workshops were run by the *Parishat*, namely *Kolikata Shilpashala* and *Kolikata Bijnan Rasshala.* [4] *The Parishat* had started to publish a periodical under the title of *Path* (the way). Jayanta Basu had remarked that this name suggests that the aim of the organisation was to show the way to a resurgent country. [5] At that time unemployment was a major problem due to the global economic depression of late 1920s. The *Parishat* was established to show the way following which the nation would get rid off this crucial problem. It was suggested that the people would become employable through the learning of science and technology and the *Parishat* would be that pathfinder. Thus the name of the mouthpiece of the *Parishat* was *Path.* The members of the editorial board were Birendranath De, Sunitikumar Chattopadhyay, Prashantachandra Mahalanabish and Jitendranath Sen. Along with them Sunilkrishna Raychaudhuri,[6] the principal of an engineering college was there to work as the director of the mouthpiece. However because of an unfavourable environment this periodical ceased to exist within a short period.[7]

The objective condition of the second half of the decade of nineteen thirties was somewhat favourable for the growth of a different society. The whole of 1930s was a decade of anti-feudal and anti-imperialist movement. At the international level, an anti-fascist platform was developed in 1935. To have a link with it the *Indian Progressive Writers' Association* was founded in the same year. In 1935 the manifesto of the Pragati Lekhak Sangha was published. [8] In 1936, the first conference of the *Bharatiya Pragati Lekhak Sangha* (*Indian Progressive Writers' Association*) was held in Lucknow. It declared massive protests against these feudal and imperialist forces. An all-India general industrial strike was held in 1937. In the same year, an anti-imperialist conference of peasants, workers and students was held at Nagpur. The second conference of the *Bharatiya Pragati Lekhak Sangha* (*Indian Progressive Writers' Association*) was held in 1938 in Kolkata. [9] The Second World War also broke out by the end of the decade. The pressure of this war was felt by the common people of the country.

Meanwhile, in 1937, the *League Against Fascism and War* was formed under the leadership of Rabindra Nath Tagore. After three years, in the year of 1940, some students of the

University of Calcutta established a cultural organisation, namely the *Youth Cultural Institute*. Its aim was to spread anti-fascist consciousness among the masses. [10] In 1942, after the murder of the cultural activist Somen Chanda (1920-1942) the *Anti-Fascist Writers' and Artists' Association* was formed. In 1943, the first Congress of the *Communist Party of India* was held in Bombay. It retained the agenda of democracy and scientific attitude towards life. In this period, the notion of democracy, internationalism and freedom of thought and expression dominated the ideal of the Bengalee literates. These ideals were strengthened by the struggle against fascism.

On the other hand, in 1939, the important book named *Social Function of Science*, written by John Desmond Bernal, was published. It was released at such a time when a debate was going on regarding the role of science in society. During the destructive First World War the common people experienced the massive misuse of science. The economic crisis and massive unemployment problem in the twenties and thirties of the twentieth century exposed a crude reality that science is being used for the interests of a powerful minority. The preparation of the Second World War showed the destructive use of science; the people were also becoming conscious about this unhappy alliance between science and imperialism.

In this time two science organizations were set up. The *Indian Science News Association* was established in 1935 with the initiative of Professor M. N. Saha and Acharya P. C. Ray and other stalwarts. It was indeed a great event and for the first time, in the history of Indian Science, such an organization was set up to cater science news as well as showcase the reflections of the community of Indian Scientists and thinkers for public understanding of science and culture together. To meet this goal from its very inception, the Association has been publishing its journal *Science and Culture*. In 1940, the entity called *Science Club* was established at the initiative of Dr. Nihar Munshi, Ranen Ghosh and others[11]. The genesis of these early initiatives can be traced in the social and cultural background of the time.

When untold miseries were being caused during the second world war that used weapons gifted by science, the knowledge of science was also found to be insufficient in solving the social problems of Bengal. Science was not used to combat the famine of 1943. But to some citizens at least, science appeared as a prominent tool to effect the progress of society and civilization. To spread this idea, the science clubs were founded with the aim of using science for the welfare of

the people. The ideal of internationalism of the contemporary time fitted very well with the universality of science.

During the war against fascism, there was a growing trend of interaction among the scientific workers of different countries. On the occasion of the 220th anniversary of the *Soviet Science Academy*, in 1945, scientific workers of different countries assembled at Leningrad[12]. At that conference, the scientific workers of Russia, Britain & France decided to form a world organisation of scientific workers. To achieve this aim a conference was held in Britain in the month of June & July 1946.[13] In this conference, the U.S.A., Britain, France, Canada, the U.S.S.R., China and South Africa sent their representatives from the organisations of the scientific workers of the respective countries. Those countries, which did not have their similar organisations, sent only 'spectator delegates'. India, Italy, Norway, Belgium, Czechoslovakia, Denmark and Spain sent these spectator delegates. From India, Meghnad Saha participated in this conference as one of the spectator delegates. From this conference, the *World Federation of Scientific Workers* was formed; J. D. Bernal played the pivotal role in deciding the aims and constitution of the Federation[14].

The effect of this international incident was felt in India also. After returning from the conference, Meghnad Saha appealed to the scientific workers of India to form this kind of organisation in his editorial in *Science and Culture*. He wrote: "the aims and objects of the Association are 'for fuller use of science for national life – for education through meetings – and for action in public field'[15]. In another article he wrote: "It is high time for the scientific workers in India that they exert their inherent right to live like decent citizens and shoulder responsibilities for the betterment of their motherland". [16] On 7th January 1947, the *Association for Scientific Workers (India)* was formed. [17] Its first president was Jawaharlal Nehru. The joint secretaries were Biresh Chandra Guha and B. Ahmed. There were differences among the organizations which were established in the pre-independence period. But certainly the common minimum agenda of all those organizations was to spread the message of science.

With the same aim, following the preparatory phase of 1947-1948, [18] the *Bangiya Bijnan Parisad* (B.B.P.) was established on 25th January 1948, [19] under the leadership of Acharya Satyendranath Basu. From this year, the *Jnan O Bijnan* was published from the B.B.P for dissemination of science among the common people.[20] Its first editor was Prafulla Chandra

Mitra. Later Gopal Chandra Bhattacharya took the charge. The main aim of the B.B.P. was also to spread awareness for scientific knowledge among the common people. Acharya Satyendranath was the forerunner of the movement for science popularisation through the vernacular.

In the year of 1951, Dr. Dhirendra Nath Gangopadhyay established the *Pavlov Institute*. From there in 1961 a tri-monthly magazine was published namely, *Manabman* (Human mind). It was a magazine of psychology, biology and social science. Dhirendra Nath tried to incorporate the society and human psyche in the science popularisation programme in Bengal. His main aim was to develop the idea of a movement for a healthy mind both of the individual and the society. But his achievement has not come under the light of publicity[21].One may question that the organizations like Indian Science News Association (1935), Bangiya Bijnan Parisad (1948) or Pavlov Institute (1951) can be regarded as science clubs? To respond this question it may be pointed out that some of the synonyms of club are association, society, organization, unity and the aim of a science club, as mentioned earlier, is to make people scientific in their attitude to life which was the motto these early science associations. These science societies can be regarded as forerunners of the science clubs of the young generation.

The interest on science and technology among the people in general and the young generations in particular was developed by the contemporary happenings. Nineteen fifties was the period of space expedition. On 4th October 1957, the United Socialist Soviet Republic (U.S.S.R) launched an unmanned satellite named Sputnik I into the space. After a month, in November, Sputnik II was launched into the space. This time a living being (i.e., a dog, 'Lika') was sent to the space. The common people were excited by the news of space expedition of a living being. Dilip Bose, affiliated with the C.P.I, tried to increase this interest along with another person Shankar Chakraborty. Both of them organised many slide shows on this space expedition in different localities of the state. Though they did not form any science club, this endeavour deserves special mention in the history of science communication. This kind of science-popularisation activities outside the academic circle is noteworthy. It was accommodated in the ideal of science clubs also. Later, after the sudden death of Dilip Bose this effort suffered a setback. [22]

Nineteen fifties was the period when the young generation got involved with the science club activities. They were inspired by their enthusiastic teachers. In this connection mention may

be made of Radhika Bagchi and his students of Scottish Church Collegiate School. From 1957-58, the students of the Scottish Church Collegiate School, with the initiative of their science-teacher Radhika Bagchi, were engaged in practical science programmes. The practising of this practical science was named as the *Laboratory*. With this *laboratory* a science exhibition was held in the school in 1962. [23] In 1963, another exhibition was organised in the Dhakuria Lake area by the school. In that year the organisation named the *Science for Children* was formed by the enthusiasm of the headmaster of the school. The spirit of this kind of initiative was transported to another missionary school of Kolkata – St. Xavier's School. Some students of St. Xavier's School tried to initiate a science club. In 1967, they organised a science exhibition.[24] Later, they formed an association for sky watching: *Amateur Astronomers' Association*. This was an instance of subject-oriented science club in the formative days.

After the establishment of the *Birla Industrial and Technological Museum* (B.I.T.M.) in 1959[25], the interaction between the science clubs and B.I.T.M. helped the development of science popularisation activities. This B.I.T.M. was initially a part of the *Council of Scientific and Industrial Research* (C.S.I.R.). Later, after the initiation of the *National Council of Science Museums* (N.C.S.M.), the B.I.T.M. became a part of it. From 1965[26], the Birla Museum started a new venture, *Museubus*, which was a mobile science exhibition[27]. This mobile science exhibition attracted many people of the urban moffasils. These people felt that if this kind of mobile exhibition could create such an interest then a permanent science club should be more attractive to the people.

On the other hand, the *Indian Radical Humanist Association* (I.R.H.A.) established by Manabendra Nath Roy, tried to spread scientism as early as the mid-sixties. It was stated as a basic principle of the I.R.H.A's constitution that humanism should oppose any kind of supernaturalism. It declared man to be the architect of his own fate.[28] To spread this idea the spread of science was necessary. In 1967-68, the student wing of the I.R.H.A., the *Rationalist Students' Association*, was formed. After that in 1969-70, its Youth wing, the *Humanist Youth Association* was formed. The nature of these science clubs was gradually changing. Previously these clubs were the arenas of participation for the students only. Now the *Radical Humanists* was attracted to the science club movement. As a result of it, the *Howrah Bijnan Parisad* was formed in 1968[29]. In the very next year, there was a split and a new club – *Antaral Bijnan Gosthi*

was formed. In 1971, the *Jadavpur Science Association* was formed. Some science associations were formed in Hooghly; those were *Chandannagar Science Club* (1971), *Pioneers' Group Hobby Centre of Hooghly* (1972), *Bhadreswar Science Club* (1973). The *Gobardanga Renaissance Institute* was formed in 1973. Its initiator was a *Radical Humanist* Moni Dasgupta[30]. By its influence some other science clubs were formed in the nearby stations of the Bongaon section of Sealdah North division. Among those *Ashoknagar Bijnan Sanstha* (1974), *Anwesha, Maslandapur* (1979), *Bamangachhi Bijnan Samstha, Thakurnagar Science Institute* (1979) [31] deserve special mention. Two other organizations *Scientific Workers' Forum* (1975) and *Science Association of Bengal* (1977) [32] were set up consequently.

The activists of these science clubs felt the necessity of creating a kind of coordinating body to co-ordinate the activities and to communicate among themselves. They wanted to share the problems, which they faced in their working domain. Their aim was to solve those problems in the light of their experience. They felt this kind of experience sharing would help them to develop the science movement in West Bengal.

The first step towards co-ordination was taken by the *Jawahar Shisu Bhavan* in 1974. It organised a science fair in the Hindi High School in collaboration with the N.C.E.R.T, where different science clubs took part. It was the first of its kind. After that the *Birla Industrial and technological Museum* came up to co-ordinate the activities of science clubs. In July 1978, a meeting of the representatives of different science clubs was held in the *Birla Museum*. Another meeting was held in March 1979. In the same direction, another meeting was held in August 1980 in the *Bangiya Bijnan Parisad*. So through this endeavour of coordinating, three big institutions - *Jawahar Shishu Bhavan, Birla Museum* and *Bangiya Bijnan Parisad*, were engaged in a social purpose. [33]

As a result of this process the first *Science Club Conference* was held at Gobardanga, North 24 Parganas on 14th and 15th August 1979[34]. Though by name it was an All-India Conference but in reality the majority of the participants were from West Bengal. Only two clubs, namely, *Rohini Science Club* of Ranchi and the *Youth Humanist Forum* of New Delhi, participated in this conference from outside Bengal. So it was mainly a conference of the science clubs of West Bengal. A souvenir was published on this occasion where a brief account of different science clubs was published. In this souvenir an important portion was devoted to the

problems faced by those clubs in pursuing their activities. If we analyse those opinions, which the office-bearers of those clubs expressed, then we certainly find some common issues[35]. The problems from which all those clubs suffered were –

i) Lack of fund and patronisation.

ii) Lack of workers and interested persons, and lack of time of those interested persons.

iii) Lack of encouragement from the teaching community.

iv) Lack of requisite space.

v) Lack of motivation of the students and lack of co-operation from the guardians.

vi) Lack of proper experienced guidance.

vii) Lack of books and materials for model making.

viii) Lack of scientific temper in the society.

To solve these problems, it was proposed that something should be done unitedly. The need for co-ordination was felt by all persons concerned. But how could it be possible? Was any central organisation necessary? Or how would it be otherwise possible to build up a coordinating network? In this context, the formation of an all-India federation was proposed and in September 1981, the *Eastern India Science Club Association* (E.I.S.C.A.) was formed 'to provide a platform for co-ordination, understanding and consolidated movements of the science clubs'[36].

Science clubs pointed out a serious problem, which acted as a hindrance to the spread of their activities. This problem lies in the lack of scientific attitude in our society. To combat this problem, a new magazine was started in 1980, namely the *Manus* (Man). It was of a new kind; its aim was not only to popularise scientific data but also to develop a scientific attitude among the people[37]. This continuous process of thinking was actually initiated with the publication of the *Bikshan* and the *Bijnan O Bijnankarmi* in the seventies[38]. The *Manus* later changed its name as *Utsa Manus* (Man is the source) for the sake of registration. Centering round the *Utsa Manus* a large number of science organisations were formed in both the urban and rural areas. These bodies tried to expose different aspects of superstitions and blind faith. They thought also about forming a coordinating body. On the Hiroshima Day (6th August) of 1982, the *Gana Bijnan Samanway Kendra, Paschim Banga* (People's Science Co-ordination Centre, West Bengal) was born[39]. The nature of their movement was very clearly exposed from their slogan:

'*Sab Kichutey Khujbo Karon, Andhabhabe Manbo Na,*

Bijnanke boiyer patai bandi kore rakhbo na.'

(We will trace 'reason' everywhere, nothing is to be believed without proper questioning. Science would not be confined in the textbooks). The first conference of this co-coordinating centre was held on 22nd and 23rd July 1989 at Kalyani[40].

Meanwhile different subject-oriented science organisations were formed. These organisations had an ideal of making science more social and society more scientific. The activists of these organisations thought that they have to work in different fields keeping the above ideal in mind. So a number of organisations started their work with the aim of a proper public health. The *Drug Action Forum* (1984) and the *Norman Bethune Janaswasthya Andolon* (Peoples Health Movement) (1986) were formed. Organisations like the Voluntary Blood Donors Association (1980), the International Eye Bank (1980), the Ganadarpan (established in 1977) began their movements for the donation of blood, eyes and body after death respectively. The *Ganadarpan* initiated its movement for the donation of bodies after death in 1986. The *Bharatiya Bijnan o Juktibadi Samity* (Indian Science & Rationalist Society) (1985) started its journey towards rationalism; the *Anti-Nuclear Forum* (1985) highlighted the evil effects of nuclear power. These organisations[41]were directly linked with the social and political problems of the contemporary period. So in the eighties the work of the science organisations expanded. Their works became multi-dimensional. Formerly, science clubs were meant for practicing science, now a social context was added with it.

Thus it can be said that what had been done in the way for communicating science during post-independent period, much credit goes to the *Science Clubs.* A prominent science communicator had tried to evaluate the role played by the science clubs in communicating science as early as in 1991. He remarked "In the last two decades, many science clubs and organisations were formed fully with their own initiatives in different parts of our country. Their contribution in the field of science literature and scientific temper was enormous. To become a true friend of science from the lower strata – this kind of initiative, in my opinion, was the most significant and right way. Science teaching in schools and colleges through the textbooks is never complete. There is always a gap in the understanding of science. The main aim of the science club is to fill this gap. This role of science club is very much important for perceiving the impact of science in the thinking, temperament and daily practices of life and to disseminate the

usefulness of science in society. These clubs are able to eliminate the unscientific ideas from the society. No other media can do this job so easily and rapidly like the science clubs." [42]

This evaluation has been done more than three decades ago. Thus one may wants to investigate the role of science clubs in present scenario. Present is the combination of continuity and change. The forces of continuity and forces of change are sometimes conflicting and sometimes complimentary. David Thomson, in his classic, 'Europe since Napoleon'[43] described the conflict between the forces of continuity and forces of change in the period of revolutionary Europe, i.e. post-1948. However in the present history of science clubs we see the forces of both continuity and change are complimentary. The working domain of science clubs in their formative years had definitely changed but all the previous activities had not become obsolete. The science clubs in the contemporary days still organize science fairs, publish science magazines. But the organization of science exhibitions or publications of science magazines are the means to fulfill the aims of the science clubs. What are the aims of science clubs? It was pointed out earlier that previously the aims of science clubs were to popularize science, to spread scientific temper and to use science and technology for the betterment of common people's life. These aims are still relevant in the contemporary period. However the target audience for which the science clubs are working and the activists of the science clubs had changed and are changing.

Previously the science clubs were mainly the working domain of the school students and their teachers. The activities of those science clubs were mainly the outer class activities. The activists of science clubs got the opportunity to have the hands on experiments, which could not be practiced due to lack of infra-structure in the class rooms. The students-activists of science clubs of the then society, either informal or formal were engaged with the simple experiments of the theories which they learned in their textbooks and model making. This kind of works had changed. Though the low cost and no cost materials are being used for experimentation of science by the science clubs yet with the development of internet and multi-media the excitement of experimenting science in science clubs had changed. The students now have more and more avenues to learn the subject than before. They can browse the internet; can learn the theme through audio-visual aids. Now the organized efforts had been made to introduce the audio-visual teaching aids for popularization of science. This effort can be made by the science clubs in

the present days but it had been initiated as commercial enterprise. However though limited in number few initiatives have already been taken to popularize science using the internet by non-commercial enterprise. In this connection mention may be made of a science periodical, which is published only as a net-edition. The name or the web-address of the periodical is www.scientiphilia.com. Its journey was started in October 2011. [44] This is well-suited in present days. However the net journal as science popularizing initiative does not end the importance of the printed journal. Truly speaking the publication of science magazines is one of the important activities of the science clubs. We are using the term science clubs but the persons associated with this kind of organized effort prefer to call themselves as science activists and like to call their association as science organization. The term 'club' is now associated with eco that is the short forms of ecological. These eco clubs are not commercial in nature but the establishment of eco clubs was initiated in a uniform manner with the help of government and a state-wide expanded voluntary organization. These eco clubs are encouraging the school-students to do something for the betterment of physical environment in form of surveys, campaigns, hands on experiments etc.

Nowadays the science clubs are active with the environmental agenda. These clubs are playing an important role against any anti-environment 'development' project. They are active in the movement to save the wetland. The activists of these clubs are demanding for the pure drinking water. This demand is very much justified in these arsenic-affected areas. In this regard mention may be made of the activities of Kanchrapara Bijnan Darbar. [45] They are trying to survey the amount of arsenic contamination in the drinking water collected from the tube-wells of Nadia and North 24 Parganas districts for a long time. [46] Along with that, they are regularly calling attention of the respective government officials, like Block Land Record Officer (B.L.R.O) regarding the attempt of destroying any pond or wetlands. [47] The theme of the programme of another science club needs to be analysed here. This programme was of Coochbehar Bijnan Chetana Forum primarily. However truly speaking it was a joint venture of a number of science clubs and even a number of other clubs, whose primary working domain was not science. To put on record the names of those clubs were Coochbehar Bijnan Chetana Forum, Bijnan Anwesak (primarily a science magazine), Neelkuthi Welfare Organisation of Human Development (a general Non Governmental Organisation) and Coochbehar Mountaineers Club

(the name suggests that it was a club for the persons interested in the mountaineering). They organized a programme for the spread of scientific temper among school students named in memory of nature-scientist Gopal Chandra Bhattacharya.[48] In this programme, four themes were chosen by the organizers. Those themes were: Snakes and the treatment of snake-bite, Diseases caused by contamination of water and their remedies, Wetland: the 'kidney' of Nature and Plastic pollutions and its alternatives. These themes suggest that the present science club movement is interested to respond the contemporary problems as well as the topics which directly affect the common rural and urban people. The problem of snake bite is a problem of rural and semi-urban areas. In this connection, it should be put on record that the science clubs not only make students aware of the problem of snake bite. This theme is introduced with the hope that the students can act positively to save the life of a person, who had experienced the snake-bite. With the knowledge, which they would acquire from the programme of science activism they would be able to give some kind of first aid to the snake-bite victims, give mental support so that the victims and their relation would not be trapped by the quackery of the claimant of supernatural power. Thus in this case communicating scientific information among new generation act as a weapon for the welfare of the common people and that is possible through scientific temper. Thus here we can see the direct linkage among the three goals of science communication. When a reader reads the information regarding snakes as a lesson of zoology he/she may not be able to link it with the surroundings. Here the role of science club is remarkable which tries to bridge between the information and action. Thus communication of science can be achieved in the true sense of the term. The works of the science clubs would not end here. They demand for the supply of the Anti Venom Serum (A.V.S) etc in the hospitals and health centres. In this regard, mention may be made of Chakdaha Bijnan O Sanskritik Sanstha, which even maintains some kind of work-roster duty in hospital to ensure the availability of A.V.S. [49] Thus we can say that the science club is playing the role of pressure group now. These clubs are working as a pressure group to develop the standard of governmental health service. This trend was initiated in the nineteen eighties. The *Drug Action Forum* (1984) and the *Norman Bethune Janaswasthya Andolon* (Peoples Health Movement) (1986) were formed in that period with the goal of achieving health for all. But there is a difference between the works of those science organizations and the works of this approach. There the emphasis was on direct

movement on the basis of the scientific approach towards the health sector which was manifested in their publications but in the present case we find basically the initiative is of communicating science among the school students with a hope that this kind of communication would help them to do something in their own domain in contemporary days and even in future. That is also different from the traditional ways of science popularizing endeavour which emphasizes on imparting scientific theories and information. Thus it can be pointed out that here lies the importance of the changing role of science clubs in communicating science.

These clubs are working sincerely to develop the science education. They are trying to bridge the gaps of the institutional education. They are working for the spread of joyful science education. These clubs are still organizing science fairs where the learners get the opportunity of doing science in a joyful manner. These clubs question the validity of the textbooks of science in the school curriculum. The *Scientific Workers' Forum of West Bengal* (1975) tried to evaluate the textbooks on science, either published or approved by the government, of primary and secondary courses in West Bengal. It exposed various unscientific subjects present in the textbooks[50]. So, many science clubs suggested an alternative to this institutional science-education. These clubs initiated the *Gopal Chandra Bhattacharya Science Popularisation Programme*. This programme preferred a proper scientific temperament to the theoretical scientific knowledge[51]. Some clubs belonging to the *People's Science Co-ordination Centre, West Bengal* played an active role in this endeavour. Some books on this subject were accordingly published namely *Nije Karo* (Do yourself) and *Pariksha* (Experiment). This kind of programme was initiated by the *Bangiya Bijnan Parisad* as early as 1974[52]. We have already pointed out the uniqueness of this kind of programme. Rather than emphasizing on information-based quiz, which generally encourage memorization, this initiative tries to develop scientific temper as well as utility of the specific knowledge. Some other ventures, mainly initiated by the science teachers are noteworthy. In this respect mention may be made of Science Communicators' Forum and *Dakshinbanga Shiksha Unnayan Samiti*. Another initiative has been taken by some teachers to do something different, like survey, hands on experiments etc under the banner of *Association for Science and Environmental Development*. [53]Along with these initiatives, organization of formal or informal conferences among different science clubs are regular feature of the contemporary days. Conferences of Eastern India science Club Association

are going on annually. [54] The last conference, which was held on 27th January 2013 at Behala Shikshayatan emphasized on 'Rational Scientific Communication and its Status report' as its main theme.[55] Indian Science News Association (1935) also stressed on the importance of science communication when it choose 'Challenges of Science Communication in India' as the theme of its Sixth science Communicators' Meet, which was held on 2nd March 2013 at the auditorium of Bose Institute. [56] What we are trying to make the point that the science clubs themselves are also seriously thinking about the status and future scope of communicating science, which is manifested in the choosing of this kind of theme.

Often the place of the occurrence of any science conference becomes a determining factor of specifying the theme/themes. If we notice the papers of the Fifth All Bengal Science Conference (*Pancham Sara Bangla Bijnan Sammelan*) of Breakthrough Science Society, [57] then we find it was convened to combat the effort of establishing the nuclear power plant and missile launching centre along with to make a superstition-free scientific-minded society. One may remember that an initiative was taken to make a nuclear power plant at Haripur near Contai in the district of East Medinipur in 2008. As the conference was held at Contai during 10-11 November 2012 in collaboration with Contai Science Centre this theme was mentioned specifically. However the science club movement in West Bengal has a rich heritage in respect of anti-nuclear movement. [58]This movement responded on the occurrence of Pokhran explosion in May 1998 and many science clubs had participated in the post-Pokhran 1998 anti-nuclear (weapons and/or power) movement. [59]

The occurrences of conferences of science clubs are regular features in communicating science. Once, this kind of conference signaled the establishment of co-ordinating organizations like Eastern India Science Club Association and Gana Bijnan Samanway Kendra, Paschimbanga. Nowadays along with the conferences of these organizations, some unitary organizations and loose bond of some like-minded science clubs often arrange these kinds of conferences. For example we may mention the Bijnan Adda (informal discussion) of Gobardanga[60] and United Science Conference held in 2013 at Chakdaha[61.]

In present days, the science clubs are opposing the use of chemical fertilizers and pesticides, terminator seeds etc in agricultural sector. The rationalist science clubs are working to spread the scientific temper. They are publishing periodicals and pamphlets according to this

line. Thus, it can be said in a line that the science clubs are contemplating with the changing social milieu. These clubs are working to make our surrounding better for the welfare of the people.

It is discussed earlier that science clubs had been transformed into science organisations. Different dimensions had been added to it. But the question arises about the real scientific temper of these science activists. The contradiction between belief and behaviour, which was present in the earlier times, is still active in the present days. There is a tendency of differentiating the inner customary beliefs and the outer behavioral pattern of the dwelling houses of most activists. The notion of science and the question of space are different. Those persons associated with the science clubs are working to popularise science and opposing the superstitions, but they in their personal lives follow different rituals. This trend can be found in different sectors – education, health, technology and various forms of expertise. This is a major limitation of the science communication endeavour. This kind of contradiction decreased the reliability of the science communicator.

Moreover, there is a lack of democratic environment in the science clubs. The founders or key-persons of any science club are always trying to retain their authority. This authoritarian attitude hampers the democratic environment. However, there are exceptional cases of cordial relationship in some science clubs.

Instead of having a sound idea about the philosophy of science the society at large is nowadays more interested to bother about its technological growth. The activities of the science clubs, from its very beginning, have been more based on technology rather than the method of science. Thus the philosophy of science – the law of experimentation, observation and inference – have been often confined to theory only, it has not been always followed in practice, or in daily living. Here lies the background of contradiction of a person who has knowledge of science but lacks the scientific temper.

With these limitations the science clubs or organisations are progressing. The growing interest among the political parties and governments along with the common people shows the progress of the movement. In this regard mention may be made of the relationship between the Communist Party of India (Marxist) & Paschimbanga Bijnan Mancha (1986), the Communist

Party of India & Bijnan O Yuktibadi Mancha (1994) and the Socialist Unity Centre of India & the Breakthrough Science Society (1995). [62]

To conclude it can be said that communicating science is a challenging job in contemporary days. Now the guardians do not encourage their wards to take part in the activities of science clubs. They think that those activities may harm the career of their children. Because of excessive load of science teaching in schools, science in practice is ignored. So in the greater domain, a learner notes down his/her's inference without doing any experiment or observation.

Naturally, in practical life, it is not astonishing to notice that these students cannot have a scientific mind. Among them, those who are meritorious, hard working and those who can fulfill the required opportunities, later become scientists. Recently, there is a growing tendency of studying engineering and technology rather than pursuing research in basic sciences. These students are detached from the common people. The daily life of a school-going student is divided in various slots. Along with spending a long hour in school, he/she has to learn different subjects like drawing, singing and swimming. But no concern has been shown to make the students aware of the society. In this situation mere transformation of facts and figures would not serve the purpose of communicating science. The real communication is interactive and responsive. The present history of the changing role of science club shows that though limited in extent the sojourn for communicating science is going on. Hope this effort will be developed in both quantitatively and qualitatively in future.

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