Learning Through Inquiry

The last month of the year December 2013 witnessed the culmination of two major children centered science events. These were based on Inquiry-based learning (IBL). The first event was the 3-day National Camp for the VIPNET Clubs of Vigyan Prasar, organised jointly by Vigyan Prasar and the Gujarat Council of Science and Technology at the Science City Ahmedabad, over 13-15 December 2013. The programme, in fact, was a summing up of the of the activities undertaken by VIPNET Clubs across the country on the theme “Manage to Save Water”. These were part of International Year of Water Cooperation 2013. About 100 clubs were selected for the Camp and a team of two students and Club Coordinator/guide teacher from each club was invited. The selections were made on the basis of reports submitted to VP about the short-term and long-term activities as suggested to them. The Camp was attended by more than 200 students and 80 teachers representing 24 States and UTs. The main objectives of the National Camp was to share experiences gained as a result of Inquiry-based and action-oriented activities and to further consolidate the understanding about issues related to water and discuss concerns with some eminent personalities through face-to-face interactions this was the fourth such camp organised by VP in last four years. Earlier such camps were organised as part of the International Year of Astronomy 2009 at Bhopal (21-24 June 2009) and Kanyakumari (9-11 January 2010), and the International Year of Biodiversity 2010 (May 2011) at Ahmedabad. For all these camps, some theme-based open-ended activities along with specific Inquiry-based projects were suggested to VIPNET Clubs.

The other programme in December 2013 was the 21st Children Science Congress (CSC) organised at Bhopal over 27-30 December 2013. In this programme more than 625 Inquiry-based projects were presented after a screening process. This was first at the district level followed by the State level. This year the theme of the Congress was “Energy: Explore, Harness and Conserve”. In India CSC is a forum for children (age group 10-17,) both from school and outside school systems, to exhibit their creativity and innovativeness, and more particularly, their ability to solve societal problems through an Inquiry-based project. The CSC has turned out to be the biggest experiment in informal science learning based on the Method of Inquiry. Over the years, the way the children undertake the projects has impressed educationists and scientists equally. This programme has established the fact that children are not merely passive recipients of delivered knowledge, but are capable of acquiring, creating and generating new knowledge. Although a formal evaluation of the CSC is

Creativity in science could be described as the act of putting two and two together to make five. 

Arthur Koestler
yet to be done, but one fact is clearly established. That is the feasibility of an alternative method of science learning, which is more joyful and engaging and helps children internalise the method of science in a more practical manner. *(The brief report of both programmes are given in this issue)*.

Conceptually, IBL is a pedagogy which enables children experience the process of knowledge creation. Some well-established key attributes of learning stimulated by Inquiry are: a child-centric approach that involves self-directed learning as an active approach. By this Students develop research skill and become lifelong learners. It is proving to be an effective approach to learn and can be adopted not only for science but for all disciplines at all levels across the world. There is adequate evidence to show that Inquiry-based learning can enhance student engagement, academic achievements, and higher order of learning. This also enhances enjoyment, interaction with communities, and enhanced learning outcome, academic achievements, student’s perceptions, process skill, analytic abilities, critical thinking and creativity, reduction of competitiveness, and engagement for co-operative learning.

The elements of this approach originated long ago. Some reference can be found in the teachings of Confucius and Socrates. In India this approach can be linked with the Ashram education system based on Guru-Sishya prampara. Learning in a natural environment was also advocated by Rabindranath Tagore as part of his views on education. However, it was the American educator and philosopher, John Dewey (1889-1952) who promoted the concept of learning by doing, which was subsequently adopted by schools in 1970. At present different terms are being used for IBL, as guided Inquiry, undergraduate research, research-based teaching, discovery learning, inclusive teaching and learning, project-based learning etc., though this approach is now pervasive at all levels of education.

Theoretically, Inquiry-based learning falls under the realm of inductive approach to teach and learn. It begins with a set of observations or data to be interpreted or a complex real-life problem to be solved. The students study the data or the problem and look for facts, procedure and guiding principles. Traditional pedagogies such as lectures and demonstrating solutions for problems, often result in students being able to solve text book problems, but unable to apply knowledge to solve real-life problems. Inquiry-based learning is one of the several instructional methods that have been developed to remedy the situation, as it takes an alternative approach in facilitating students’ learning. Instead of initiating the learning process by presenting learning content for the students to memories and comprehend, Inquiry-based learning mimics the natural human learning process where learning is initiated when a problem is encountered. In seeking solution to the problem, the person learns the skill as well as acquires knowledge that revolves around the problem and the environment (contextual knowledge) in which the problem arises. However, there are a few negative aspects that have also been reported about Inquiry-based learning. According to *Justice et al. (2003)*, students perceived an increased workload in Inquiry-based learning. On the other hand, *Plowright and Watkins (2004)* suggest that anxiety occurs over the need to become self-directed learner and students may have difficulty in adjusting to the approach and in coping with group dynamics when cooperative learning is employed.

Despite a few perceived negative aspects, the tilt is in favour of Inquiry-based learning approach. Teachers can also benefit using IBL through integration of teaching and research, increased enjoyment and interaction with students and their induction into a wider community.

Vigyan Prasar network of Science Clubs, VIPNET is a robust platform for all teachers and communicators to experiment with this approach. The experiences of IBL can be shared either in the National Teachers Science Congress, being organised biannually by the National Council of Science and Technology Communication (NCSTC) or at the annual meet of the VIPNET Clubs. The theme for this year for IBL will be 'Hundred Years of Atom'. The programme will be on a campaign mode and has been discussed in the November and December 2013 issues of VIPNET News. Details of activities to be undertaken will be discussed in the next issue of VIPNET News. VP wishes a very happy and engaged new year 2014 to all Vipnetains.

Reference:-
2. *Rachel Sproken-Smith, University of Otago, New Zealand, Experiencing the Process of Knowledge Creation: The Nature and Use of Inquiry-Based Learning in Higher Education (akoaatetaroa.ac.nz/.../IBL)*

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विपनेट कल्बों का राष्ट्रीय शिविर सम्पन्न

19-15 दिसंबर को अहमदाबाद में आयोजित किया गया

विज्ञान प्रशासन, विज्ञान एवं प्रौद्योगिकी विभाग, भारत सरकार के अनुसार एक राष्ट्रीय शिविर का मुख्य शिविर में कार्यरत है, जिसमें राष्ट्रीय एवं विदेशी शिक्षकों एवं विद्यार्थियों की संख्या प्रति कक्ष का गठन किया जाता है। इसका परिपक्वता है कि ज्ञान में भारत के 535 से अधिक निदेशियों में विपनेट कल्बों का उपयोग किया गया है।

उन निदेशियों ने इस शिविर का अनुसरण किया और उन्होंने विभिन्न मुद्दों पर विविध विचारों के रूप में अनावश्यकता समझते हुए कार्यरत किया है। उन्होंने शिक्षकों के अनुसार यह बात स्पष्ट नहीं कर सकते कि ज्ञान में भारत के 535 से अधिक निदेशियों में विपनेट कल्बों का उपयोग किया गया है।

प्रथम दिवस 15 दिसंबर, 2013

सभी विद्यार्थी संस्थाओं की 12 दिसंबर के साथ कार्य करने का आदेश दिया गया था, जिसमें उनकी व्यक्तिगत भाषा बनाने एवं कार्यक्रम का समय आयोजित करने में सुविधाहृद हो। अवश्यक कार्य सदर 12 दिसंबर के साथ शुरू होने वाला है। और अन्य संस्थाओं द्वारा संभाला जाना चाहिए। इस विषय में विद्यार्थी गर्मी दर पर विनिमय व्यवहार, गर्मी पर विनिमय व्यवस्था नियमों व जागरूकता कार्यक्रमों के आरोप पर प्रत्येक पंजीकृत, उनके अनुसार संस्थान 100 कस्बों का चयन किया गया।

INTERNATIONAL YEAR OF CRYSTALLOGRAPHY 2014
Glimpses of Registration & Inaugural Function on 13 December, 2013

Key Speakers

Technical Sessions in Progress

3 D Movie & Musical Fountain Show
International Year of Crystallography 2014

Poster Presentation on 13 December, 2013

Visit To Narmada Dam on 14 December, 2013

Run for UNITY on 15 December, 2013

Group Photo
International Year of Crystallography 2014

If you want to know more about Vigyan Prasar, its publications & software, besides the next moves of VIPNET Science Clubs, please write to us at the address given below:-

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National Children's Science Congress (NCSC) has completed its 21st year of existence through the completion of the national event in Bhopal held over 27-31 December 2013 with the focal theme "Energy: Explore, harness and conserve". The event was hosted by the Madhya Pradesh State Council of Science & Technology (MPCOST) at its beautiful premises. As we know, NCSC is a nationwide science communication programme being organised since 1993. It is a programme catalysed and supported by the National Council of Science & Technology Communication, Department of Science & Technology, Government of India and the NCSTC Network, New Delhi is the National Organising Agency.

21 years is not a small period to assess the impact of a programme of this stature. As Dr. Narendra Kumar Sehgal (I always regard him as the Father of NCSC) in his recent article on NCSC has written, "The children who took part in the very first CSC/NCSC, are today young men and women of 30-37 years. It is (theoretically) possible that at least some of them now have children of their own, just old enough, to take part in this year’s CSC/NCSC. They will be our second generation child scientists". NCSC-2013 is now complete. We could have enquired if there was any such child scientist at district/state/national level CSC 2013, which would have been a pleasant story of long lasting impact of CSC as former child scientists.¹¹

NCSC-2013 in Bhopal was started with much festivity and warm hospitality provided by the host. The event which started with the "Walk for Science" on 27th December ended with the Valedictory function on 31st December. Padmabibhushan Professor Yashpal, the President of NCSTC Network was the Chief Guest in the Inaugural function held in a Stadium at Bhopal. Dr. B.P. Singh, Head, NCSTC, Er. Anuj Sinha, Chairman, NCSTC Network, Dr. P.K. Verma, Director General, MPCOST and Dr. D.K. Pandey Scientist F, NCSTC were among the other dignitaries.

Now, we move on to the academic and technical part - the core activity of Children’s Science Congress. This year, along with 35 states/union territories of India including Kendriya Vidyalaya Sangathan(KVS) and Navodaya Vidyalayas, NCSC welcomed participants from ASEAN Countries and UAE. 643 projects were registered from the Indian states and UTs out of which 634 projects were presented. From ASEAN countries 13 children presenting 3 projects and from United Arab Emirates 8 children presenting 4 projects attended the NCSC 2013. Of the 634 projects presented 46% were from female participants, 54% were from lower age group (less than 14 years of age) and 44% were from rural areas. This year selection of child scientists from rural background, by the state coordinators, seemed to be relatively on the lower side in comparison to the previous years. Yet such a large representation from rural areas prove the reach of CSC movement to the remotest corners of the country. While KVS and Uttar Pradesh had the biggest contingent (41 each), Andaman Nicobar, Sikkim, Lakswadwip and Chandigarh had the smallest contingent of child scientists 4 each).
Glimpses of 21th Children Science Congress 27-31 December -2013 at BHOPAL (Inaugural function)
Glimpses of 21th Children Science Congress 27-31 December -2013 at BHOPAL (Technical Sessions & Activity Corners)

The participating child scientists presented findings of their mini-research projects in 13 parallel sessions. The child scientists also had to go through a session of separate poster presentations. Parallel to these presentations, the written reports of each of the child scientists were evaluated by a separate panel of evaluators. The child scientists were allowed to present their projects in the language of their choice. Therefore, presentations were made in English, Hindi, Assamese, Bengali, Tamil, Telugu, Malayalam, Oriya, Punjabi, Boro, Kannad, Marathi, Punjabi and Gujarati. National organisers arranged evaluators for each of these languages.

As an evaluator I had the opportunity to examine about 45 projects in technical sessions in an allotted room. It was nice to see child scientists from different parts of the country and abroad coming with lots of ideas and action to tackle the issues of "Energy" based on their local contexts. Of all the projects I have witnessed some, were survey based, in some projects child scientists tried to develop some devices to conserve fuel or electricity, a few worked on energy audits and in some the child scientists really tried to validate their hypothesis/ prepared devices through experimentation. Many of the child scientists brought static models to explain their projects. Looking at many of the projects, I have got the feeling that children were engaged in preparation of some energy conservation devices without going much into the experimental validation. Here is the role of the academic coordinators and...
A series of training programmes are being organised on different themes for the coordinators of VIPNET clubs for the Northern & Southern zones as follows:

1. “Managing Disasters” and ‘Model Rocketry’ for the Southern Zone (For VIPNET clubs from the States of Andhra Pradesh, Karnataka, Kerala, Tamilnadu, Puducherry). The programme are being organized jointly by NCSTC, Vigyan Prasar and Tamilnadu S&T Centre, Chennai.

2. Fostering Scientific temperament and Explaining Science so called Miracles. (For VIPNET clubs from the States of Delhi, Haryana, Jammu & Kashmir, Punjab, Himachal Pradesh, Uttar Pradesh, Uttarakhand, Chandigarh)

For each training programme about 50-60 participants will be selected on the basis of nomination as per the prescribed format. The programme will be organized in the month of March 2014. Kindly send us your nomination to so as to reach VP by 28 February 2014. The selected participant will be informed individually about the exact dates and venue of the programme.

You can send your nomination by E-mail also.

Please paste a passport size photograph here.

Desk, VIPNET (Regional Training Programme for VIPNET Clubs),
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**REGIONAL TRAINING PROGRAMME FOR VIPNET CLUBS FOR NORTHERN & SOUTHERN STATES**

**NOMINATION FOR PARTICIPATION**

1. Name of the participant: .................................................................
2. Name of the Club : ........................................................................
3. Date of Birth : .........Sex : ............................................................
4. With in School [ ] Outside in School [ ]
5. Unique Authorization number issued by Vigyan Prasar: .......................
6. Address:(Office) ..............................................................................
   .................................................................................................
   (Residence )..................................................................................
   .................................................................................................
7. Phone No : ..................................................................................
8. E-mail : ......................................................................................
9. Have you ever attended any training programme organised by Vigyan Prasar, if Yes, please mention the details.
10. Please mention how you will utilize the acquired skill for the benefit of your club members?
11. Please mention 10 activities of your club undertaken in last one year.
12. If you are a working teacher, kindly give your school address, with phone/fax number and your nomination should be endorsed by School Principal.
NCSC-2013 at Bhopal - through the eyes of an evaluator

Contd...from Page - 9

guides at the district and state level. They should not equate NCSC with other science project competitions. It is different in the sense that the basic objectives of the NCSC is motivating the children to apply the "Method of Science" through mini-research projects based on local-specific issues and the focal theme. As Dr. Sehgal in his article (as mentioned above) emphasised, "The basic idea behind the CSC/NCSC was, and remains, to help bring out the 'scientist' in every child, through choice of simple projects which would require, among other things, use of their own head and two hands besides team work and application of the scientific methodology in carrying them out and for their completion".

Yet, many child scientists came up with exciting and innovative ideas and tried to prove their hypothesis experimentally. This is encouraging and their fellow child scientists should be inspired by such work. A child from remotest corner of the country, without having electricity and LPG facilities in their village, trying to prepare a modified chulha with water heating facilities (as the place was very cold) and experimentally validating her modifications was really exciting. Many such examples can be given and such projects are responsible for making NCSC a great experience and also cause for its sustenance for such a long period!

NCSC, as an event, is not just presentations of projects in technical sessions. Child scientists were given opportunity to interact with reputed scientists in every evening and also to interact through video-conferencing. The child scientists from different states and UTs also performed colourful cultural programmes, showcasing the traditional songs and dances of their respective states.

The escorts and teachers were engaged in activity corners conducted by reputed resource persons drawn from different parts of the country. Organisers arranged a trip to "Sanchi" for all the participants on 30th December, which was really an icing on the cake.

All these make NCSC a unique event standing out from other scientific events.

1. (Sehgal, Narendra Kumar; ‘Second Generation of Child Scientists’, Amar Bigyan, Mouthpiece of state level CSC, Assam 2013)

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Puzzle- 41 Based On Hundred Years of Atom

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Answer Water Puzzle- 39

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International Year of Crystallography 2014

Natures Revenge

Look at the massive destruction
That caused a huge devastation
And has again raised an important question
Can we play havoc with natures creation

The storm was in full rage
And took everyone along the blaze
Is it a natures maze
That devastated everything in rage

Everywhere we witnessed chaos
People full of grief and pathos
We fiddled with natures ethos
So have to bear with the loss

People lost their lives
Bees are still looking for their hives
Wish we could have felt those vibes
And taken precautionary strides

Nature has taught us a lesson
It should be our mission
To look at it with compassion
And respect every creation

Or else! there are more hazards in store
The loss would be more and more
Don’t do the folly to ignore
And work together to restore

Dr Monika Koul
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National Science Day (NSD) – February 28, 2014

Focal Theme

”Fostering Scientific Tempear”

The Day is observed to mark the novel discovery of Raman Effect by the great Indian Physicist Sir C. V. Raman on 28th February, 1928. Raman Effect is a phenomenon in spectroscopy discovered by the eminent physicist while working in the laboratory of the Indian Association for the Cultivation of science, Kolkata. After two years of this discovery, Sir C. V. Raman brought the first Nobel Award for the country in 1930. Hence the National Science Day is a great day for Indian Science and scientific community.

The basic objective of observing the National Science Day is to spread the message of importance of science and its application among people.

The list of activities which can be organized by VIPNET Clubs:

Debates, Quizzes, Exhibitions, Lectures, radio-TV talk shows etc. involving schools, colleges, academic institutions and citizens.

Activities may plan in such a way, either start or culminate on February, 28th -2014.