

Activity Kits on Weather and Biodiversity: An Indian Hands-On Experience

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Abstract: *Vigyan Prasas, the National Institute for Science and Technology Communication, is an autonomous organization under the Department of Science & Technology, Govt. of India. In broad pursuit of its objective, Vigyan Prasas has initiated several large-scale programmes, activities and schemes in the country over the last decade. Vigyan Prasas also has a network of about 12000 Science Clubs, spread throughout India. An important component of majority of Vigyan Prasas's programmes is the development of low cost/no-cost activity kits in the form of Hands-on-activities for nurturing curiosity and excitement among children. As part of the programme of International Year of Planet Earth 2008, two kits, on Biodiversity and 'Weather' were developed for these clubs. The paper highlights and analyzes the feedback received from the science clubs and the other users as a hand-on experience in understanding some basic concepts of science, in general and on Weather and Biodiversity, in particular.*

Key Words: Biodiversity, Vigyan Prasas

1. Introduction.

Vigyan Prasas, under the Ministry of Science and Technology, has flourished into a national resource-cum-facility centre; and is engaged in development of a variety of software utilizing different means, media and modes. Vigyan Prasas has been regularly beaming weekly television programmes aimed at communicating science to the people for over three years now. Vigyan Prasas also has been producing radio programmes on various aspects of science and technology and broadcasting on 117 centers of All India Radio in major 18 Indian languages along with English. Vigyan Prasas has set up a network of satellite interactive terminals spread throughout the country exclusively for S&T communication with two way audio-two

way video facility using Edusat, (India's satellite for education). Yet another important activity of Vigyan Prasas is the utilization of the print media and the Internet for S&T popularization. Vigyan Prasas also has a network of about 7500 science clubs spread throughout the country.

An important component of majority of Vigyan Prasas's programmes is the development of low cost/no-cost activity kits and training modules in the form of Hands-on-activities for nurturing curiosity and excitement among children. These modules are more suitable for all developing countries like India, having wide range of socio-economic and cultural diversity. The modules are based on an approach, which is decentralized, activity based, low-cost, participation-intensive and allows local environs to be used as learning and teaching ground. It has also been realized that through these modules (also called parallel or alternative approaches to science education) based on hand-on-activities, what we do or learn is directly and closely connected with real problem(s), situation(s), thing(s) and happening(s) in everyday life. With the help of these modules, children can understand science as a complete process in a simple and enjoyable manner. Till date around 10 kits and 15 such training modules have been standardized by VP. Based on these kits, teacher's training programmes have been organized throughout the country. Some of these kits are 'Understanding Biodiversity', 'Weather', 'Astronomy', 'Emergence of Modern Physics', 'Transit of Venus' and 'Solar Eclipse'. Some of the most popular training modules are "Scientific Explanation of so-called Miracles", "Low cost innovative Physics experiments", "Understanding Mathematics through Origami", "Telescope making and Astronomical Activities", "Use of PC for Scientific Experiments", "Exploring Nature" and "Hydroponics-Fun with Plants in Soilless Condition".

2. Kits on Weather and Biodiversity (Special Initiative of International Year of Planet Earth 2008)

On the initiative of two organizations, International union of Geosciences i.e. IUGS and UNESCO, the United Nations general Assembly proclaimed the year 2008 as the International Year of Planet Earth. In addition to research in Earth sciences, the focus was also on outreach activities to create awareness about the extent to which Earth's systems is a part of our daily lives and, in turn, which of our activities interfere with those delicately balanced systems and to focus on the positive aspects of this relationship and to create a sustainable future for humans and this planet.

As part of International Year of Planet Earth 2008, VP planed an ambitious project for various target groups, comprised of production of software (kits, charts, posters, booklets, audio/video films etc.), training programmes and field level activities involving 7500 science clubs.

As result of this initiative, a series of collaborative programmes with like-minded agencies like National Council for S&T communication and S&T Council and S&T Department of States of India were organized to train the master resource persons (MRPs). A 52 episode radio serial "Planet Earth" (*Dharti Meri Dari*) was also broadcast from 117 radio Stations of AIR in 19 Languages. On Doordarshan, a 26 TV Serial "Kahani Dharti Ki" was also shown which was produced by VP. A series of publication (about 20books) in Hindi and English and set of 21 posters on different topics on Planet Earth were also brought out in English & Hindi.

One of the special initiatives of Vigyan Prasar was to developed two activities Kits on "Biodiversity" and "Weather" for the Network of Science Club i.e., VIPNET. Though, majority of these clubs are within the set-up of formal education system, but these kits were developed in the form of material which would be supplementary to formal education. The basic idea for the development of the kits was to develop about 80-50 hand-on activities based on scientific information and physical phenomena to enhance the understanding of 'Biodiversity' & 'Weather', the sub-themes of Planet Earth 2008 programme. It was expected that the kits would help the target group in the understanding of scientific concept, information, phenomena and the dynamics of natural processes

relating to Weather & Biodiversity through hands-on experience.

3. Mechanism for the Development of Kits

As per the earlier experiences of Vigyan Prasar, by using in-house expertise of the organization, a series of in-house brainstorming sessions were organized. As result of these deliberations, a rough sketch and lay-out of the kits were formalized by keeping children and teachers as the main target groups. Initially a list of activities, concepts and information capsules (about 92 for biodiversity and 39 for weather) were finalized for designing the kits. The help of Manthan Education Programme Society (MEPS), Ahmedabad, was taken besides involving a number of students from local University and National School of Design, Ahmedabad. With the help of technical experts from the relevant field, a list of possible hands-on activities was finalized after a series of deliberation followed by presentation before them. Time to time all suggestions & inputs were also included in the prototype of kits. One of the suggestions which came from all experts was that "in both the kits there should be a perfect mix of information with hands-on activities". "All the activities are to be such that they should be done with the help of locally available resource material at the minimal or no cost". Even after the inclusion of all the inputs & suggestions, the basic premise of both the kits remains same i.e. promoting and encouraging among the children:

- a. Curiosity and sense of wonder (meaning how and why) about things and happenings, events and/or phenomena around them;
- b. Sprit of inquiry and asking questions and seeking well-reasoned and convincing answers to these questions.
- c. Keen and systematic observation of things, facts and oddities around them;
- d. Experimentation to check out, verify, disprove or confirm a suspicion or guess;
- e. Stress on learning by doing and on low or no-cost activities by using common and easily local material.
- f. Involving a large number of people in all programme and activities.
- g. To develop kits for training teachers who would be able to innovatively engage

Though the basic premise and the philosophy for the development of the kits remained same as per the aims of objectives of the VP, but a contemporary outlook, both in terms of design and content was given to make it more relevant to be used as resource material for the “National Campaign on Planet Earth 2008 “Dharti Meri Dharti” of Vigyan Prasar. These kits were supposed to be distributed as resource material during Master’s Resource Person’s training programme, which were organized throughout the country along with sending it to about 7500 clubs. The science clubs were also trained to undertake activities based on the kits as part of the campaign during the International Year of Planet Earth 2008. The immediate specific objectives of the development of Kits were:

1. To developed a hands-on resource modules on Biodiversity and Weather in a visually rich format for developing a “Mini Weather Station” and “Repository of Biodiversity” in the clubs.
2. To provide a sustained base of activities to Science Club on theme Planet Earth 2008
3. To help the member of the science clubs to internalize the theory and the abstract concepts taught in the class through hands-on experience relating to Biodiversity & Weather.

4. The other broad objectives were

- To understand the course of nature and the cause effect relationship with nature
- To fill the gap between theory and practice by providing supplementary material
- To develop a responsible behavior towards the environment.
- Develop low-cost or no-cost activity kits on weather and biodiversity as to address the prescribed curricula.

4. Major Challenge: - The major challenge in the development of the kits, beside content was its cost, design and transportability to about 7500 science clubs which are spread throughout the country.

5. Development of Final Prototype:-

I. Content of Biodiversity Kit:- In the final prototype of biodiversity kit, 51 self explanatory activities were included along with two posters to cover five broad aspects on biodiversity i.e. Understanding Biodiversity, Importance of Biodiversity, India as a mega biodiversity Country, Threat to Biodiversity, Conservation efforts (National and International).

II. Content of Weather Kit:- In the prototype of Weather kit, 31 hand-on activities, illustrating scientific principles, physical phenomena to understand the dynamics of weather were included, so as to fulfill the immediate objective of the kit i.e., developing a mini weather station in each club for collecting data relating to weather. In both kits, a series of project idea and activities as open ended experiments to be performed by the students were included. The design of each activity and cover of both the activity kits were finalizes as to ensure their transportability by post to about 7500 science clubs. The cover design was finalized with the help of students from National School of Design after involving the official from Post and Telegraph Office, Govt. of India, Ahmedabad. Before the final production of the kits, once again, the demonstration of the kits was given to a group of students and teachers to get their feedback on the content, language and design. After necessary changes and correction in the language and drawing etc., the prototypes were sent for final production. Both the kits were developed in Hindi and English. Finally, 10000 copies of each kit in two languages (English and Hindi 5000 copies each) were produced.

6. Dispatch of the kits to Science Clubs

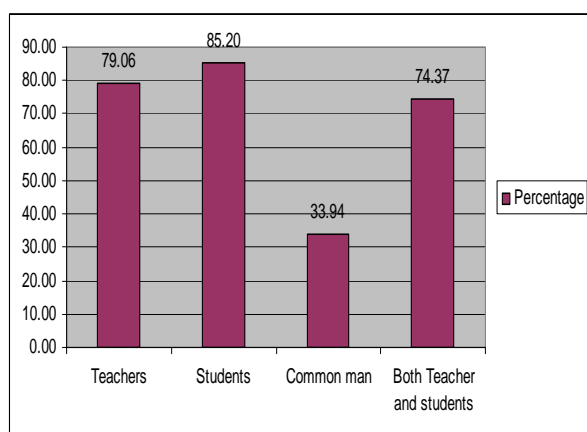
Both the kits were sent to about 7000 Science Club along with a survey form to get the feedback on content, quality, usability, durability and inviting their comments and suggestions as to what more could be added or deleted from these kits. The feedback form was also distributed during the training programmes of MRPs, organized in different parts of the country to get the feedback. In total about 500 duly filled-up feedbacks were received.

The feedback form was designed in the form of 10 questions. The first five questions were of multiple options on usefulness of the kit, its language and about the activities etc. In all the

multiple choice questions, the users were given freedom to tick more than one option, if they feel so. The other five questions were open-ended questions, asking the user about the usefulness of the kits and what kind of activities they are going to plan based on the content and information provided in the kits. It is, however, emphasize that this survey was not an evaluation or assessment per se, but only a qualitative study with an objective to improve the kits.

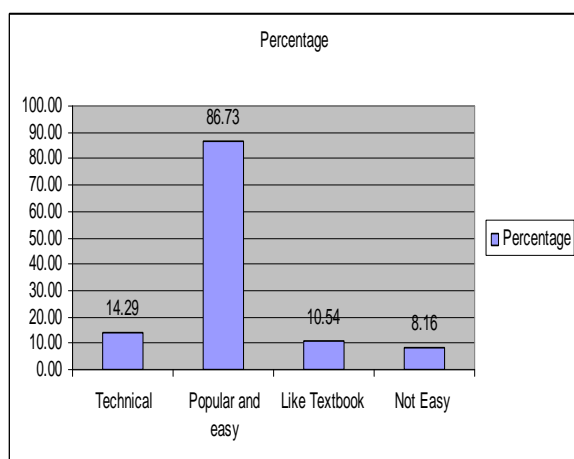
Question-I : According to you, the Weather and Biodiversity kits are good resource material for Teachers, Students, Common man or For both for teachers and Student.

The majority of user find is good not only for teachers/students but for both (74.37%)



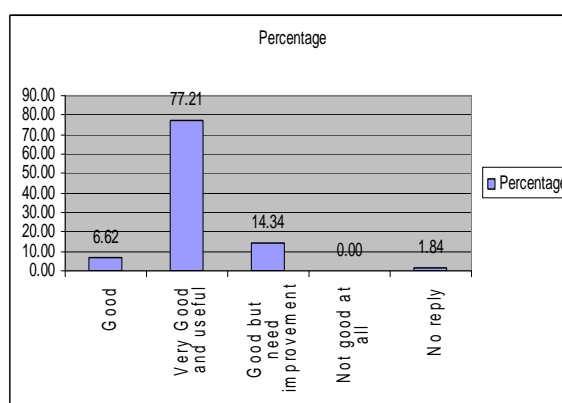
Question-II: Language of Kit.....

Majority (86.73%) of them find the language easy and popular

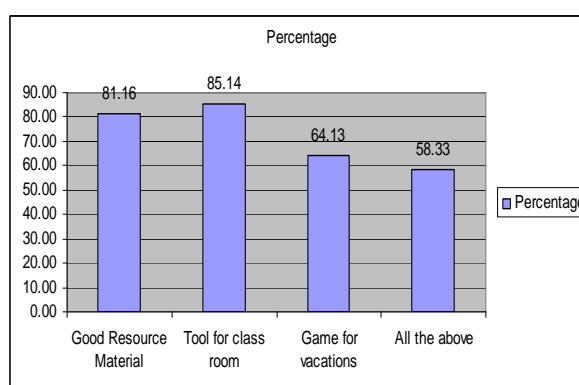


Question-III: - Activities given in Kits are.....?

Majority of the user (77.21) find the activities very good and useful.



Question-IV: - How the kits has been used by coordinators of science clubs and students



Majority of them has used the kits as a resource material in clubs(81.16%), the teachers has used it as a tool to supplement classroom teaching(85.14%) and students have used it as material for games during the vacation(64.13%) and about 58 % used it for all the three purposes.

7. Observations about the Design and Content of the kits.

Majority of the user were satisfied and ranked it between good to excellent as far as the design of both the kits is concerned. Only a few find it bit difficult to arrange the activities sequence wise. Majority of the users suggested to use the plastic as material for the kits instead of paper” to make it more lasting and durable for repetitive use” with “little bigger in size specially the fonts and pictures”.

Content wise, majority of the user find it sufficient and interesting, “presented in a beautiful manner”. Though, a few were of the opinion that in biodiversity kit “some more information should have been included on the extinct species and pet animals”. About the content of weather kit, there were few

suggestions to include some information and hand- on activities relating to climatic change, global warming and cyclones/storms.

8. The overall Comments and Suggestions

All the users, those responded, found both the kits very useful for class room and as well as outside class room activity. They found it very good and “a concerted attempt to create awareness about weather and biodiversity in a practical way”. According s to some, “these kits provide knowledge in a practical way and should be sent to all schools and colleges to develop the interest of the students in environmental issues”. Some typical responses are as follows:-

1. Both kits are really good and can help in clearing the concept of students which otherwise would have been very difficult to clear with regular teaching process.
2. Very nice, we will wait for more such kits in future.
3. Similar hands- on kit can be developed on topics relating to magnetism, heat and some concept of chemistry (Like structure of an atom) so that the topic becomes easy.
4. Content are suitable for classroom teaching.
5. These two kits can truly help in promoting the scientific outlook, and inculcating true scientific temper. Both kits are full of informative material.
6. Both the kits are informative, easy to demonstrate and will surely help children to understand the concept clearly.
7. These kits are very useful for teacher, students and common man. Some activities are directly related with the school curriculums which will be very helpful for students in their studies.
8. It is good resource material for hands- on activities.
9. The kits are activity oriented which is very effective and creates curiosity, enthusiasm and scientific thinking among the students at school level.
10. Immensely useful and language is very easy.
11. Very interesting and useful. Our students have taken great interest.
12. The kits are self explanatory and attractive which motivate learning, thinking and doing among the students. Excellent with lots of information.

13. Good amount of thought has been put up in developing the kits. Congratulation for all of you at Vigyan Prasara
14. Both the kits are like resource pool; help us to expand our knowledge and activities.
15. These two kits are very precious and valuable for the welfare of people.
16. Both Kits are very useful to understand and conserve biodiversity.
17. The kits are systematic and well designed for learning purpose even for upper primary and secondary school students.
18. The set of both kits are new tools and new ideas for the VIPNET students
19. This is sufficient for me to make the project.

8.1 Suggestions

1. If C.D should be provided to make it more interesting
2. Both the kits are really good but need some extra specimen in Biodiversity kit.
3. Both should be available in other regional languages too.
4. It is better to give training to club's members.
5. These kits should be provided to all school.
6. Please publish the book which is based on these kits.
7. Based on the kit an, interactive CD may be developed.
8. Notes to explain the hands- on activities may be added.

8.2 Types of Activities to be added in the kits

Majority of the users were satisfied with the number of activities included in the kits. They were of the view that “activities are sufficient to understand the concepts and there is no need to add any other activity”, “in its present form it is enough and sufficient” and “adding more activities will be an overdose” A few suggested that Puzzle, quizzes crosswords, booklets on skits/riddles, 3-D images, some working models, work sheets and games can be added in the kits.

8.3 Future Activities to be taken up by clubs and other users based on kits

Besides establishing a mini weather station and repository of Biodiversity, the users would

like to take up following activities based on the kits:-

Activities based on Biodiversity:-

Projects

1. Visit to places of ecological importance like wetland, national park zoo etc.
2. Planning project activities relating to endangered species and their conservation.
3. Selected activities will be converted into permanent display and exhibits to be displayed in school
4. Nature activities will be organized as suggested in the kits.
5. Conference, debates, various competitions to create awareness about the biodiversity conservation/ management will be organized.
6. Setting up of information centers on local biodiversity for farmers.
7. Project on social forestry, medicinal plants, protection of jackal, birds, butterflies, preservation of local biodiversity stock, eco-tourism, Insects-Our Friends, causes of pollution of local rivers etc. Biodiversity in the kitchen and school garden etc would be taken up by the clubs.
8. Demonstration of kits for the students of rural areas.

Projects/Activities based on Weather Kits

9. Project on artificial rain, understanding local Climate condition, weather information Centre, Global warming and Climate change, waste management, Study of rainfall pattern, alternate methods of weather forecasting, storms/cyclones, disaster preparedness .
10. Demonstration based on kit to make everyone in school to understand the science of various physical phenomena effecting weather.
11. Designing and development of equipment for collecting data.
12. Awareness and Training programmes will be organized.
13. Organization of seminars, debates and other competitions based on the information given in the kit.

Conclusion

The above findings, comments and suggestions show that to a great extent the objectives of the development of the kits as hand-on science have been fulfilled. It is not out of context to mention here; no doubt that these kits based on parallel or alternative approach is more suitable for a country which is more diverse like India. But given the rich experience India had had in hands-on science and given the overlapping concern of Afro-Asian-European Nations, the experiences can be shared for cross breeding and cross fertilization of the idea for mutual benefits.

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