



Aiming for Work-centred Education: Introduction to Basic Technology (IBT) program in secondary schools in Maharashtra

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August 2014

The students of Class 9 decided to conduct an energy audit of their school and hostel building. They brainstormed on the various ways to reduce electricity consumption. Their teachers had already introduced them to energy audit forms and how to fill it. Students divided themselves into the groups and recorded energy consumed at each place. They noted that electricity can be saved by switching off lights in toilets and bathrooms in the hostels at night. They shortlisted ideas such as installing automatic circuits which can be switched on and off the light simply by clapping hand. They made the circuit and installed it. Another group made a circuit and installed light sensor for street light which would switch on and off depending on the intensity of solar light. Students used a Do-It-Yourself (D-I-Y) manual and made the circuit by using tools available in the school with guidance from their electrical instructor and as part of the project, costed the work.

They also considered different questions such as why, what, when, where, how and searched for answers from different text books. There were many questions for which they could not find answers and these were enthusiastically marked by students and teachers as 'HPNPD' short form of Hindi word 'Hame Pata Nahi Par Dhundh Lenge' (We don't know but we will find it out)!

**Agricultural M.P High school, Jamgoan District,
Ahmadnagar, Maharashtra**

August 2014

Students of 9th class carried out electrical wiring of their classroom because they wanted an electrical point for the LCD projector. They were studying 'Electricity' in their science curriculum. Their teacher asked them to draw an electric wiring diagram, with electric symbols, and make an

estimate of cost of wiring which the teacher helped them buy. Simultaneously, subject teachers introduced concepts like current, voltage, wattage, size of wire, earthing, simple phase/3 phase etc. They also learned about the history of electricity and story of Faraday and Edison. They wrote a report of their experience.

**Gopal Gandhi Ashramshala, Mangaon District,
Raigad**

December 2013

In a class while teaching different calorific value of fuel, students were asked to prepare kichadi, using different fuel such as wood, kerosene and LPG. They cooked equal amounts of rice and took readings of fuel used and time it took to cook. They also recorded observations of the amount of smoke emitted, blackening of utensils, etc. They found out their wood stove was the most inefficient, giving rise to a discussion for the reasons behind it. This led on to the productive task of construction of a smokeless chulha.

Above are some examples of Introduction to basic Technology (IBT) program. The program is running in more than 122 schools in four states.

Introduction to Basic Technology (IBT)

A scientist turned educationalist, Dr S S Kalbag, firmly believed that 'learning while doing in real life situation is the 'natural way of learning'. This is the way, in which we learn our mother tongue. We learn to swim, to cook, to drive, to operate a computer by this method. In fact whatever we can do is always learned by learning while doing. This method is so effective that it trains school dropouts into successful entrepreneurs without burdening them.

Dr Kalbag wanted to find ways to introduce this methodology as a part of mainstream education. Thus, the IBT program was conceived and introduced in 1987. It is a pre-vocational program

which was implemented from Classes VIII – X as an experiment with the permission of the State Education Board (SSC), Maharashtra, in three schools from 1987-1990. It was accepted as an optional subject in 1990. From 1990 till date, IBT is introduced in various schools in different geographic and economic regions. Recently Maharashtra government, has included IBT as a core subject under the RMSA vocational scheme.

The IBT is a very good example of how any innovative intervention in school education can take the route of experimentation in schools, scaling up as a pilot program and finally becoming part of mainstream education.

In the IBT program, the syllabus is the whole of nature, which is broadly divided into four sections: engineering, energy-environment, agriculture-animal husbandry, food processing. Students carry out various socially useful productive work, one day per week (20% of school time) in these areas. Instructors are people from the community with demonstrable skills. Work activities are related to the curricular area and subject teachers explain the theory and principles behind the task carried out by the students. Basic principles of IBT program are shown below.

IBT Principles

1. Students will learn by 'Learning while doing'.
2. Students will learn multiple skills in nature.
3. School will provide various services to the community at modest cost.
4. Instructors must have demonstrable skills.

Table 1: IBT Principles

Impact of IBT

The IBT programme was evaluated at every stage of its development by different agencies. Some of them are PSSCIVE, NCERT, IIT-B, EWB & also internally by VA. The following benefits have been recorded:

- Students' interest in the school increases.
- Students get wider exposure to world of work
- Students' understanding in curriculum area increases
- Increase in enrollment and attendances is recorded in several schools

- It helps students in selecting their future career preference
- School becomes a happening place

A comparative study of students who opted for IBT and those who did not was conducted in 2009. Three IBT schools and three non-IBT schools in the same vicinity were selected. They were evaluated as per the approved syllabus and competencies expected from the students. A questionnaire using Bloom's Taxonomy was designed. The results of the study are presented in Table 2. It was observed that IBT students performed better in parameters like understanding, application of knowledge, analytical ability, evaluating the situation and creativity.

Information	Understanding	Application	Analytical ability	Evaluation	Creativity
11.7%	22.6%	36.3%	20.9%	55%	63.9%

Table 2: Performance of IBT students vs non-IBT students

An independent third party evaluation of IBT programme was done by Lend-Hand-India in 2012. They have recorded following impact

- 49% IBT students (2011-12) enrolled for technical courses after SSC. This is higher than the 16.81% all-India enrolment rate and 20% enrolment in a controlled group.
- 14% girls enrolled for technical courses when national GER for girls in rural areas is 8.3%. For boys, 38% enrolled for technical courses when National GER for is 13.7%
- Out of 31% students who are not pursuing higher studies after Class 10, only 15% remain unemployed. The rest are employed/self-employed or engaged in agriculture.
- The percentage of students starting their own enterprise/becoming self-employed in almost three times higher than controlled group.
- Dropout rate has decreased by 17%.

IBT programme is being implemented in different geographical region of Maharashtra. It has also started in few schools in Chattisgarh, Goa, Karnataka. Many NGOs are adopting IBT programme and implementing it, thus proving that it can be replicated.

Reasons behind success of IBT program

Following are the important factors for the successes of IBT programme.

1. Curriculum: The programme prescribes nature as its syllabus. It broadly defines basic concepts and technologies to be taught. Therefore it is flexible and can be adapted to local conditions.
2. Community services: Students provide various services the community which pays for such services. Students get real life training. It also helps to keep the programme updated as per the community needs.
3. Being recognized as a subject: IBT started as a formal subject with dedicated periods in the timetable with formal permission from State examination board (SSC) in 1987, though Vigyan ashram led the program and kept on updating and experimenting with it. Formally it was conducted under the monitoring and implementation mechanism of the State Education Department

and Directorate of Vocational Education & Training. This helped in demonstrating its importance in government system and it helped IBT became part of core curriculum of Maharashtra state.

4. Instructors: Implementation of IBT will need skilled, technically qualified instructors which is difficult to get in the village. Hence instead of specifying formal qualification for instructors, IBT asks for instructors with 'demonstrable skills'. Young local entrepreneurs such as electricians, masons, fabricators, etc. are selected and trained as instructors. They are encouraged to enroll for the Diploma in Basic Rural Technology (DBRT) course of NIOS (National Institute of Open Schooling). This helps to create a sustainable local human resource.

Operating costs of the programme

The following strategies helped in keeping down the costs of the programme:

- a. Providing chargeable services to the community: This also helps in lowering the cost of raw material required for practicals. Most importantly, students get real life training.
- b. Charging fees for the programme: It ensures parents' involvement and keep them informed about the programme. The present operating cost of the programme is Rs. 1000/- per student per year.

Content of the IBT program

Department of Science and Technology, Government of India funded the pilot of IBT in 1987-1990 and still supports the development of design manuals on basic technologies. Teachers' handbooks are printed by the SSC board. Vigyan Ashram has made videos, power-point presentations and manuals to ensure lower dependence on instructors for delivering the message to the students. In last few years, Vigyan Ashram has started developing 'Open Education Resources (OERs) for the IBT. These OERs are lesson plan which will help teachers to integrate work and subject areas. These OERs are available on www.learningwhiledoing.in

Limitation of IBT program

Dr Kalbag was inspired by Gandhi's thought on education. He chooses "appropriate technology" based activities for productive work. These productive tasks are in line with their curricular subjects. Unfortunately our education system has failed to understand the holistic nature of IBT. It has always been considered a vocational subject and almost no attention is given to the pedagogical significance of IBT program.

Schools teachers are expected to teach students academic portions related to productive work. It is easy to link technological activities to principles in science and mathematics. But integrating such live work activities with syllabus of the social sciences and languages is a difficult task. School teachers are not trained to conduct class on such live case

studies. It also leads to questioning on some of their own practices which teachers find uncomfortable. Therefore it can be said that IBT programme needs to experiment on integrating social sciences and languages around productive work.

Learning approaches like Nai Talim, Work-centred education, Design thinking, Project-based methodology, Activity-based learning and so on are essentially calls for learning while doing in schools. IBT program is trying to introduce this methodology in formal schools. It is trying to do it by considering our financial constraints and huge numbers. The program has evolved over last 30 years. It is necessary to build on its achievement and successes and work on the limitations to bring change into the education system.

Dr.Yogesh Kulkarni is working as Director of Vigyan Ashram. He is engaged in training rural youth, especially dropouts, on various appropriate technologies and helping them to start their own enterprises. He is credited for spreading the pre-vocational program, 'Introduction to Basic Technology' in 100+ schools. He is a practitioner and strong advocate of 'Learning while doing in real life situations'. He has started a Fab Lab for digital fabrication at Pabal with the support of MIT (USA). He may be contacted at vapabal@gmail.com