Midterm evaluation study of IBT program

Academic year: 2017-2018

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Executive summary

To review implementation of IBT program an evaluation study was conducted in 4 IBT schools (Dnyanada Vidya Mandir, Narayangaon, G.E.G. Deo Prashala, Bori, Sant Dnyaneshwar Vidyalaya, Chas, and Kulswami Khanderaya Vidyalya, Hiware). The survey was administered with students from Grade 9 only. The data was collected through focus group discussions with students and IBT instructors, a questionnaire for students, and projects related to IBT topics which were presented by the students. The objective of the study was to understand how the schools have progressed in implementing the IBT program and students' understanding of the program.

The key findings based on the analysis are mentioned below:

- Results from the previous study identified that performance of the school at Narayangaon school was between low to mid-level, school at Hiware was at the mid-level, and schools at Bori and Chaas were at the mid to high-level. Results of the current study suggest that Narayangaon school has shifted to mid-level, Hiware school is between mid and high level and the rest of the schools are between mid to high level.
- In terms of completing the syllabus and undertaking various practicals; all the schools are performing better. However, the responses of students during focus group discussions or responses to the questions asked in the questionnaire varied from school to school. For example, students at Narayangaon school were not openly discussing their experiences during the focus group discussions. Their responses in the questionnaire were very similar and seemed like majority of the students had copied responses from each other's questionnaire. The kinds of projects selected by the students from Narayangaon school were different and unique, however, not all students were able to explain the project properly. If one examines the complexity of the projects, students from Narayangaon had selected simple projects which did not require them to use complex skills that they have learned during IBT periods.
- The students were asked about the projects / practical performed/initiated by them at school, at home and at community level. Last year the responses of IBT students were mainly focused on preparing food items or fixing wiring. The focus still remains on preparing the food items, however, they have tried preparing vermicompost at home, soil testing, azolla, and many other.
- When asked students if they find learning from IBT useful for other subjects like maths, Science, etc.; students from all the schools were able to give examples of concepts which were common between IBT and other subjects. This is an achievement, because last year students were not able to identify this link between IBT and school subjects.

- The study from last academic year showed that not many students wanted to pursue farming as an occupation. In the last study, due to limitations of the study, it was not possible to interact with the students and identify the reasons behind such responses. However, this year we tried to capture students' opinion about farming. It seems that students still do not want to pursue farming as their primary source of income, they think there is limited scope for growth. However, students mentioned that they would like to support their families while doing farming with the modern techniques that they have learned through IBT program.
- When asked students how IBT will help/ support them after SSC, responses of the students across the schools were quite standard. The common trend amongst students was IBT is mainly useful to those students who are not good in academics. Additionally, students also mentioned that IBT is useful if students pursue career in hotel management, agriculture and engineering.
- Overall it seemed that compared to the last year, this year instructors were able to follow the syllabus systematically and they were able to conduct required practicals with students. IBT instructors informed that till last year not all the schools had the required equipments, instructors were new to the content as well, hence, the instructors took time in setting up the working spaces for IBT period and managing the given time for IBT. One of the instructors shared that though one whole day is not dedicated for IBT, compared to last year they are able to manage the time efficiently and complete the syllabus.
- Through interactions with instructors from the school at Bori, Hiware and Chas, it seemed that instructors have also altered practical in order to give students a chance to learn and practice techniques. For example, instead of teaching students how to make a simple stool, the instructor selects more complicated structure so that students get to learn and practice multiple techniques at a time.
- One of the instructors reported that after learning IBT for one year, now students come up with their own ideas or they take initiative to solve the problem, which encourage them to teach students more advanced skills.
- Through projects like vermicompost, farming and nursery, all the four schools have sold services to the community.
- During observing IBT periods, it was noticed that all the schools have displayed required tools in the classroom for Energy and Environment. For example, tools are displayed, different types of circuits and wiring are displayed on the wall. Students were

referring to these displays during the period. However, such relevant equipment, information charts were not displayed in the classrooms for Home Science.

- Through discussions with students and instructors it was point out that on days like 15th August or 26th January; projects and technologies on which students have worked are displayed and explained to parents. Apart from these main occasions, parents rarely visit school and IBT project.

Introduction

Last year an evaluation study was conducted amongst 4 IBT schools and 2 non-IBT schools. The objective of the survey was to understand what students know about IBT and if there is any difference between understanding of IBT and non-IBT students. For reference overall findings of the previous study are mentioned below:

- 63% of total IBT students reported that they learned diverse things apart from their regular school syllabus; whereas only 47% of total Non-IBT students replied that they learned something new.
- The students were asked to identify technical words related to farming, business, electronics, etc. The responses suggest that on average 53.2% of the IBT students were able to recognize the words; whereas only 35.2% of the Non-IBT students were able to identify the words.
- The students were asked to write about the projects / practical performed/initiated by them at school, at home and at community level. Due to the exposure given through IBT program, the responses of IBT students were mainly focused on preparing food items, fixing electrical wiring, selling vegetables, etc. On the other hand, responses of non-IBT students were related to the school and/or their studies.
- Regarding gender biasness, 74.2% of the Non-IBT students strongly felt that repairing a diesel engine and hand pump was not for girls but only for boys, whereas 63% of the IBT students felt the same way. Research in Science according to 85.3% IBT students and 83.3% Non-IBT students was for both girls and boys. According to 62.7% and 55% IBT students welding and electrical fitting respectively were for both boys and girls; whereas Non-IBT students strongly believed that it was only for boys.
- Students were asked about career choices. 41% of the students from IBT and non-IBT school aspire to take up government jobs. 26.3% students from IBT schools expressed the desire to get involved into some kind of business. But, not many students from both the categories were keen on farming as an occupation.

In this academic year (2017-18) a focused study only with 4 IBT schools was conducted. Now that all the schools have completed one year of IBT, the study was designed to understand schools are implementing the project and how it is impacting students' understanding of IBT skills. The following report discusses findings from the study conducted in 2017-18 academic year.

Methodology

The study was conducted in the following 4 IBT schools with the students from Grade 9:

1. Dnyanada Vidya Mandir, Narayangaon,
2. G.E.G. Deo Prashala, Bori,
3. Sant Dnyaneshwar Vidyalaya, Chas,
4. Kulswami Khanderaya Vidyalya, Hiware

While designing the survey material for the study, following outcomes of the IBT project were considered:

1. Students will learn new skills through IBT program.
2. IBT instructors will use 'Learning while doing' methodology to conduct IBT activities.
3. The students will use the learning of IBT to solve their real-life problems and needs.
4. School will become demonstration center for the community and showcase use of technologies.

Last year, to collect the data a questionnaire for students was developed and focus group discussions were conducted with IBT instructors only. At non-IBT schools, only a questionnaire with students was administered. Due to limitations of the study, focus group discussions with students were not conducted, which could have actually helped to understand students' perspective on IBT as well as to identify reasons behind their responses in the questionnaire.

To fill this gap, this year, along with instructors, separate focus group discussions were conducted with the students from each IBT school. For focus group discussions, students were divided into groups as per their IBT groups. Each group consisted of 10-12 students.

Along with focus group discussions a questionnaire was administered with the IBT students. During the last study, a questionnaire was administered with all the students from Grade 8 and 9. Administering the questionnaire with all the students had its own drawbacks. One of the major challenges we faced was managing all the students and trying to stop them from copying each other's responses. Though it did not happen in all the schools, still it affected responses by the students. Hence, this year the questionnaire was administered with only the selected students from Grade 9. 25-30 students from Grade and from each school were randomly selected.

Additionally, all the selected students were asked to identify one project for themselves and display at the exhibition organized at one of the IBT schools. The purpose of this activity was to understand how students select the project, how do they identify a problem, how do they implement their learning from IBT while working on the project and whether they are able to

explain their project. Though students could not work on the individual projects due to logistical issues; they defined their own groups and came up with the project ideas. Wherever required, they received guidance from the IBT instructors.

To gather information from IBT instructors, focus group discussions were held. Secondly, IBT periods of each vertical were observed. Such classroom observations were planned only to understand how an IBT period is conducted, what kind of interactions take place between IBT instructors and students. Since classroom observations were held only once, nothing concrete can be concluded based on it; however, it certainly gave an idea of how IBT periods are implemented.

Around the beginning of the academic year, as part of the study, IBT instructors were asked to maintain records for the students selected for the study purposes. These records were about how students were performing during the IBT period, noting down questions asked by students, what kind of difficulties they face while learning IBT lessons. Though an orientation workshop was conducted for instructors, where instructions on how to observe students and how to maintain the records were discussed; this activity did not work out. There could be various reasons behind why IBT instructors were not able to maintain the records. First, it could be that due to other responsibilities, instructors did not find time to complete the task. Secondly, since instructors were not regular subject teachers and they were not required to maintain such records and documents, they did not understand how to maintain the records. And lastly, since it was not something that they were familiar with, they needed more and one-to-one guidance.

Now let's look at the detailed findings derived from the interactions with students and instructors, responses to the questionnaire and projects presented by the students.

CONSOLIDATED FINDINGS

In the following section, first we will look at the findings based on the questionnaire and students' projects. Then to have a better understanding of how IBT is implemented in all the schools, the findings from interactions with the students and instructors will be presented school wise. Please note that, all the students have performed the basic and necessary practical during IBT period. While explaining the findings of each school, the common practical/ activities may not be repeated. A list of practical conducted by each school is presented at the end of the report.

Students' performance in the questionnaire

In the questionnaire two problems were given and the students were required to come up with solutions to the problem and explain how they will develop a product or a system as a solution to the problem. Overall the students have followed a common method to write the answer. For example, first students have discussed the problem, then they have listed down various solutions to the problem and lastly discussed the method of developing a product.

The first question was, if a school bag weighs a lot and it's troublesome for students to carry it every day to the school; then as a solution what can be done. Let's look at the findings below:

- Overall there is not much difference across the schools in the way students have discussed the solutions. In Narayangaon students have mainly focused on one solution, whereas in other three schools, students have discussed about 3-4 different solutions. No gender bias has been observed in the responses. Girls and boys have thought on the similar lines.
- Majority of the students across the schools have responded that attaching a wheel to the school bag is the best solution to reduce the weight. Only three students from the school at Hiware have explained the process of making a product in detail. They have used diagrams as well as rough measurements of the required material. Others who have explained the process have written down the steps, but they have not always used a diagram and none of them have stated rough measurements of the required material.
- Secondly, students thought of shelf in the classroom as a replacement to a school bag. Out of 24 students in Narayangaon 21 students thought making a shelf in the classroom is the best solution. Out of 21 only 2 have written down the detailed process along with diagrams, required material and measurements. The rest of the students have simply mentioned that a shelf could be the solution. Students in general from other schools as

well, have explained that such a shelf could have subject wise compartments, or each student can get one compartment.

- Then the third common solution is attaching a side box to the bench or creating a space inside the bench.
- Students from three schools except for Narayagaon have mentioned other solutions as well. For example, students from Hiware school have mentioned that students can use a tablet and study from e-learning material. A few of the students have reported that instead of regular wheels, an electric cart which can be operated through a remote control is the best solution. 2-3 students from Chaas and Bori school have written that using a school bag which is made of either bamboo or coconut leaves will help reducing the weight of the school bag.
- 12 students from all the four schools have not responded to the question at all.

In the second question, students were asked to think of a product / a machine / a system to support their mothers in completing domestic chores. Though the solutions are quite similar across the schools, students have come up with interesting examples.

- One of the common solution written by students is developing a robot that will assist mother throughout the day. One of the students from Bori school has written that he would like to develop a robot which will not only help his mother but his father at the farm. The boy has further explained that he would attached a solar panel, so a robot will be charged on a solar energy. Students have not explained the process of developing a robot and it has been discussed as one of the many solutions to the problem. Even then, it is interesting that students thought about such a solution. Except for Narayangaon School, this example has been discussed by students from other three schools. Additionally, not only boys but girls have also considered this as a solution.
- Secondly, students have discussed roti maker as one of the solutions. Majority of the girls have written about roti maker or a machine to knead flour. Majority of the girls from Narayangaon have mentioned roti maker. The students from Narayangaon misunderstood the instructions given to them during the survey and explained the project they had selected for the exhibition. Hence it cannot be concluded that the students only thought about roti maker. However, it seems that even those students who were not part of the project of making a machine to cut multiple puris; have not really discussed any innovative solutions.
- Majority of the students from the school at Chaas have discussed vegetable cutter as one of the solutions.

- It seems that students from Hiware school have given focus on solar based products. For example, solar cooker, solar cooler, solar heater to heat water, and solar dryer not only for food items but to dry clothes as well. One of the girls has explained that she would like to use skills of plumbing and ensure that her mother gets easy access to water and does not have to walk far away to bring water. One of the boys has mentioned that he would attach an alarm to the stove, so that when food is ready the alarm will ring and till then his mother can work on other tasks. The similar example has been mentioned by students from Bori school as well.
- One of the boys from Bori school has explained a multipurpose cart which can be used to carry grocery from the store, water cans, vegetables, etc. This example was discussed by students from Hiware and Chaas school as well.
- Many students have discussed that they will develop a washing machine and / or a vacuum cleaner. The process of building a washing machine has not been discussed. Some of the students have mentioned how a vacuum cleaner can be made, for example, using a bottle or a can in the house. It seems that students have about how to make a vacuum cleaner at home.
- Many students from Chaas school have discussed how they can fit an alarm inside the water tank.

Based on the responses it seems that students are able to think of different solutions to the problem. Unlike in the first question, majority of the students have discussed multiple solutions to the problem. Such questions could be part of the regular IBT periods. Discussions on a variety of problems and related solutions may encourage students to think creatively and innovatively.

Students' performance in the group projects

Selected students from all the four schools were asked to work on a project idea and present it to all the students. An exhibition of all the projects was organized at Hiware School. While examining the projects we looked at how students were explaining the project, how did they come up with that project idea, and what kind of skills the student had to apply while developing the product.

Let's look at the findings which are derived based on the interaction with students and the presentation made by the students.

- The overall observation was that all the students had equally participated in developing the project idea. Although, all the students have mentioned that they took guidance from

their instructors only when required; there is a possibility that students may have received extensive help from the instructors. but it was not possible to control such situations.

- Documentation of the process of selecting a project and then developing a product was well done. All the students had received a set format to document the process.
- The students had used techniques from all the verticals of IBT. A good balanced of all the IBT verticals was found in the selected projects.
- While students were explaining their projects, it was observed that students were able to name the parts they had used in the product correctly, they were able to answer the questions, and it did not seem like they had memorised what to explain; instead they were explaining the project without any flaws. This could be considered as one of the indications of students' full participation in the project. Additionally, students were using the correct terminology while explaining the project. While explaining the projects students were mentioning how they failed at first and then they had to try alternate method or experiment with the material. This also suggests that students truly had worked on developing the product.
- Considering the kind of projects selected by the students, it was evident that students had studied problems of their family and community. This was mainly done through discussions amongst the students and instructors.
- Extensive use of YouTube and Google was done by almost all the students. They reported that to understand the specifications of their product and to get more ideas, they searched for videos and relevant information on YouTube and Google. Since instructors use such online platforms to show videos related to IBT, students already knew how to use these platforms.
- No gender bias was observed in terms of selecting certain projects by girls or boys. For example, girls from Chaas school had prepared a periscope. Another group of girls had prepared a fan for the farm to keep birds away.
- It was observed that students had also worked on some complex products. For example, one of the groups from Hiware school had worked on an automatic watering system. The idea was that watering will automatically start when soil gets dry and then when the land is enough wet, the system will automatically turn off. While explaining the project, one of the students explained that he had seen a similar project at one of the science exhibition and his group tried to explore further. The student was able to explain how this project could be implemented at a larger scale.
- Another group of students from the school at Bori had developed a structure of pipes and planted chillies in it. The students had recycled some of the pipes. One of the

students explained how a similar kind of structure can be used in urban set up where there is not enough space for farming.

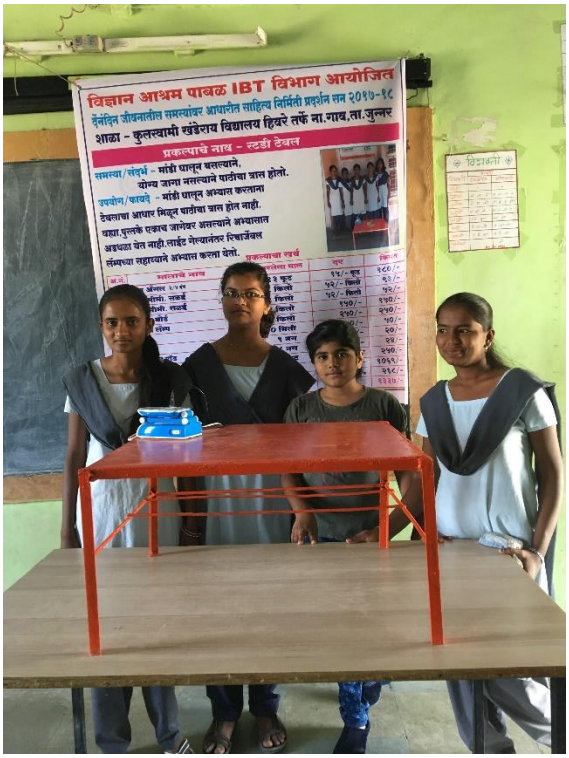
- The projects by students of Narayangaon school were quite simple compared to other schools. The projects mainly required students to use skills of cutting, welding etc. None of the projects were based on topics from Energy and environment. Nonetheless, students were able to explain how they developed the product. Puri cutting machine built by one of the groups of girls seemed to be the main highlight.

Overall it seemed that students are understanding how they can use IBT skills to design and develop a product. It is important to conduct similar activities regularly. May be instructors can ask students to complete a specific number of projects per term/ year. This will enable students to understand how IBT skills can be used and how to convert an idea into a product.

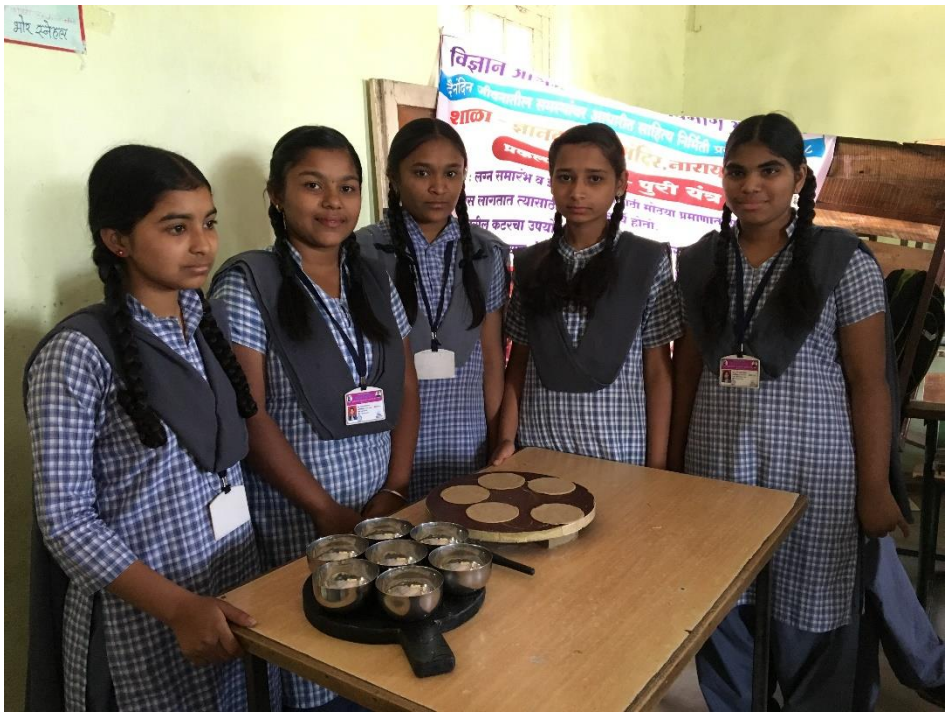
Most of the students mentioned that in this academic year they learned about 'Design thinking' approach. It seemed that students have understood the concept of design thinking, because during interactions with the students, they were able to explain the approach and steps involved in the process. Giving students an opportunity to use such approach will enable them to understand broader scope of IBT skills.

Following are photos of some of the projects exhibited by the students:

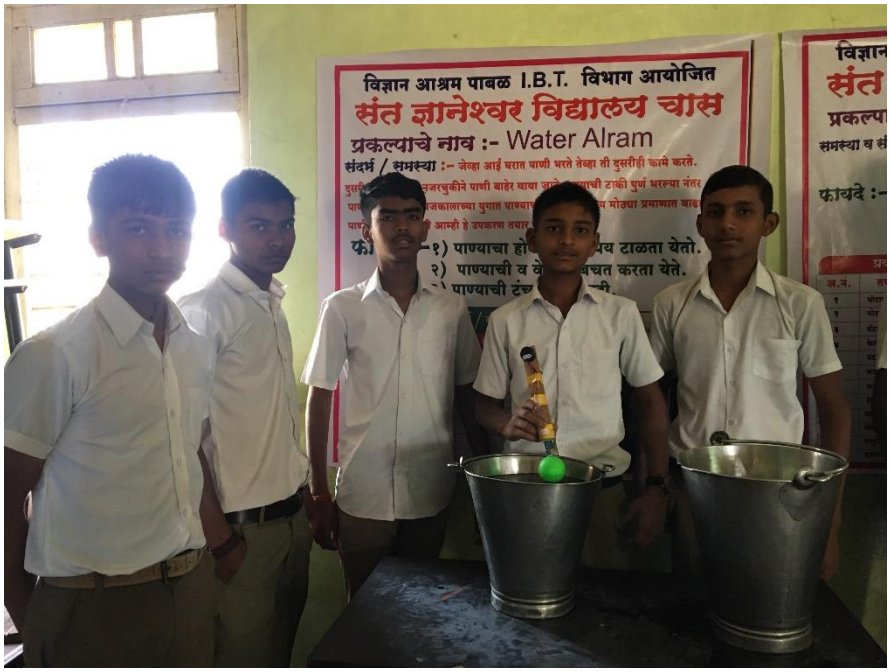
01. Study table prepared by girls from Hiware school



02. Puri cutting machine developed by girls from Narayangaon school



03. Water alarm prepare by students from Chaas school



04. Multi-layered structure with hydroponics technique prepared by students from Bori school.

School-wise findings

1. Narayangaon School:

➢ Learning from IBT

During the focus group discussions, in general students' first comment was they enjoyed attending IBT periods and have learnt many new skills. Students also thought that they learned more during this academic year than last year simply because all of them got an opportunity to complete practical from all the verticals of IBT.

According to the instructors, last year the school had limited equipments and not all the facilities were available. For example, a place was not identified to prepare vermicompost or no shed for nursery was available. Due to lack of adequate infrastructure, instructors could not take all the practical. This was mentioned by some of the students as well. This year instructors purchased all the required material and they received help from Vigyan Aashram as well. Instructors also received help from the students, for example, one of the students shared that as part of one of the practical, they fixed a door to the nursery shed. Students also helped in constructing a bed for vermicompost. Construction was one of the new skills that students learned this year.

According to the students at Narayangaon, two main highlights of this year were the scrap rally and saplings/ plants that they sold from their nursery at the school. The school organized a scrap rally, where students appealed villagers to donate scrap material like bottles and pipes, appliances like mixer, fans which were not in the working condition. Students modified tins, cans and plastic bottles collected at the scrap rally and used the recycled products for their nursery.

During the discussions, the instructor who teaches Energy and Environment mentioned that last year he focused on teaching basics of wiring and different types of wiring. Now that students are familiar with kinds of wiring and its uses, he has shifted the focus of practical on how to repair electronic appliances. One of the boys mentioned that he used a motor from one of the fans which was not functional and used it to prepare a cooler.

When asked about the experience of handling equipment for different verticals, one of the girls mentioned that initially she was afraid of using equipment for welding, cutting, etc. However, now with practice and regular use of such equipment; she has become familiar with its use and slowly gaining confidence to use equipment. Other girls had similar experience. The instructors shared that they still have to push girls to use different equipment. However, girls are less reluctant compared to last year and participate in all the activities.

The instructor of Energy and Environment shared that instead of teaching students how a stove works (this is one of the practicals), he took practical based on the electric induction. According to him people are replacing stoves with appliances like induction, so it is important to keep students up to date. He also explained students the basics of how to repair an induction.

Though students were sharing their experiences about IBT, the researcher had to probe them a lot. The overall experience indicates that compared to students from other schools, students at Narayangaon did not openly discuss what they learnt from IBT period or if they have tried something from IBT at home and their general experience of learning IBT.

➢ Learning from IBT supporting regular subjects

We asked students if they found any connection between IBT and regular subjects like maths and science. According to one of the students, learning theories from science has become easy because of IBT. One of the girls from Grade 9 mentioned that since students get hands-on experience during IBT period; which allows students to understand the concepts easily and remember key terms, processes, etc.

Not all but some of the students were able to identify common concepts from IBT and other subjects. For example, Ohm's law, parallel circuit, costing, or farming related topics from Geography.

➢ IBT and its application in the real-life

When we asked students about the activities / project that they conducted at home, preparing vermicompost and trying out new recipes at home were the most common activities reported by the students. One of the students mentioned that he harvested fenugreek at home.

During interaction with students, not many examples of community services were mentioned. However, even the few examples given by the students are worth taking into consideration.

All the saplings/plants prepared by the students at the nursery were made available for parents to buy. Students had worked on a variety of plants including chilli, different flowers, curry leaves, etc. They had also prepared organic fertilizers as a part of their agriculture related lessons. Parents also bought these organic fertilizers from the students.

One of the boys mentioned that he visited a nearby workshop and spent a day working on activities like welding, soldering, etc. Another boy helped his neighbour to repair a motor and completed plumbing related tasks as well.

Scrap rally organized by the school was one of the ways to connect with the community. One of the instructors informed that students are working on repairing the products collected during the scrap rally and they intend to return them back.

2. Chas School

➢ Learning from IBT

When we asked students, what do they think about IBT, one of the girls shared,

> "*We get to learn new things. We get to know new equipment that we have never used before. Rather than learning from textbooks only, we can actually use the equipment and work".*

Another girl reported that,

> *"After using different equipment, we realised that even we can make products like table."*

This kind of feedback from the students indicate what they think about IBT. This initiative to work on different equipment was observed during classroom observation as well. Without any fear or reluctance girls were handling electric boards, soldering machine and trying to figure out the problem they were facing with a torch they had made. The girls as well as the boys needed hardly any support from the instructors. It was observed that even the instructors were giving students an opportunity to work on their own.

At Chaas school, IBT is implemented for entire two days. It enables instructors to conduct more practicals and experiment within the scope of IBT. This was observed in the previous study as well. As a result of this, some unique projects were discussed during our interactions with the students.

Students from all the groups were eager to share what they have worked on during the IBT period. Students built a soak pit and a bed for vermicompost. They also helped in building a poly house. It seemed that students had made different tools required for farming. This was mentioned by students from other schools as well.

At Chaas, along with chillies, students also took experience of harvesting red cabbage and iceberg. The instructor informed us, that he wanted to experiment with a new crop, that is why he selected red cabbage and iceberg. According to him, every crop has its own requirements of water, sunlight, etc. If they keep experimenting with new crops, students will automatically get an opportunity to learn about different requirements of the crop and which conditions/ environment is suitable for crops. Students also learned the process of making murghas - nutrient-rich food for animal, this practical was only conducted in Chaas school.

Students reported that as a part of one of the projects for Home Science, they prepared perfume and sold to teachers and students in the school. Students also mentioned that they used spray painting machine for the first time in their life.

One of the students shared that last year, they mainly learned about different types of wiring. However, this year, they actually used those techniques and made a torch, clap-based light, touch-less bell, etc.

The instructors added that this year extensive use of videos was done to give demos of different products. This was discussed at the school in Bori as well. According to the instructors, through videos students easily understand the concept and the product. Instructors either search for videos on their own or they select videos that circulated on WhatsApp groups for IBT instructors.

Students from Chaas school shared that they watched videos on how to make murghas, procedures in construction, how to use an oven, etc. It seems that especially boys are watching more videos on YouTube as they have access to internet / smartphone at home as well. They are keen to learn about new experiments. One of the students expressed his interest in building a drone. Currently he is watching videos on YouTube and trying to understand the process of making a drone.

➢ Learning from IBT supporting regular subjects

One of the students mentioned that practicals from Energy and Environment helped him to understand basic principles in electronics. The students added that lessons from Home Science covered topics on protein, carbohydrates, blood group which they usually study under science subject.

One of the boys mentioned that IBT program has helped him to develop overall sense of measuring dimensions and visualizing a product. According to him, when such topics are studied in science, maths or geography as part of theory lessons, it becomes difficult to visualize. Realizing this implication of IBT is a great achievement.

The instructors shared that while conducting practicals, it is easier to explain subject related concepts. Students themselves point out that they have studied these concepts in school subject. Though no specific focus is given on explaining other concepts, casually the connection between regular subjects and IBT is addressed.

➢ IBT and its application in the real-life

As part of the community services, students took up various jobs at the school level. For example, they prepared a see-saw for the school, they painted the school gate, then installed an audio system in the school. Apart from this, every month, students put up a stall in the school, in which they mainly sell food items. It was sensed that students felt that they belong to this school because they had worked on the school level tasks.

Apart from the school level activities, students also repaired fans and electrical board at home. One of the girls shared that he fixed broken legs of the couch at home. According to students, they have saved money by taking up electrical work at home or by repairing fan at home.

Students also prepared spalings, vermicompost, and azola at home. The instructor of agriculture shared that students often bring soil from their farm or neighbour's farm and perform soil testing in the school. The instructor for Engineering shared that sometimes students bring fans or cycles which are not working and takes his help and fix the issue.

IBT instructor for energy and environment mentioned that through one of the computers in school, students were getting an electric current. IBT students identified the problem, changed one of the wires which was causing the electric current and fixed it. Since they had learnt about earthing, they were able to apply the knowledge. He especially added that mainly girls were involved in it. Important point is without taking help from the instructor, students identified the problem on their own. The instructor has noticed that in general students' working speed has increased compared to last year.

The instructors feel that, there are many activities that can be conducted in the community. However, organizing and executing such activities is a big challenge. Though students live in the same village, going around in the village with all the tools and children could be challenging.

3. Hiware School

➢ Learning from IBT

During the interactions, students were generally quiet and not shared about many projects. Yet, it seemed that compared to last year, they had worked on lot projects.

According to one of the instructors, all the instructors are now familiar with the syllabus and techniques of teaching which was not the case last year. He added that familiarity with the syllabus and practicals has helped him to manage the time effectively, however, he was not content with the number of practicals completed in this year. He added that his focus was on how he can teach maximum concepts and skills from one practical. For example, while preparing ferro cement bench, he ensured that students learn about measurement, preparing a mould for columns of bench, welding, and construction as well.

Another instructor added that sometimes instructors have lot of ideas in the mind, however, time and children's speed do not allow them to implement all the ideas. All the instructors think that for the next year they would like to work on new projects but use similar IBT skills.

Another concern shared by the instructors was, if the school starts teaching IBT as one of the core subjects, instructors would require to be more organized. They will have to make sure that all the students are getting equal exposure and opportunity to participate in all the practical, because if an external examiner comes to the school, students cannot tell him/her that they did not perform certain practical so they cannot answer. Hence, the responsibilities of the instructors have increased. Instructors will have to keep in mind that students will be appearing for an exam, and accordingly they need to study IBT subject. Instructors mentioned that they would like to receive an orientation from Vigyan Aashram on this regard.

➢ Learning from IBT supporting regular subjects

Students did not give many examples of how IBT is related to the regular school subjects. However, couple of students discussed that concepts and learning from all the IBT verticals are useful to study regular subjects. He added that for example, they study about chemical and organic fertilizers, calculating resistance, and Ohm' law in IBT as well as in Science.

➢ IBT and its application in the real-life

The students proudly mentioned that one of the major community services that they provided was selling vermicompost. The students themselves had constructed a space for vermicompost. Amongst all the four school, the school at Hiware produced highest quantity of vermicompost. One of the farmers from the village purchased most of the vermicompost from the school. Many students also mentioned that they tried preparing vermicompost at home. One of the boys shared that he tried to convince one of his neighbours on the use of azolla. He also helped them in the process of making azolla bed. One of the girls shared that students sold vegetables at the nearby market. During that time, villagers asked students what was special about their vegetables. Then students explained how they have only used organic fertilizers to grow vegetables.

The instructor who teaches Agriculture added that he had asked all the students to bring soil from home and then taught how to perform soil testing.

One of the boys shared that he installed a clap switch at one of the houses where only two old people live. The instructors shared that students constructed a bench made of ferro cement for villagers and they plan to build more at various places in the village. Apart from this, students did electrical fitting, wiring at home as well at others' houses.

Similar to Narayangaon school, students at Hiware school organized a scrap rally to collect scrap from the villagers. Students added on 26th January, students set up food stall and sold food items to parents. Work of students completed during IBT project, was also displayed on 26th Jan. Students added that hosted a blood group camp and checked blood groups of parents.

4. Bori School

➢ Learning from IBT

Students from the school at Bori shared why they like IBT is because they get to do new activities. This sentiment was true across the groups we interacted with. Another girl shared that she feels excited about all the subjects in IBT which is not true for regular school subjects. According to her, IBT is important because otherwise it would not have been possible to learn skills like welding or electrical fitting. At home children do not get such opportunity.

One of the girls shared her experience of farming related activities. She mentioned that earlier she thought of farming with only hard work and physical work. But after learning new techniques at IBT, her perspective about farming changed. Since her family does not do farming, she had limited knowledge about farming.

Another girl mentioned that last year they did not get to do many of the practicals because the school did not have enough equipment. However, this year the situation has changed. She added that last year it was mainly about learning theory and this year it was more about practical. When asked students if they learned something new, students mentioned that last year they did farming in the open area, whereas this year farming was done inside the shed. According to them both these experiences were different. Additionally, they learned the technique of dripping. Projects like vermicompost and azolla were done last year as well, however, this year they increased the scale of production.

According to the instructor teaching Agriculture, the school has better equipment and material compared to last year. Last year they faced other challenges as well. For example, a shed was built for nursery and harvesting. The structure was temporary and not sturdy; so, it collapsed during the storm. Due to this incident, students got discouraged and lost interest in trying out again. Now the school has built a permanent shed, hence even the instructor feels enthusiastic to conduct new experiments and takes initiative. As part of the practical, students have harvested chillies.

The instructor for Home Science agreed to the above point that right kind of equipment matters a lot. She shared that last year, they did not have equipment for baking; the instructor used to take cookies to the nearby bakery and get it baked there. Now that they have an oven, it has become easier and students got an opportunity to bake cookies, cake and dhokala as well.

Based on the interactions with students and instructors at Bori school, it seemed that students have been working on a variety of practical which are not necessarily mentioned in the syllabus.

For example, students prepared cycle stand as per the needs of the school. Then students also mentioned a variety of food items such as Dosa, Dhokla, and Paneer which were not reported by any other school. The instructor of Home Science shared that students get bored of preparing same food items. Hence, she ensures that students get to try new food items as well. Since one of the dairies is located next to the school, it was easier for the instructor to plan preparing items like paneer. Students mentioned that they also visited the dairy as part of IBT. She also took initiative and taught students how to make flowers from cloth material.

During the interactions with students and instructors, multiple times use of videos was mentioned. Students shared that they had watched videos on topics like how to use a microwave or a packing machine, then how to use a machine to collect strawberry and other food grains, different types of crochet stitches, and many more.

➢ Learning from IBT supporting regular subjects

As mentioned by one of the students, they look at regular school subjects as theory subjects and IBT as a practical subject. He added that in IBT they have performed practicals like calculating PH level, checking blood pressure; which has helped them understand theories from Science. The general notion amongst students was that IBT is useful only while studying Science.

During the interaction with the instructor for Agriculture he shared that students had to face loss in agriculture. The PH level of the soil was higher than required, hence, the students could not harvest fenugreek. From that loss, students learnt the side effects of higher PH level and then what measures can be taken to balance the level. It also helped students to learn the topic on PH level by actually taking an experience. This incident suggests how a failure or loss can be turned into a learning experience.

➢ IBT and its application in the real-life

All the students were eager to share the activities they had done at home. Majority of the students mentioned that prepared food items such as tamrind jelly, mixed fruit jam, dosa, idli, etc. Not only girls but boys as well mentioned that they prepared food items at home. One of the boys who is interested in cooking, made biscuits at home. He took small quantity of corns from the instructor and prepared popcorns at home. Another boy tried paneer, khawa, and modak as well. It seems that students are not only trying the similar food items but experimenting with

ingredients as well. For example, one of the girls shared that instead of regular flour, she used rawa to make dhokala.

Apart from cooking, students have finished other tasks as well for example, checking earthing, fixing fuse, and repairing electrical boards. One of the girls proudly shared that since she can do electrical work as well, for simple tasks her family does not ask an electrician to complete the work. The family support her and give her permission to fix simple issues.

Many students also shared that they prepared azolla bed at home. One of the boys mentioned he prepared vermicompost, saplings of mango tree, and dripping for his farm.

Boys and girls agreed that because of IBT they have started taking more interest in farming and helping their parents at home.

The instructor for Home Science shared that she had taught students basic stitches of crochet. One of the boys took interest in it. He asked the instructor for needles and other required material and prepared a crochet piece on his own at home.

Students added that at school they have learned how to use YouTube videos to search for information. One of the girls mentioned that she uses YouTube and Google to search for lessons from her syllabus or find out information on complex science experiments or to find out meanings of English words.

During the interactions with students, the instructors admitted that they lack behind in providing community services. Students regularly sell food items in the school or put up food stalls during school events. Through that students have got experience of selling the products made by them. The instructor for Home Science added that by selling products students learn skills of communication, how to deal with customers, etc. She shared an example of a boy enjoys selling products. The instructor added that he ensures that all the products are sold.

Along with that students have also checked earthing at the village temple and at some of the homes of the villagers.

Opinion on usefulness of IBT skills after 10th

During the interactions with students and instructors, we discussed what after 10th and if IBT is useful after 10th. Opinions of students across the schools were quite similar and nothing unique was identified.

Students across the schools felt that if a student fails in the 10th exam, then he/she can start a business of their own or take up a job that is related to one of the verticals from IBT. Another common thought was IBT is useful if a student decides to take admission to any of the ITI courses. The instructors agreed with this point. During our visit to the Narayangaon school, we got an opportunity to interact with the students from Grade 10. Majority of the boys from Grade 10 expressed their interest in pursuing courses at ITI.

Students also reported that if someone takes up a job as an electrician or at the hotel or as a mechanic then skills learned at IBT program will be useful for them. One of the students from Chaas school mentioned that students can start a 3D printing workshop which will be unique because not many people know how to use a 3D printer.

When asked students if IBT is useful to those students who are excellent in academics; students replied that in such cases IBT skills are useful to perform domestic tasks only. For example, light fitting, checking earthing, repairing a fan or a mixer. One of the girls from the school at Bori mentioned that IBT skills are useful to support family as well. For example, while pursuing other studies or doing a job; students can support families who are into farming with modern techniques they have learned at the IBT program.

The students from Chaas discussed that everybody from the village only do farming, hence they would like to pursue something different. He further added that the students are mainly interested in learning new techniques through IBT program, which help them to reduce dependence on chemical fertilizers and do cost effective farming. One of the students mentioned, that he would like to learn modern and environment friendly techniques of farming, so he can help his family if they are facing any challenges while doing farming. However, this is only to support them, and he himself is not interested in farming.

One of the students from Hiware school shared that if students decide to pursue career in any of the verticals of IBT, for example agriculture or engineering or hotel management; then students will not have difficulties in identifying tools and equipment. The similar opinion was shared by another student from Bori school. He mentioned that they know the tasks to be performed while cooking in the kitchen. If students want to start their own hotel or want to join hotel

management, then they will have an idea about the scope of work and they will be familiar with the type of work.

According to the instructors at Bori school, IBT program is important because it gives students an opportunity to learn something out of the box and something as basic as helping in the kitchen. The instructor for Home Science at Bori shared that if students relocate to a city or town for their studies or job, then practicals from Home science will be useful for them. For example, students know how to prepare a tea or they regularly clean vessels during the period. Even boys participate in such activities. She added that especially boys do not get exposure of work in the kitchen; their families do not allow them. At IBT program, even boys participate in the activities and which is making them to live independently. One of the boys requested her to share his photograph while cleaning the vessels with his father. His father did not believe that his son can clean the vessels, therefore he wanted to show him a proof.

To widen the understanding of IBT and its usefulness after schooling, continuous discussions with students and sessions by experts in the field may be useful.

RECOMMENDATIONS

- Through projects exhibited by students, it seems that students can think differently and apply techniques to develop a product. Such events need to be organized often in order to develop skills of using techniques, presenting the concept and developing confidence amongst students.
- Currently students are supposed to try out practical at home as well. To encourage students to try these practical at home and to ensure that students do not focus only on certain activities such as cooking food items; a systematic approach can be adopted. For example, IBT instructors can set a minimum number of practical for each vertical and ensure that during one academic year students complete those projects.
- Focus group discussions with students indicated that students think that IBT is useful only if students are preparing for ITI or take jobs as a mechanic. If one of the objectives of IBT project is to instil critical/analytical and creative thinking amongst students then, it is important to change this perception of students about IBT. Additionally, interactions with experts from the fields may help them to understand wider scope of IBT program.
- Through discussions with instructors and students, it was pointed out that students do not enjoy learning theory. Since it is important to learn theories, instructors need to orient on how different learning strategies can be used to teach theory.
- Related to the above point, now that set up for IBT program is available in all the schools and the instructors are familiar with the syllabus; more focus needs to be given on training the instructors specifically on the pedagogy and how they can develop critical and creative thinking amongst the students.
- Since instructors are not teachers by profession and they have their own limitations, interactions with experts from the fields related to IBT can help students to receive guidance and develop advanced skills.
- A few of the students from Chaas mentioned that they read Agrovan a local newspaper dedicated to agriculture-based news. From the newspaper they get information on the market prices and other events related to farming. Conducting such discussions during the IBT period needs to be standardized. This may help students develop advanced level thinking.
- A standard guideline on how to set up a classroom for IBT verticals may bring structured approach in the way classrooms are set up. For example, each classroom for Home Science must follow hygiene related rules and standards, so a guideline of these rules can be given to the instructors. Additionally, hygiene related posters/ charts can be displayed in the classroom to remind students while they work on practicals.

Additionally, a monitoring system should be developed to check if such protocols are followed or not.

- All the schools are implementing unique projects and it is important that villagers get to know about these projects and technologies. Is it possible to plan open days for parents and other villagers to visit the school and understand technologies adopted at IBT program? This may encourage parents and villagers to visit school apart from 15th August and 26th January only.

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