Review of 2017 batch of Level 1 Jugaad Lab, Feminist Approach to Technology (FAT)

Introduction

In continuation with their commitment to create a free, innovative, and creative space for young girls from low-income families to learn aspects of everyday science and technology in an informal way, Feminist Approach to Technology, (referred to as FAT henceforth), has built on the experiences of 2015 – 16 of the Jugaad Lab in the second batch of Level 1 (L 1) in 2017. This was the second year of the pilot phase to work in the areas of Science, Technology, Engineering, and Mathematics (STEM) with girls to address the larger issues of gender rights. This review seeks to analyze the layers of processes that shaped the nine months of L 1 batch[1] in terms of its progress and the headway made in breaking social barriers for the participants. In addition, the review will also suggest ways to take this work further.

The review is based on discussions with the three team members, participants, select parents of the participants, Gayatri Buragohain, and a reading of the reports and documentation done by the team. The interaction with the team, Gayatri, the participants, and select parents was undertaken in the week of January 8, 2018.

Building on experiences of 2015 - 16

Mobilization was undertaken by the team for the new L 1 batch from mid to end March 2017. Classes commenced on April 11 when students filled the baseline forms (on April 11 and 12). The new batch was initiated on April 15 and 16 through a Sessions' Break Camp and regular classes started on April 18. Though regular classes were not held during the summer break, the Lab was open for students to come in the afternoons and some special classes and workshops were held. Regular classes resumed in July and continued till end December.

One of the key issues that emerged during the review was the manner in which the team built on their experiences of the previous year to shape the plans of the new batch. To begin with, they decided that the girls applying for the Jugaad Lab should have age appropriate reading and writing skills. In the previous year, many participants' inability to read and write, resulting the team to move away from their assigned focus on STEM to assisting the students develop their reading and writing skills. This could be assessed by asking the participants to fill up the admission forms themselves. This decision to admit girls based on their age appropriate reading and writing skills allowed them to focus on STEM and not begin with the basics of reading and

[1] 13 students were given the certificate of completion at the end of the programme. This report incorporates the details of 12 participants as the 13th one was not present for the baseline and endline.

writing. Three girls from English medium section of the government school also applied and were selected.

Further, the team used the curriculum and work plan developed in the course of the last year as the basis of planning for the 2017 batch. The experience of organizing events and activities in the previous year also enabled them to plan budgets effectively.

Continuity in the team also enabled them to constantly draw from the earlier experiences and build on them. One team member had played a secondary role in facilitating the classes last year but was encouraged by other team members to take on more responsibility. With the support of the team she emerged as the main and often the only facilitator this year for L 1. The manner in which she has adapted to take on new responsibilities in the last year or so at the Lab reflects the larger goals of FAT to build young leadership from among the participants of its programmes.

Though the team was unable to build in a regular planned schedule, community mobilization and interaction provided the team with an opportunity to enhance their skills to interact with the parents, especially when their daughter was not regular with her classes. This provided them with a better understanding of the ground realities that are faced by the participants and also negotiate with the parents so that they could continue attending the Lab. The team learnt that a couple of participants were irregular as their mothers were pregnant and the participants were responsible for a fair amount of household work and hence could not attend the Lab. Such issues emerged only after field visits and provided the team with insights into the lives and problems of participants which they might not share on their own.

Continuing to provide STEM education in an informal space

The experiences of 2015 – 16 had well established the ease with which the participants had adapted to the Jugaad Lab and its way of teaching and practical experiences of making science based projects. Similar trend was seen in 2017 where the participants took to the classes and curriculum, as well as making projects of everyday use. As in the previous year, participants noted that the team here is not verbally harsh with them and there is no form of punishment. The easy way of explaining concepts and constant revision with videos and worksheets were a new way of learning for them which they appreciated. They enjoyed the exposure visits and project work the most. In response to my question about their favourite aspect of the Jugaad Lab, all girls unanimously said that working on projects was the best part of the Lab. They listed all the projects that they worked on with the solar lamp and trolley for school bags being in everyone's list.

Some other experiences were also similar to that of the previous year. Girls shared that they were initially scared to handle electric equipment such as soldering machine as they had never

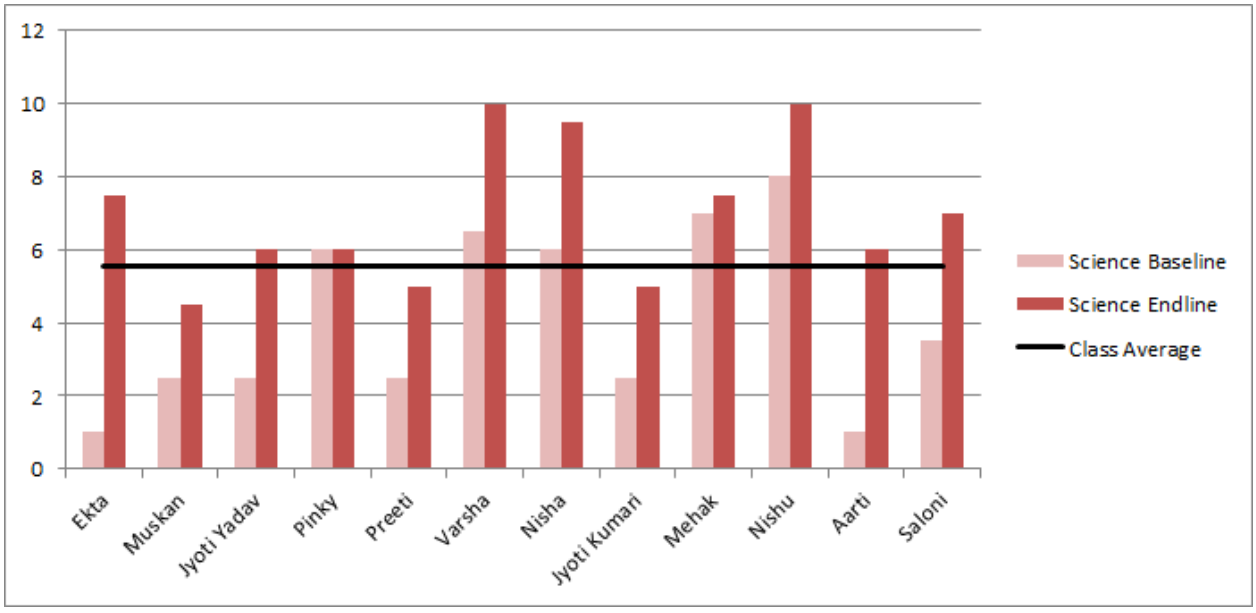
seen, nor handled such items earlier. The team encouraged them to use such machines and they gradually overcame their fear. Exposure visits not only provided an outing for the participants but they were curious to observe and some even asked questions. The team shared that a group of participants asked while taking the tour in the planetarium was curious about how can the astronauts wear such heavy clothes in the space? Also, during the visit in Veethre factory when the students were asked to take off their slippers and wear the slippers provided by the staff while entering in one of the R&D section for safety purpose, participants kept asking the reasons for doing so and what will happen if somebody enters in their own footwear?

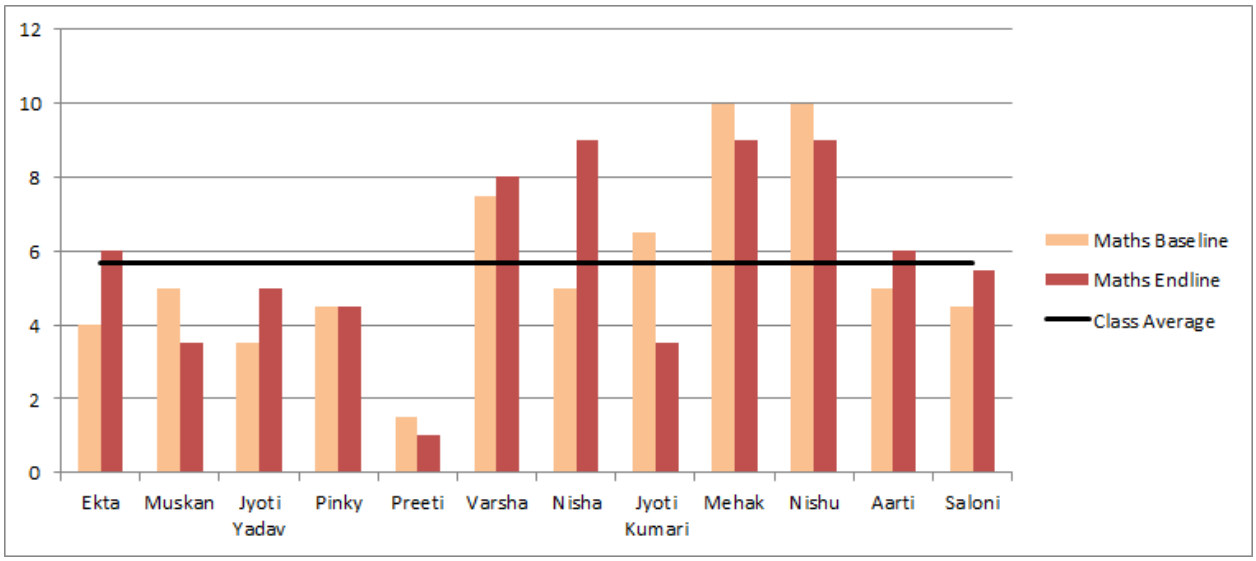
Support was also provided by the funding agency to build on the team's understanding of informal STEM education. Learnings from interaction with different organizations doing similar work and opportunity to attended workshops to enhance their skills to teach STEM in a fun way were incorporated in terms of curriculum. A workshop on learning disabilities enabled the team to identify different strengths of all participants instead of focusing on quantitative assessments.

Moving ahead

Participants' progress was mapped across a range of parameters with the baseline and endline being one of them. A reading of this data shows only a few girls showed an improvement in math while almost all showed an improvement in science.

Baseline and endline data of science and math





But this data shows only part of the change and needs to be read along with the performance in class through the course of the programme in terms of the grades scored in the worksheets after every lesson was completed, the level of interest and participation in the lesson, and the level of interest in the practical classes where participants learnt to make something based on everyday science. With reference to the worksheets, almost all students scored full marks in science (only two worksheets) whereas the variation in math was much more. It needs to be noted that most students scored consistently high marks in the math worksheets as well. A discussion with the team on the difference between endline and the scores of the worksheets revealed that the only reason can be that the topics are fresh in the minds of the participants after a particular lesson while doing a worksheet but the topics were not so fresh in their minds when doing the endline.

The following table maps the progress of each participant along the different parameters that were recorded for each one of them.

Participants' progress

S. No.	Name	Observations based on documentation and interaction with them (in some cases)
1	Aarti	Showed a remarkable improvement in science endline and worksheets, and also showed high level of interest and performance in activities.

2	Ekta Kumari	Remarkable improvement in science endline and above average performance in worksheets. Also showed high level of interest and performance in activities.
3	Jyoti Kumari	Improvement in science and gradual improvement in participation and interest in events. Consistently good performance in worksheets.
4	Jyoti Yadav	Improvement and consistent high level of participation and performance across board.
5	Mahak	Not much change in the endline (above average) but consistently high level of participation and performance. Consistently good performance in worksheets.
6	Muskan	Showed a mediocre level of performance and interest through the course of the programme. Her performance was affected as she was irregular. But her performance in the worksheets was above average. She came as a very shy person and opened up a bit.
7	Nisha	Showed an improvement in terms of the baseline and endline. Attended all activities with a high level of interest and participation, and scored high grades in the worksheets as well.
8	Nishu	Achieved high scores across the board (with the exception of the math endline)
9	Pinki	Showed no change in the baseline and endline but scored high grades in all worksheets. Consistent good performance in worksheets.
10	Preeti	Showed an improvement in science with a mid- level of interest and participation in events but was above average in her performance of worksheets.
11	Saloni	Showed an improvement in the endline and was consistent in her performance on the worksheets. Her level of interest and participation in events showed a consistent improvement.
12	Varsha	Attended all activities with a high level of interest and participation, and scored high grades in the worksheets.. And showed an improvement in terms of the baseline and endline as well.

Challenges identified by the team:

- Internal reorganization of responsibilities owing to ill-health of Gayatri Buragohain, the Executive Director of FAT, led to two team members giving less time to the Jugaad Lab as they were also assigned organizational roles. One team member was primarily responsible for facilitating the classes for L 1 with guidance from the other Jugaad Lab team members. The other two team members planned the classes with her and built her capacity wherever required.
- Students from a particular community stopped attending Jugaad Lab due to a backlash from one of the communities linked to two older students' (who had attended other course at FAT) refusal to get married at an early age. Parents stopped sending their daughters to FAT as they their parents envisaged that these young girls would also take similar steps in the future. Though this incident affected the older students at FAT more, eight students of Jugaad Lab also became irregular during the summer holidays. The FAT team had to visit the community regularly to remove the misconceptions of what is taught at FAT and regain the trust of the parents. Even the Jugaad Lab team had to visit a few parents regularly to convince them to send their daughters regularly. A meeting with the parents was organized at FAT on July 25 to discuss what is taught at FAT; clarify their doubts; share the timings and rules of the Jugaad Lab; and show the different spaces at FAT to the parents. After this meeting, of the eight girls who had become irregular, five[2] became regular again.
- Tuitions are generally given a priority over Jugaad Lab by the parents leading to participants not spending adequate time at the Lab or being irregular. The team had to constantly meet the parents to reiterate the difference between tuition and the Lab – and request them to allow their daughters to attend the Lab regularly.
- The distance between the different communities and FAT deters parents from sending their daughters to the Lab. In some cases, it is not only the distance but crossing a busy road, crossing other neighbourhoods, and crossing a *nullah* (flowing sewage water) all posed a problem. Most girls came together and if one is not attending the Lab on a particular day, other girls from the area would also not come. Though FAT paid for and arranged their transport back home, it solved only part of their problem.
- The team felt a tremendous human resources shortage not only for facilitating the classes but also in terms of organizing the rickshaws for the girls, procuring material for the workshops, and organizing them as well.

[2] One girl relocated to the village; one was not allowed by her brother (reason not very clear); and the third one was not allowed as her family thought that the way to FAT is not safe.

- The team also felt the need for a counsellor in some cases while dealing the participants as none of them had the training or understanding to counsel the concerned participant.
- In response to my question about the detailed documentation undertaken this year, the team was of the view that it was a very time consuming process. On further probing, they shared that only few documentation processes were used by them in their planning processes or as a reflection tool. One use cited by them was of the attendance records which were analyzed to see the topics missed by specific students and accordingly plan the revision exercises. This aspect will be discussed later in the section on Way Forward.

Achievements identified by the team

- The team thought that their ability to hold classes and complete the curriculum in spite of challenges was one of their main achievements. As mentioned earlier, a reallocation of their roles and responsibilities implied that two of the team members could not give as much attention to the L 1 as was initially planned. This provided an opportunity to one team member to become an independent facilitator and with hard work and support from the other team members; she was able to fulfill the role.
- The team was able to build on the experiences of 2015-16 and use the curriculum and experiences in a systematic way instead of ad hoc lesson planning.
- The team was able to identify the strong points of all participants as well as areas where they needed to focus. This could be in terms of studies or behaviour. For example, they identified the participants' strength in science and/or math; preference to work on projects over regular curriculum; hesitation to participate or interact with anyone in class; the different ways in which each student grasped concepts and various aspects of the curriculum; and the learning capacity of each student.
    - They were able to break the fear of handling any kind of electric equipment. The example given was that of the soldering machine. In the larger scheme of their aims, the team enabled the girls to also make small projects along with learning science and math. The team was of the view that they could address the main issues that the Jugaad Lab had set out to do.
    - With the exception of a couple of girls, all participants asked questions in class and clarified their doubts.
    - The fact that all participants are now looking forward to L 2 is viewed by the team as an achievement as the participants have an interest to learn science and math further – not only in terms of the school curriculum but the hands on experiences as well.

- Parents are committed to sending their girls learn to Jugaad Lab. The regular interaction with parents in the community and their visits to the Lab has given clear indications to the team that they are pleased with the progress of their daughters. This is an important achievement for the team as they are of the view that they had to constantly explain the difference between tuitions and their way of teaching. Parents were impressed with the products made as part of the projects. The interaction with the parents after the incident in the community convinced the parents to send their girls back and regularly to the Lab was also a step towards positive relationship building. My interaction with the parents indicated that they are convinced about the safety of their girls at the Lab, the fact that it is an all-female space, the girls learn to make useful products, and learn science and math as well.

Way forward

- This year the team regularly filled a series of monitoring documents beginning with baseline and then finally doing an endline. Baseline was undertaken not only in science and math but also to understand participants' short term goals, the people they are close to, the situations that bother them, and insights into their understanding of gender. In addition to these, the team noted the level of interest and participation, in workshops and classes (also performance in classes). Detailed observations about interaction with their peers, facilitators, and also the guest facilitators were made. Though all these documents have been regularly filled, the team and the organization needs to discuss internally whether such time consuming processes are essential if they are not used in mapping the progress of each participant and identifying areas where they need to focus. Discussions with the team reveal that often the scores were given after an internal discussion – hence there was a discussion on each participant.
    - The team's reflections on each participant during my interaction with them clearly reveals that they have discussed the progress of each participant – both in terms of academic achievements and projects, but also recognize the change in terms of self-confidence and each one's special ability. It is important to now discuss whether such detailed documentation is useful or not.
    - Given the small number of participants, in the next batch, the team can focus on individual participants and have person specific plans. The first step would be to focus on the short term goals identified by the participant and remind them to take steps towards fulfilling that goal. Small yet important steps such as writing a date on the sheets would help them identify whether they are getting closer to the goals. Similarly, the team needs to ensure that the forms are complete. All monitoring formats need to be looked at as representing the whole picture of

the participant. There is a need for reflection on why participants fared better in the endline of one subject and not the other?

  - How will they use endline – is it just an indication of progress or will be used as a baseline for the same participants as L 2? Once these participants join the next level of Jugaad Lab, the endline can be used as a starting point for planning the next level.

- Discussion with the team and at the organizational level revealed that the present batch would move to the next level but there would be no new induction to L 1. My interaction at the community level showed that a few parents are eagerly waiting to send their younger daughters/ or nieces to the Jugaad Lab this year. Though this is a pilot phase of the Jugaad Lab, it would be appropriate to give prior notice to the community that the L 1 would be discontinued.
- The interaction between parents and the Lab team should continue in a systematic manner and not be limited to being need based. My interaction with the parents indicated that they are convinced about the safety of their girls at the Lab, the fact that it is an all-female space, the girls learn to make useful products, and study as well. Most mothers that I met were not educated and voiced that since they were uneducated; they want their daughters to be educated. Some of the fathers also shared that they will continue to provide for their education related needs. Regular interaction will keep the communication channels open.
- One of the initial plans of the Lab team was to address social issues of gender and social inequality as well. This was not done as they could initially not find an appropriate facilitator and after the community incident decided against addressing these issues in the Jugaad Lab so that parents do not doubt the intent of the team. This is a delicate issue when dealing with young girls and especially when combined with their complex backgrounds with interplay of rural linkages and low – income families. This aspect has to be thought through both by the organization and the team. Experts working on such issues with young girls can be consulted and then these issues can be introduced at a later stage, and not L 1.
  - Issues such as these can be introduced in a subtle manner in L 1 but addressed at length in L3. This is possible when the three years at Jugaad Lab are viewed as a whole and there is continuity in terms of the social issues addressed over the years. At a later stage, perhaps in L 3, the purpose behind Jugaad Lab can be explained to the participants in terms of social injustice and gender. This can also then bridge the gap between what FAT set out to do in terms of gender justice and the way in which the participants and the community perceives Jugaad lab – a place which teaches science and math in a fun way to young girls from low income families. Only then can FAT come close to the end goal of girls becoming

leaders and innovators to solve STEM related problems of the community and go ahead with STEM education. The planning and execution of the programme in L3 will now mark the next phase of Jugaad Lab.

- The different programmes of FAT bring in a range of experiences for the respective team. Finding a way to interact and learn from each other on issues from documentation to effective styles of teaching would benefit them.
- Capacity building trips and workshops benefitted the team. They learnt about new ways to teach the curriculum and do the projects. In addition, a deeper understanding of different ways in which young people learn helped them to work better as facilitators. Such exercises would continue to benefit them.

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